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Program 1: Transforming Sheep and their Management

Project 1.2: Reproduction Efficiency

Project 1.3: Improved Parasite Management

CRC for Sheep Industry Innovation

Executive summary

In this study fifty semi-structured interviews were carried out across Australia, within the Sheep CRC partner organisations. The interviews targeted farms that incorporated sheep in their enterprise mix. There were nine interviewers that covered four states; W.A., S.A., N.S.W. and Vic. and included all of the major recognised sheep growing zones. From the interviews case studies were compiled that contained the management practices of sheep farming enterprises, specifically concentrating on the areas of reproduction and parasite management.

The aim of this study was to determining if respondents could be generally categorised to identify 'homogenous' groups. The intention of identifying these homogenous groups was to identify for whom, if anyone, a compelling product could be developed in the management practice areas focused on.

For the reproduction area the aim was to reveal opportunity within the respondent's cases for farm management practice changes that would result in an improvement in lamb and weaner survival. Achievement of this aim was to assist in the achievement of the Sheep CRC outcome of a 10% increase in the net reproduction rate and/or productivity in more than 20 % of Australian ewes (CRC, 2008).

For the parasite management area, the aim was to identify respondents that could be engaged in the Targeted Treatment system for combating the ongoing problem of developing drench resistance in sheep and by doing this identify farms that through engagement with the CRC might contribute to the achievement of the CRC outcome of a 10% increase in the productivity of 30 % of farms.

The interview analysis resulted in the collection of information primarily detailing farmer's current management strategies for reproduction, parasite management and scanning practices (as a part of the reproduction area).

For the management areas focused on within the study the information collected revealed that many of the practices that have been promoted as strategies that can be used to improve sheep reproduction and parasite management are currently being employed at some level by the respondents. These areas included:

- Maintaining condition score of sheep (particularly ewes)
- Managing rams and ewes at joining
- Applying breeding pressure
- Providing shelter at lambing
- Use of predator control
- Use of supplementary feeding
- Internal parasite control systems in place utilising accepted infection and drench resistance measures

Within the focus of the reproduction interview, the major theme that was revealed was a focus on the management of nutrition and condition of sheep as a strategy for taking advantage of reproductive potential and ultimately improving lamb and weaner survival. This theme was apparent in the majority of the cases, with a small number of cases where a focus on condition and sheep nutrition was not obvious, and at the other end of the spectrum a small group existed where the focus on sheep nutrition and condition was apparently

driving the productivity of the sheep enterprise. This information was combined with the information identifying respondents that use scanning for determining ewe pregnancy. In this way a model was identified encompassing a group of respondents likely to be engaged by management strategies to improve sheep reproduction outcomes, which involve the use of scanning technology and focus on sheep condition and nutrition.

As for the reproduction interview focus the internal parasite interview focus resulted in a compilation of strategies, from the cases studies, on this management area. This included evidence of a prevalence of the use of currently recognised laboratory tests for faecal worm egg count and drench resistance test as tools for managing internal parasite management. From analysis of this compilation it was also evident that in most cases there was a parasite management system in place that was tailored to the individual farm context. Never the less the response to the proposal of taking on the Targeted Treatment system was promising in that more than half the respondents were willing to consider the proposed system.
From the case study information a model was proposed identifying respondents likely to respond favourably to the idea of being involved in the ongoing research development and possibly adoption of the Targeted Treatment system. The caveat to the model was the reservations of many respondents based on concerns of production losses and /or fear of the possibility of parasite management system failure should a Targeted Treatment system be adopted. These reservations may need to be addressed if cooperation and engagement of farmers is to be successful.
Opinions on future possible solutions to the problem of internal parasite management included genetic selection and new chemicals. However these suggested solutions were seldom mentioned in isolation of other currently employed management systems, including drenching regimes that included pasture management and animal nutrition management. In a small group of cases where animal nutrition was noted as driving the productivity of the sheep enterprise there was also a belief this focus contributed positively to the management of internal parasites.
It should be noted that this study is not definitive. Obtaining more certainty in the validity of the models proposed here is recommended and the possible methods for obtaining that validation are available through examination of methods applied to similar studies conducted within primary production. In addition, the information collated during this study remains available for further interrogation, validation back to the respondents, or cross validation with other sources.

List of project participants

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Introduction and Aims

This study is part of the Sheep CRC Program 1 and deals specifically with market research, the results which were to be used to assist in the adoption of research with projects 1.2.1 Reproduction Efficiency and 1.3.1 Improved Parasite Management. The intention of this research was to achieve meaningful market penetration of the sheep farming industry in order to identify the target customer, that being one that has the attributes of the "Early Majority" (Rogers, 2003). These individuals are typified by a profile of "pragmatic SME business operators seeking low risk safe improvement to their business performance" that want practical, compatible solutions that deliver return on investment.

This study is fundamentally market research, that is, social science techniques applied to gather record and analyse information which, in this case, was focused on understanding customer behaviour as it might influence the design and the communication of product. The intention of this research was to locate a "Beach Head" (Moore, 2007) or a foothold in the Early Majority market (Rogers, 2003) which will lead to the development of a compelling product proposition that meets the identified need of specific market niche in the Early Majority Market. As previously stated the current study was focused on the CRC priorities of Reproduction Efficiency and Parasite Management.

In the case of Reproduction Efficiency the goal of the CRC is, through improved management and selection of ewes, lambs and weaners to achieve a 10% increase in the net reproduction rate and/or productivity in more than 20 % of Australian ewes (CRC, 2008). This goal is embedded in the outcome of achieving a 10% increase in the net reproduction rates in 25% of Australian ewes (CRC, 2008).

For the Improved Parasite Management area the aim is to achieve a 10% increase in the productivity of 30 % of farms. The focus of the market research for the Improved Parasite Management project was to assist in the development of the "Targeted Treatment" concept, a sustainable basis to routine worm control recommendations based on limiting drenching to animals likely to benefit from treatment (CRC, 2008), is the focus of the current market research and contributes to the achievement of the overall CRC outcome.

Specifically for the Reproduction Efficiency the current study concentrated on obtaining answers to a series of questions (appendix 1) focused on identifying the current practices of the respondents. There was no clear management strategy either promoted or investigated within the interview process associated with Reproduction Efficiency.

In the case of Improved Parasite Management the strategy of "Targeted Treatment" (CRC, 2008) was pointedly investigated within the interview process, this was in addition to questions that were intended to ascertain current practices employed by the respondents. It is important to note that the approach for taken for the two major themes of interview were different and consequently the information collected from the respondents is directed by this interview question structure.

Considering the different approach applied for the Reproduction Efficiency and Improved Parasite Management issues, the aims of this study were, through the collection collation and subsequent analysis of information from semi structure interviews; identify characteristics of customers that can be used to identify homogenous groups and through that process identify for whom, if anyone, a compelling product* can be developed?

**A compelling product must have relative advantage – i.e. it must be better than the current practice and it must be compatible with the currently used management system. In addition if it is disruptive of the current system or even if it is a relatively non disruptive change is best to be not complex, have high tialability and result in benefits that are easily observed and communicated (Rogers, 2003).*

Methods

This market research covered four major sheep producing states and included the zones as classified by *Lifetime Wool* (Web site):

- Medium Rainfall Sheep Zone – W.A.
- Cereal Sheep Zone – W.A, VIC, S.A.
- High Rainfall Sheep Zone – VIC, NSW.
- Northern Tablelands Sheep Zone – N.S.W.
- Southern Slopes Sheep Zone – NSW, VIC.
- High Rainfall Zone - SA

The interview team included 9 individuals: 3 from Western Australia; 3 from South Australia; 2 from New South Wales and; 1 from Victoria (Table 1.).

Zone	Number of respondents	Number of interviewers
Medium Rainfall Sheep Zone – W.A.	13	3
Cereal Sheep Zone - WA; Vic; S.A.	13	5
High Rainfall Sheep Zone - Vic; NSW.	6	2
Northern Tablelands Sheep Zone – N.S.W.	5	1
Southern Slopes Sheep Zone - NSW; VIC.	7	2
High Rainfall Zone - SA	6	3

Table 1. Farming zones covered by the interviewers and the number of respondents covered by each set of interviewers.

The data collection technique employed in this research was a “Hybrid Model”, based on the principles of ethnographic research. It had similarities with ethnographic research techniques in that the aim was to carry out:

- Social science research based on studying people’s behaviour in everyday contexts, rather than under controlled or artificial conditions.

- Informal, semi-structured conversations including observation of the subjects in the environment in the enterprise setting, but not necessarily during production operations.

- Open ended-enquiry and utilising observational techniques

- An examination of the entire adoption (farm) context (and the aim was to document that)

During the current study it was also intended that the data collection process be open to change and refinement. However the capacity to refine the interview process was constrained by the difficulties associated with the broad scope of the subject matter investigated and the difficulties communicating within a large team spread over several states and institutions.

Locating respondents

Snowball Sampling:
It was the intention of this research to employ Snowball sampling in order to obtain a sample of respondents from the target audience. Snowball sampling (Cooper and Emory, 1995) is not necessarily based on probability sampling and in the current study it was not. The basis of snowball sampling is that the respondents are located through referral networks (Cooper and Emory, 1995) and the beginning respondents identify others who possess similar “characteristics”. Using this sampling process the recruitment of respondents will snowball within the ongoing referral process.

Respondent Sampling:
The intention of respondent sampling is to use networks in the group of interest to identify, in the case of the current study, “early majority” (Rogers, 2003) type producers. The effectiveness of this sampling technique for identifying groups with in the community of respondents will is dependant on obtaining a suitable sample size. Although Respondent sampling was proposed to be applied to this study the method that was finally applied and the number of interviews conducted were inappropriate for this technique.

Engagement of Respondents

Initial contact was made and a brief explanation of what the research entailed and why it was being carried out was explained. If the potential respondent was interested further information was then provided. This was followed up by an arrangement to meet prior to an assurance of anonymity of the results and the understanding that a prepared "case study" would be sent to the respondent for comment, prior to their responses being included in the study results.

Following that:

- The interview was conducted and a draft case study compiled from the responses
- The draft case study was sent to the respondent for comment and clarification of responses was obtained. Further relevant or missed information was also collected at this point
- Case studies were then redrafted in light of comments ands any additional information
- The final draft of the Case study was then sent to respondent for final comment and approval

Interview Technique

Interviews were intended to be conversational with broad questions used to generate and stimulate discussion about the issues. Open enquiry methods were intended in order to produce new information. However, within this interview technique it was necessary to cover certain topics and specific questions. In order to achieve this, a semi structured interview protocol was provided to each interviewer. This protocol contained questions relating to specific areas of interest to the Sheep CRC which included:

- Reproduction Efficiency issues
- Internal Parasite Management issues
- In addition questions on the use of scanning technology were asked.

In this way, and with this issue focus, the case studies were compiled from the interviews with the intention of providing in-depth information, derived from the respondent's comments and the interviewer's observations, on the context in which innovation was intended.

The Semi Structured Interview

The interview was directed by pre - arranged question that were provided to each interviewer as a question schedule. This schedule directed the conversation with the respondent and the

semi structured nature also introduced the issues to the respondent**.** The question schedule is included here (appendix 1) however the issues that were introduced during the interview process were as follows:

ENTERPRISE BACKGROUND

BREEDING

Existing Knowledge of Lamb and Weaner Survival
Current Lamb and Weaner Survival Issues
Lamb and Weaner Survival Management
Management Practices that are currently used to Promote Higher Levels of Lamb and Weaner Survival
Stage of Reproductive Cycle and Interviewees Management Practices
Possible Management Interventions
Pre-joining:
Joining:
Pre-lambing:
Lambing:
Marking:
Weaning to Approximately 12 months of age:

PARASITES

Existing Knowledge of Worm Problem
Current and Historic Parasite Problems
Worm Management
Details of Management Practices that are currently used to Manage Parasite Infection
Future Management of Parasites (Used to introduce targeted treatment concept to respondents)

Collation and Analysis of Results

A case study from each respondent was prepared by the interviewer and following final scrutiny of the contents by the respondent submitted as research data. Each case study was analysed with the aid of the qualitative data analysis software NVivo 8 (QSR). Prior to this process a workshop, that included all the interviewers and managers, was held in an attempt to draw out the major themes from the case studies. This process revealed that there was a large volume of information within the case studies and that the themes were difficult to extract using a workshop forum. A model for the Reproduction Efficiency did result from the workshop process (appendix 2) however this model was not found to be strongly represented in the subsequent software assisted interrogation and analysis of the case study text. At the workshop, there was no model proposed for the Internal Parasite Management. Although it was recognised that there was overlap in the case study information related to the two major themes investigated, i.e. strategies for reproduction management and strategies for internal parasite management.

Results and interpretation

With the aid of Nvivo software, information from issues that were evident from the respondent's responses to questions. These responses were then categorised into *strategies* and *thinking* and through the analysis of these categorised data interpretation was carried out as it related to the aims of the study. The *strategies* were identified as indications of management actions and the *thinking* was more focused on the rationale for actions, or opinions on issues or *strategies* that were proposed by the interview format.

The major category headings for the *strategies* were:
Dietary supplements
Don't investigate issue
*Drench resistance measures**
*Drenching**
Dual purpose flock
*Ewe handling**
*Flock structure controls**
*Fly control**
*Information gathering**
*Investigate worm infestation**
*Land care actions**
*Manage rams**
*Manage sheep nutrition**
Nutrition and Sheep Condition focus
*Other worm control**
*Pasture management**
*Reduce sheep numbers**
Risk aversion
*Save resources**
*Scan ewes**
*Selective breeding**
*Supplementary feeding**
Use predator control
*Vaccinate sheep**

The major categories for the *thinking* were:
Assist worm management with nutrition
Happy with performance
*Lamb & weaner loss important**
New chemicals
No enthusiasm
*No explanation**
No good answers available
No problem
No ROI

*Opinion for 30% strategy**
Sheep most important
Solve worm problem with genetics
Worm management is simple but laborious

**Those categories within strategies and thinking have more subcategories under that particular category. Not all categories were included in the interpretation as they may have not been relevant or were to insignificant within the cases to include.*

In addition to the textural information in the categories, information about the respondent's individual cases studies (i.e. farms) was recorded as attributes. Attributes recorded included all information that consistently appeared and was easily extracted and recorded as a numeric value or string. Attributes in this study were all recorded using strings and included:

30% not drenched- Targeted treatment strategy
Check rams
Condition score
Enterprise main focus
Enterprise sheep focus
Farm size
Foxes (Predator control)
Labour units
Lupins to rams
Marking rate
Number of sheep
Rainfall
Resistance test
Scanning
WEC (worm egg count)
Zone

The categorisation of the case studies by *attribute* was possible and this information has been presented for each *attribute* as a separate report (appendix 3). As the basis of the measure for the attribute marking rate has not been standardised throughout the cases, this attribute was not generally been applied to the interpretation of the case study information; where it has it should be noted that a consistent measure was not applied for this attribute for the cases.

Increased lamb and weaner survival

Under the *strategies* information it was apparent that many of the respondent's case studies indicated that they were employing management strategies that would be expected to maximise reproductive efficiency. This was noted under the information covered in *strategy* categories such as:

*Ewe handling**
*Manage rams**
*Selective breeding**
*Supplementary feeding**

Use predator control
*Vaccinate sheep**

*Manage sheep nutrition**
Nutrition and Sheep Condition focus
*Scan ewes**

Information collected under *Ewe handling* was divided into subcategories. These subcategories indicated that at lambing over half the respondents provided shelter of some sort and over a third of the respondents assisted ewes at birth. However it should be noted that assisting ewes at birth was related to monitoring ewes at lambing, which was seen as an intervention that could be positive or negative when viewed as a strategy for improving lambing rate, e.g.

"Monitoring of birthing – have a quick look only".

"Ewes are checked daily, if ewes are seen that are down or are having trouble lambing assistance will be given. However it is still seen to be a relatively hands free operation"

Both comments from different respondents indicate regular monitoring activity but at the same time a reluctance to interfere with lambing ewes.

The *Manage ram* category indicated that almost all the respondents check their rams or have a veterinarian do a check prior to joining and this is confirmed in the attribute table (appendix 3) which indicates that over half of the respondents check their rams with the remainder either not providing a response or indicating that they do not do a check.

Under the selective breeding category there were a number of sub categories including: *Breeding for resistance; Breeding for survival; EVB; Reduce fibre diameter; and Visual selection,* however individually theses subcategories did not cover more than one fifth of the respondents. Alternatively the subcategory *Breeding pressure applied* was noted in almost half of the respondent's cases. This subcategory contained information indicating that the farmers culled sheep based on their lambing success. The decision on which sheep to cull was not consistent across the respondents however the response that was most commonly indicated was that maiden ewes (particularly merinos) were not culled until they had two opportunities to produce a lamb. This strategy is reflected in the response below:

"Dry ewes from the prime lamb flock are sold; the SRF ewes are given a second chance."

The *strategy* category *Supplementary feeding* related directly to questions focused on reproduction. In this study the term "Supplementary feed" describes feed in addition to that available from pasture in the paddock. This category also contained subcategories which included; *Don't Feed ewes supplement; Feed ewes supplement; Feed rams supplement; and Feed." weaners supplement.* There were very few respondents that clearly indicated that they did not feed ewes a supplement. Alternatively almost two thirds of the respondents

indicated that they do feed ewes a supplement diet and half the respondents indicated they feed their rams a supplement diet. Just over a third of the respondents indicated that they feed their weaners a supplementary diet. Overall less than a fifth of the respondent's cases did not indicate some form of supplementary feeding practice. The majority of those respondents that indicated they fed ewes a supplementary diet also indicated they also either feed their rams or weaners a supplementary diet. Not surprisingly in the attribute table (appendix 3) the majority of those that indicated they use scanning also supplementary feed their sheep (ewes, rams and weaners).

The degree to which the supplementary feeding practices recorded in this study might result in a negative return on investment (Lloyd, 2008) is beyond the scope of this study however if the use of supplementary feeding was promoted to improve lamb and weaner survival more information on the current feeding practices of farmers may be required.

The *strategy* category *Use predator control* and the attribute summary "Foxes" (appendix 3) indicate that just over half the respondents use some form of fox control in an attempt to reduce lamb losses. This consists of baiting, shooting and, in a small number of cases, both. In cases (almost a third of the respondents) where there was not a predator control measure in place there is no obvious indication of why predator control was not used. Interestingly in every recorded level of the attribute "marking rate" (appendix 3) approximately half of the respondents in each marking rate category indicated that they used some form of fox control.

The *Vaccinate sheep* category held three subcategories: *Vaccinate weaners; Vaccinate;* and *Vaccinate lambs*. The practice vaccination of sheep was noted in the majority of respondent cases. Lamb vaccination was most prevalent followed by sheep and weaners and the generally wide use of the practice is desirable from an animal health and subsequently survival particularly of lambs and weaners. More specific details of the vaccination used are held in the case study data however that information was not examined or report here. If this information is needed or considered important it can be extracted and interrogated as required.

A theme that was evident throughout the case studies was *Nutrition and Sheep Condition focus*. The majority of the respondents made mention to some level of focus on the nutrition and condition of their sheep when asked about reproductive performance and in some cases management of losses due to internal parasites. An example of this thinking that was particularly focused on sheep nutrition was:

"*Sheep nutrition was seen to have a higher priority than worm management and was the key to the sheep system. Through having better sheep nutrition it was believed worm management was made less of an issue as sheep were less susceptible to worms"*.

This was not to say that the majority of the respondents were this focused on nutrition as a driver to sheep production but it was evident that there was a general recognition of sheep condition and nutrition management as a means of improving lamb and weaner survival and the productivity of the sheep enterprise.

Following this nutrition theme, the *Manage sheep nutrition* category contained several subcategories including that referenced information on: *Lifetime ewe management (LTEM); Maintaining condition score of ewes, rams and weaners; Managing ewes on condition differentially; and Manage twining ewes.* The *LTEM* was not a prominent theme in that the program was not named very often within the cases however the principles of sheep Condition Score (CS) monitoring and management (a principle theme within that program) was regularly referred to. The subcategory of *Maintaining CS of ewes* was referenced within the majority of respondent cases. However this was predominately referring to visual scoring rather than "hands-on" scoring, with approximately half the respondents indicating that they used visual assessment and the rest either using hands-on scoring or not using CS at all. The subcategories related to differential management of ewes on CS and management of twining ewes was mentioned by a small proportion of farmers and not surprisingly the cases where farmers managed twinning ewes, was also included in the attribute summary report indicating that farmers used scanning (appendix 3).

Independent of the attribute summary for scanning, information gathered under the category *Scan ewes* had the subcategories *Not to scan; Scanning for conception multiples; Wet and dry check ewes; and Scanning for pregnancy only*. The *Not to scan* subcategory covered almost half the respondent cases and held information that pertained to those that did not scan at all and those that chose not to scan regularly based on management reasons that may change over time. That is a proportion of those that indicated they did not scan did so in poor years, for example;

"*The flock is only scanned in very poor seasons, when it is necessary to cull unproductive ewes. Even when scanning is undertaken, twins and singles are not differentially managed".*

Other reasons for not scanning included no Return On Investment (ROI), No enthusiasm, and happy with current practices and performance (Figure.1). An example of a *No enthusiasm* response was:

"Does not pregnancy scan - so is unaware of the conception rate. Scanning is regarded as just another job".

Outside of these *Thinking* subcategories, there were other cases where specific reasons for not scanning were not elaborated in the cases, other than noting that the practice was not used.

It is noteworthy however that the case quoted above dealt with the question (i.e. *issue*) of conception rate and the respondent acknowledged there was no accurate measurement of reproductive performance because scanning was not used. In addition, accurate statements of conception rate were noted in the cases of those that did scan when for information around the same issue:

"The owner believes 30% of lambs die/go missing at lambing – 2 days; he doesn't know where they go but knows this occurs from scanning information".

The *Scanning for conception multiples* subcategory was noted in just less than a fifth of the respondent cases and not surprisingly was linked to the subcategory *Manage twining ewes*. The relevance of this connection being that scanning for multiples, managing twins and supplementary feeding were all practices that were associated with each other and indicated a higher level of stock management utilising these practices.

The same proportion of cases as for *Scanning for conception multiples* was noted in the subcategory *Wet and dry check ewes* and this practice was generally used to identify "dry" sheep for culling. Those noted in this subcategory were not recorded in any of the scanning subcategories but were included in the *not to scan* subcategory. This hands-on wet and dry checking of ewes is an alternative practice to scanning.

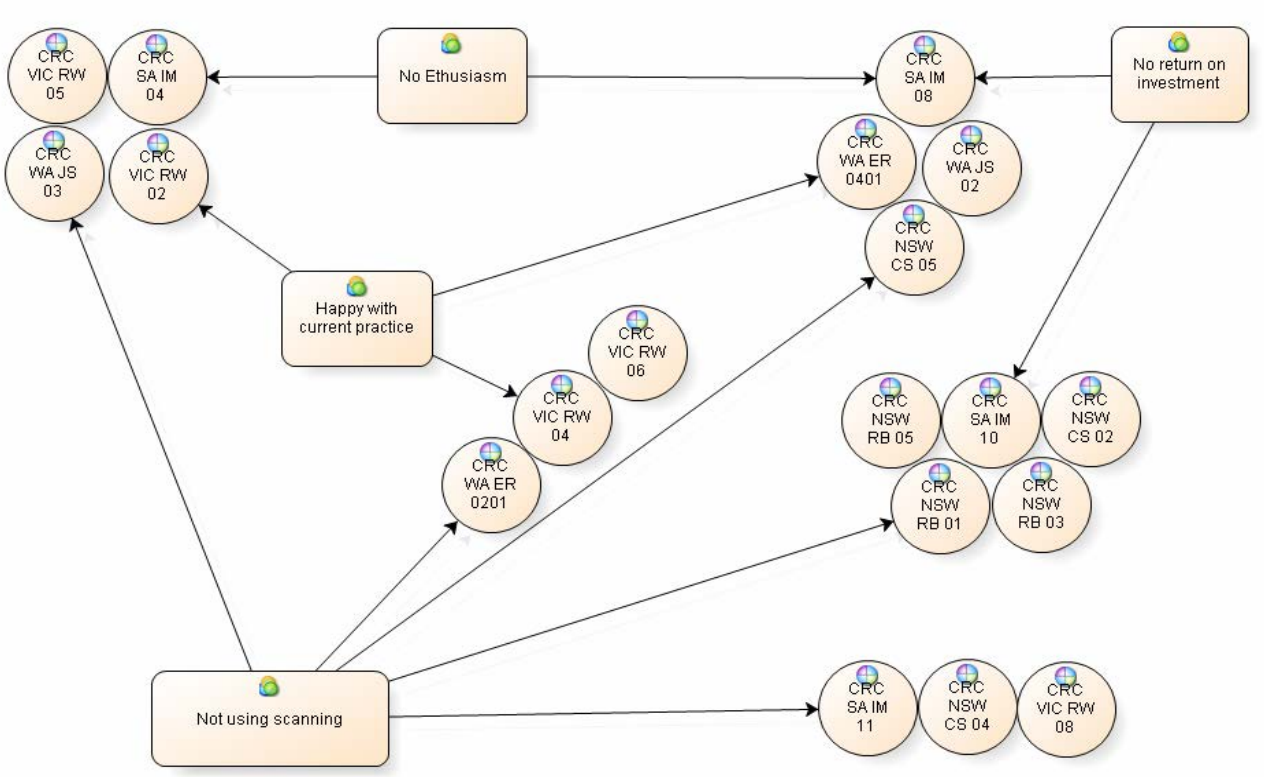

Figure 1. Model showing links between respondent cases and *Strategy* subcategory *not to scan (Not using scanning)* with the *Thinking* categories *No enthusiasm, No return on investment, and Happy with current practice.* Case circles with no link to *Thinking* categories did not include explanations for not scanning.

The subcategory *Scanning for pregnancy only* accounted for just under half of the respondent cases. This subcategory in combination with the *attribute* Condition score – but only visual (appendix 3) were used in the model (Figure 2). The model identifies a group of farmers that have been typified as those with a strong potential to be motivated to take management changes to improve lamb and weaner survival of their sheep. The rationale for this model is the those farmers that are aware of the need for attention to the condition of their sheep in the context of reproduction, and those that are prepared to embrace new technology that will allow them to measure the reproductive output of their sheep, compared to the reproductive potential, are identified. It follows that the group identified in the model is likely to be interested in improving the use of these management tools (i.e. Condition Scoring and scanning technology) to better realise the reproductive potential of their sheep.

In addition those that only scan or visually condition score are also indicating a management focus on improving the management of the reproductive output of their sheep and are very likely to be interested in management practices that they could implement to improve this area of farm management. It should be noted at this point that the model in Fig. 2. was based on the data available from this study and should be cross checked and validated within the larger farming population. That said, examination of the model using the attribute available in this study indicate that the model exists across the attributes Zone, Farm size, Enterprise focus (appendix 3).

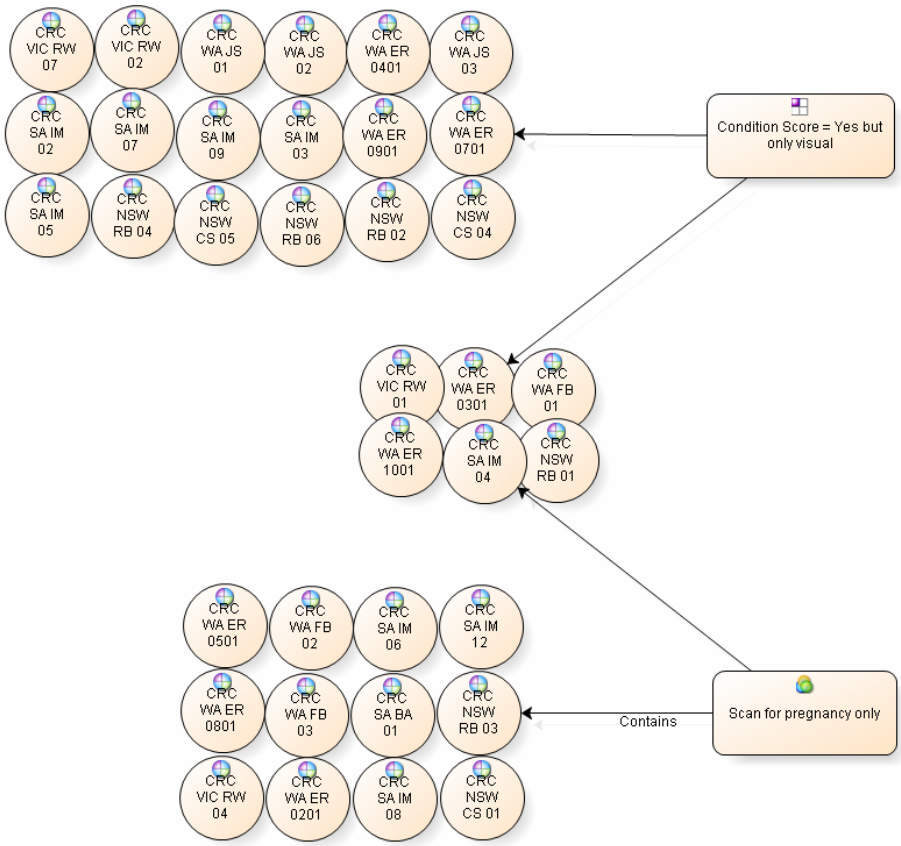

Figure 2. Case study generated Respondent Model: Each circle represents a respondent case (farm). Arrows indicate connection between the attribute - farmers using visual condition scoring and *strategy* category - *scan for pregnancy only*.

Improved Parasite Management

As stated previously the approach to the investigation of Improved Parasite Management was different to that used for Reproduction Efficiency. They were similar in that both used semi structured interviews however for the Improved Parasite Management a strategy for Targeted Treatment was proposed within the interview as a hypothetical management strategy that respondents were invited to make comment on. For this reason the *Thinking* categories were used to record the information generated from this line of questioning. This was appropriate because the answers to the Targeted treatment hypothetical questions were not actual management strategies that were currently employed on the respondent's farm. The actual hypothetical questions posed to the respondents were different for the different areas. For the *Haemonchus* dominant regions the explanation was:

Under this program, instead of drenching all flocks on the farm when a drench for Barbers Pole Worm is considered necessary, you would decide which flocks needed treatment and drench only those. The decision on which particular flocks would be drenched would be made using a "drench decision aid" – a ready-reckoner or small computer program which

uses information on the flock worm egg count and factors such as sheep age, condition score, recent rainfall etc, to indicate the risk of Barbers Pole Worm problems and best-bet drench type to be used. This requires worm egg counts to be taken from flocks at intervals during the "Barbers Pole Worm season", and it is likely that an overall saving of drenching will be made, and even if a similar number of treatments turn out to be necessary, the staggered drenching pattern will have a significant effect in reducing the development of drench resistance. Research will indicate the minimum need for worm egg counting based on peak risk times, but the effort and cost of worm egg count monitoring will often be offset by the reduction in drenching.

For the mostly winter rainfall areas the explanation was:

Under this program, instead of drenching all sheep in a mob when they are yarded for a drench, you would drench only the individual sheep that appear likely to benefit from it. This is based on the fact that there is a big variation in a mob between sheep that cope well with worms and are not affected by them and those which are not performing as well as possible, probably due to worms. The percentage to be drenched in a particular situation would be indicated by a ready-reckoner, produced from the planned research. It would be based on: 1) the sheep class; 2) a worm egg count before drenching, 3) the average sheep condition score.
For example, for a flock of adult ewes with an average worm egg count of 500 eggs per gram and in an average of condition score 3, research may show us that 30% should be drenched. These individuals would be identified when drenching by visually assessing which 30% in any race load were the poorest sheep and drenching only these.
The program would indicate the best times that a drench decision should be made, say 3-4 times/year, so the worm egg count is only needed then, and usually on only one mob for each sheep class. Further research is planned to indicate the likely percentage of a mob to benefit from a drench where no worm egg count is available.

Response Strategies and Thinking

Independent of the hypothetical responses collected from these proposed scenarios, under the *strategies* information it was apparent that many of the respondent's case studies indicated that they were currently employing a range of internal parasite management strategies. This was noted under the information covered in *strategy* categories, such as:

*Drench resistance measures**
*Drenching**

The major categories for the *thinking* were:

*Targeted treatment strategy**
Solve worm problem - genetics
Solve worm problem - new chemicals

Assist worm management with nutrition

Strategies

Under the *Strategy* category *Drench resistance measures* there were several subcategories including *Drench resistance test, Don't drench all sheep, Drench rotation, and Introduce cattle.* Over half of the respondent cases indicated that they had used a drench resistance test at some time. The attribute summary *Resistance Test* (appendix 3) breaks this down further and also indicates that there were 9 cases where the Parasite Management questions were not included in the question schedule presented to the respondents. With this in mind it is apparent that only approximately a quarter of the respondents had not ever done a resistance test. This is an indication that there exists a general acceptance within the respondent's cases that drench resistance is an issue that justifies the need to have some measure of it in place. In addition to this the attribute summary report WEC indicated clearly that the majority of respondents carried out worm egg counts to assist them in the management of internal parasites in their sheep. That some did not use this tool is perhaps not surprising considering that internal parasites were not considered a problem in some cases.

The *Don't drench all sheep subcategory* accounted for almost a quarter of the respondents cases and held information on those that currently do not drench all their sheep. The responses in this subcategory varied in detail but usually respondents stated that they did not drench a certain percent of their sheep and this could be as high as 20% or down to 5%. There was no apparent reason for the choice of this percentage but the practice was clearly stated as a measure taken to combat drench resistance developing.

"*The producer does not drench the best looking 20% of each adult flock. He drenches the tail, and will spot drench a mob while skipping other mobs*".

"5% of adult ewes are left not drenched; these sheep are then mixed with other sheep later in the year so as to swap worms and slow resistance. The practice of leaving 5% has been in practice for the last two years and started as a result of fear of getting resistance"

Not surprisingly these respondents formed part of the group identified in the attribute summary as either agreeing to the Targeted Treatment concept or agreeing to consider it if production losses were not going to be an issue.

Drench rotation and *Introduce cattle* were other subcategories that were mentioned by respondents as practices they currently used that they understood made a contribution to reducing the rate of the development of drench resistance. However introduction of cattle was generally mentioned in reference to a wish to reduce sheep numbers and animal husbandry labour.

"*The goals with the sheep enterprise are to improve management to decrease the amount of work required (cattle help) and to decrease the number of deaths among young sheep.***"**

Question: Have/would you reduce the number of sheep because of internal parasite problems?
Answer: *"Have already made changes by increasing the cattle enterprise."*

Current drenching practices were mentioned in all the respondent cases with various levels of practice detail included. The information on drenching practices was captured in the category *Drenching* and included the subcategories: *Drench weaners, Drench all sheep, Drenched sheep onto clean paddock, Drench ewes prior to lambing;Clear and white drenches* and *Capsules.*

More than half the respondent cases indicated that they drenched lambs/weaners and just over half indicated that they drenched all their sheep routinely. This included the practice of "summer drenching":

"Ewes are tested in October or November. They are normally drenched regardless of the result (as it is the first summer drench). He still feels the test is worthwhile for the information gained".

"The enterprise has a summer drenching program where all the sheep are drenched regardless of worm burden, thus monitoring is seen as a pointless exercise.
All sheep are drenched in December and January.
Maidens, weaners and Rams are drenched in April".

"It is also difficult to go from the silver bullet that is summer drenching to a fully integrated worm management program".

These statements reflect a point of view on this issue that is seen in many of the respondent cases, that is that they have a management system for internal parasite management that works for their enterprise and there appears an underlying reluctance to disrupt these systems, particularly when they are currently simply to manage.

The practice of drenching ewes prior to lambing was noted in less than a quarter of the respondent cases. This practice was clearly focused on internal parasite management and improved reproduction/lamb survival through the management of worms in lambing ewes. The subcategory *Drench sheep onto clean paddock* includes all sheep that are drenched and then placed in paddocks that have been spelled or previously cropped (stubbles). There was considerable cross over of this subcategory and the subcategory *Drench weaners* which indicated that weaner were most commonly drenched and then placed onto "clean paddocks". Again this practice is likely driven by the issue of internal parasite management and focused on achieving improved weaner survival.

The use of clear and white drenches and capsules was mentioned in a few cases but the relevance to the aims of this study was not determined. That said it is understood that from a

drench resistance point of view the use of capsules is not a practice that is encouraged and was mentioned in very few cases.

Thinking

The questions that formed the issues and subsequent thinking recorded for parasite management within this study were primarily focused on the question of the acceptance of the management strategy “Targeted Treatment.” The responses to this were recorded in the attribute summary report (30% drenched). The information has been recorded under that heading because the question has been interpreted as a proposal to drench 30% of sheep. Although this is not correct, the idea of 30% drenched it is not necessarily a misconception that detracts from the concept in that it was an example only. In any case, the responses to the proposed concept was recorded in the attribute summary report – 30% drenched (appendix 3). This summary indicated that the majority of respondents were willing to consider the Targeted Treatment for use on their farms as a measure for combating drench resistance. When combined with the *strategy* category *Don't drench all sheep* a model could can be proposed by identifying a group that demonstrates the potential to be involved in the Targeted Treatment system research and development (figure 3.). This model is based on the premise that respondents indicating they don’t currently drench all their sheep and have indicated that they will or may consider being involved in the Targeted Treatment system are a sensible group to engage with. The model also includes or can include those that have they are interested in the Targeted Treatment system but have not indicated that they currently don’t drench all their sheep. From the model it can be seen that the contributing respondent are well dispersed by state, however the attribute *number of sheep* I also well distributed throughout the group indicating that farms that hold various numbers of sheep (appendix 3) contribute to this model and more importantly that farms with large numbers of sheep are not necessarily going to be excluded from this model.

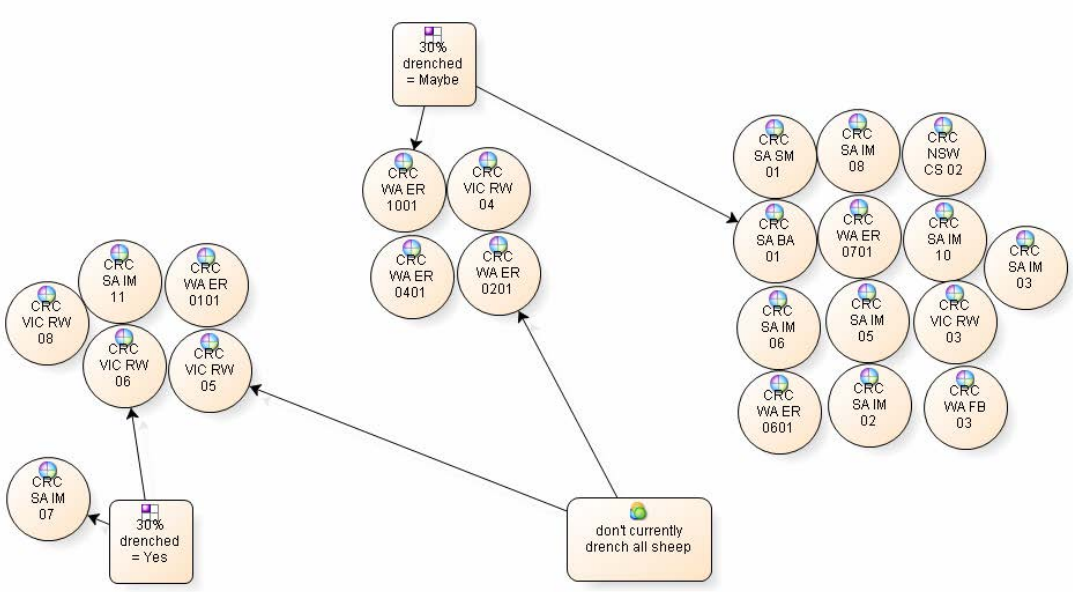

Figure 3. Case study generated respondent model for engagement groups for involvement in Targeted Treatment (30% Drenched): Each circle represents a respondent case (farm). Arrows indicate connections between *strategy* category *Don't drench all sheep* and attributes indicating responses to the proposed Targeted Treatment system, 30% drenched = maybe or 30% drenched = yes.

Notwithstanding the existence of the model it is noteworthy that there were only a few respondents that were prepared to accept the Targeted Treatment system proposal without reservation. The reservations that were apparent were again directed by the interviewer questioning around loss of production. That is, loss of production possibilities were introduced to the respondent as an issue rather that initiated unprompted during the interview process. In response to questioning on loss of production a small number of respondents indicated that they thought there would be a gain or the Targeted Treatment system would result in no change.

"The producer said the drenching 30% program sounds good, but thinks that you wouldn't loose any production with it; you'd be more likely to gain."

Of the rest there were an almost equal number of respondents not prepared to accept production losses as were prepared to accept a loss.

"Production losses were prepared to be inflicted so as to extend the life of current drench types; this would only be in the order of 2 or 3%."

Notwithstanding this there was a fairly clear emphasis in thinking on there not being a production loss to bear if current management practices were to be changed.

Within this area of enquiry there was also the issue raised on what respondents saw as the

future method for managing internal parasites and drench resistance. The thinking around this issue was captured in the categories *Solve worm problem – genetics* and *Solve worm problem - new chemicals.*

The response indicating that genetics could solve the problem was mostly combined with mention of other management strategies but was sometimes mentioned as the viable long term solution.

"*The interviewee thinks that the future of worm management will include using EBVs for faecal egg count, using clean pastures and new drenches."*

"Genetically resistant sheep is seen as the long term solution to worm management because it would save time and money."

The development and use of new chemicals was much less frequently noted and was usually noted in the context of fitting in with other management measures.

"*New drenches will be the best option for their system as they will then be able to continue the effective system that is already in place and it would be another tool in the management of mixed sheep that come onto the farm. It would also be the easiest option."*

Within this there was an apparent connection between sheep reproduction worm management and sheep nutrition.

"The business will look towards the solutions of integrating worm resistant sheep and pasture and nutrition solutions to solve the problem of drench resistance."

This managing nutrition theme was not represented often within the cases of the study but was extremely obvious within a case study when it was a driver of the farm. Very often the theme of managing nutrition to improve sheep production was apparent but not necessarily elaborated as it was in the few cases where this was the obvious driver of the enterprise.

Summary

Fifty case studies were reviewed in this report with the aim of determining if the responses of the respondents could be generally categorised and subsequently be used in identify 'homogenous' groups. The intention of identifying those homogenous groups was that through that process it might be possible to identify for whom, if anyone, a compelling product could be developed. The nature of the interviews and the resultant information collected meant that the majority of the information detailed farmer's current management strategies. The interview focus and thus were most of the information was provided, was in the areas of reproduction, parasite management and scanning practices (as a part of the reproduction area).
It can seen from the information collected on reproduction strategies of the respondents, that many of the practices that have been promoted as strategies that can be used to improve sheep reproduction management are currently being employed at some level. For example

Walker (2003) in: Barnett (2007) highlighted research areas and management recommendations of: effects of environment on reproduction from germ cell to lambing; genetic and epigenetic control of reproduction from germ cell to lambing; neonatal mortality and early growth; and differential nutrition strategy and management of flock mating. Aspects of the recommendations of that report are noted as strategies utilised by some the respondents of this study. Most notably, but with indications of variable use as current practice, these include:

- Maintaining condition score of sheep (particularly ewes)
- Managing rams and ewes at joining
- Applying breeding pressure
- Providing shelter at lambing
- Use of predator control
- Use of supplementary feeding
- Internal parasite control systems in place utilising accepted infection and drench resistance measures

Within the current study it is through the interpretation of the detail of these management strategies, within the farm context information available within the individual cases, that the aims have been addressed.

For the Reproduction Efficiency project the aim was, through the analysis of the information collected, identify homogenous groups for which a compelling case might be conceived. This was done through conducting interviews with no particular management strategy promoted. Alternatively, for the Improved Parasite Management project, although covered by same aim, the approach within the interview process pointedly sort comment and opinion on the Targeted Treatment system for combating the ongoing problem of developing drench resistance in sheep. This meant that for the for the Reproduction Efficiency project, the interview process was attempting to reveal opportunity within the respondents cases for farm management practice changes that would result in an improvement in lamb and weaner survival. Achievement of this aim was to assist in the achievement of the Sheep CRC outcome of a 10% increase in the net reproduction rate and/or productivity in more than 20 % of Australian ewes (CRC, 2008). For the Improved Parasite Management project the focus of the interviews was more on obtaining information which could assist in the identification of a group that was likely to accept the principals of the of the Targeted Treatment system of worm management. This aim was to contribute to the achievement of the CRC outcome of a 10% increase in the productivity of 30 % of farms.

Reproduction Efficiency

Within the focus of the reproduction interview, the major theme that was revealed was a focus on the nutrition and condition of sheep as a strategy for taking advantage of reproductive potential and ultimately improving lamb and weaner survival. This theme was apparent in the majority of the cases but with varying level of focus within the individual case studies. There were a small number of cases where a focus on condition and sheep nutrition was not obvious, and at the other end of the spectrum there was a small group where

the focus on sheep nutrition and condition was clearly stated as driving the productivity of the sheep enterprise. Within this spectrum it was apparent that a group exists that have a interest in the importance of condition and nutrition to sheep reproduction and may be actively investigating ways to incorporate management strategies to improve through possible practice changes and the utilisation currently available technologies.
Scanning technology is a currently available technology for assisting in the management of sheep reproduction and was a focus of this study. The information collected on the use of scanning in this study revealed that the majority (almost 2/3) of respondents use scanning technology sometimes or somehow. On closer scrutiny it was revealed that a subgroup of these use scanning technology for determining ewe pregnancy only.
The model proposed within this study identifies respondents that will find information on management strategies to improve sheep reproduction outcomes. This model was based on the premise that there exists a group of farmers that are actively looking for productivity improvements by investigating management practices within sheep condition and nutrition. It is also based on identification of a group that are engaged in the use of scanning technology, and are thereby demonstrating a willingness to embrace available new technologies aimed at improving sheep reproduction outcomes within their management systems. The model proposed combines these two groups suggesting that the overlap (i.e. those that use scanning and have a focus on nutrition have strong potential for engagement)is where the most potential for engagement lies. However it includes those respondents that are involved in one practice but not the other.

Improved Parasite Management

Within this interview process many of the practices focused on internal parasite currently employed by the respondents were noted. Within the compilation of *strategies* it was evident that in most cases there was a parasite management system in place that was tailored to the farm context. Noting that in most cases individual systems were generally in place the response to the proposal of taking on the Targeted Treatment system was promising in that more than half the respondents were willing to consider the system. This is perhaps not surprising in that the prevalence of the use of currently recognised laboratory tests for faecal worm egg count and drench resistance indicate a high focus on managing internal parasites by the respondents.
From the case study information it was possible to propose a model identifying respondents that are likely to respond favourably to the idea of being involved in the ongoing research development and possibly adoption of the Targeted Treatment system. However it was noted that the reservations of many respondents to the idea of production losses that might occur through the process, or and the fear of the possibility of parasite management system failure, need to be addressed if cooperation and engagement of farmers in this system is to be successful. The existence of established “working” systems already being in place in most if not all of the cases examined means that the proposed system will most likely need to be adapted to suit those incumbent systems.
The responses to the question of future possible solutions to the problem of internal parasite management included genetic selection and new chemicals. However these suggested solutions were seldom mentioned in isolation of other currently employed management systems, including drenching regimes that included pasture management and animal nutrition

management. Within Nutrition management strategies there was a small group of cases where respondents indicated clearly that animal nutrition drives the productivity of the sheep enterprise and this included a belief that a focus on nutrition contributed positively to the management of internal parasites.
It should be noted that this study is not definitive. Obtaining more certainty in the validity of the models proposed here is recommended and the possible methods for obtaining that validation are available through examination of similar studies (e.g. Kaine and Niall, 2001). In addition there is now repository information in the form of case studies and an analysis data base that has been created through the interrogation of these case studies. This information is available for further interrogation and or cross validation with other sources based on questions that might arise from this report.

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Appendix

Appendix 1. - SEMI-STRUCTURED INTERVEIW QUESTION SCHEDULE

Interviewee Information:

This section only provides basic information on the identity of the interviewee.

Name:

Property Name:

Property Location:

Property Size:

Section 1: Enterprise Background

This line of conversation is designed to provide basic information on the interviewee's enterprise that will primarily be used to classify the respondent according to enterprise type, production goals and animal management philosophy.

Before we start, can we have a bit of discussion about your operation generally:

- What is the current approximate enterprise mix in terms of portion of income received from wool, prime lamb, cattle and crops? Has this changed much over the past decade?

- How many sheep do you run and in how many mobs?

- In terms of the operating area of the enterprise, what portion of land is typically allocated to each enterprise?

- What is the long-term average rainfall on your property and how would you describe the topography and soil profile of the property?

- What is the structure of your sheep enterprise:

    (a) First-cross ewes joined to terminal sires to produce prime lambs
    (b) Self-replacing merino ewes, with a portion joined to terminal sires for prime lamb production (if so what portion are joined to terminal sires)
    (c) Self-replacing merino ewes for wool production

- What are your whole-of-farm production goals?

- What are the production goals of your sheep enterprise?

- What is your current stocking and grazing strategy and has this changed at all over the last decade?

- What traits do you select for in breeding decisions and how do you select animals?
- What if any natural resource management practices do you deploy?
- Can you tell me a little bit about how you run the non-sheep enterprises on your farm?
- Have you changed the way you run your other enterprises over time?
- What are the labour resources deployed on your total enterprise on an annual basis? How much of this resource is consumed by your sheep enterprise?
- What are the main sources of information that you use in managing your enterprise?

BREEDING

Section 2: Existing Knowledge of Lamb and Weaner Survival

This line of conversation is designed to determine the interviewee's perceptions in relation to the extent and nature of any lamb and weaner survival issues that they specifically might face and their attitude toward managing those issues. It is important to understand if the farmer sees this as an issue within his farm management and why or why not.

Rates of lamb and weaner survival can vary considerably across Australia, but also within any given geographical area. Similarly, the definition of what is economic and practical with respect to management practices varies considerably from enterprise to enterprise. As such, I am very keen to better understand the nature and extent of any lamb and weaner survival issues associated with your enterprise and how important, generally speaking, lamb and weaner survival is to you in the scheme of things.

For the purposes of this discussion we will use the following definitions:

Lamb losses prior to birth;

Lamb losses between birth and weaning; and

Weaner losses – means weaner deaths, where a weaner is defined as animal that has been removed from its mother and is less than 12 months of age.

Current Lamb and Weaner Survival Issues

- What do you believe to be the current rate of (a) conception; (b) losses prior to birth; (c) lamb losses between birth and marking; (d) lamb losses between marking and weaning; and (d) weaner losses on your property?

- Can you describe the metrics do you use to measure any of these variables (e.g. conception rate, lambing rate, marking rate, weaning rate, percentage to first shearing etc)?

- What portion of lamb losses do you believe happen at birth and why?

- How much do you believe these rates vary from year to year, if at all?

- What information do you base each of these estimates on?

- What do you believe to be the major cause(s) of (a) abortive losses, (b) lamb losses and (c) weaner losses on your property from year to year?

- Why do you believe these factor(s) are the major causes of abortive, lamb and weaner losses on your property?

Lamb and Weaner Survival Management

- In terms of all of the issues that concern your in the management of your farm business, where do the following issues sit in terms of priority and why do they have this level of priority:

    - Abortive losses
    - Lamb losses
    - Weaner losses

- What are the main issues that take priority over abortive, lamb and weaner losses?

- What are the main issues that are secondary to abortive, lamb and weaner losses?

- Over the longer term, have these issues always had this level of priority? If not, what level of priority did they have and why?

- Would any future event affect how you prioritise abortive, lamb or weaner losses?

- Based on your current understanding of management practices that can be deployed to improve pre-birth, lamb and weaner survival, do you believe they are simple and easy to put in place or complex and difficult?

Section 3: Details of Management Practices that are currently used to Promote Higher Levels of Lamb and Weaner Survival

This line of conversation is designed to allow the interviewee to reflect on their management practices and explain things that they do that they believe have an impact on pre-birth, lamb and weaner survival outcomes. The interviewer will note practices that are undertaken and how those practices are undertaken.. Once the interviewee has finished explaining their practices the interviewer will discuss some of the additional measures that could be undertaken at each stage of the reproduction cycle, exploring why the interviewee does not

currently undertake these practices and seek the interviewee's opinion as to what would comprise an optimal management practice set.

If I go through the various stages of the sheep reproductive cycle could you please explain anything that you currently do to reduce the likelihood of abortive, lamb and weaner losses:

Stage of Reproductive Cycle and Interviewees Management Practices	Possible Management Interventions
Pre-joining:	• Artificial insemination • Embryo transfer • Monitoring of ewe condition – visual, condition scoring or weighing (specifics) • Nutritional regime targeted improving chances of effective conception (specifics) • Use of high fecundity breeds • Selecting rams with EBVS or Indexes for maternal and or temperament traits • Selecting rams with EBVs or Indexes for terminal traits • Vaccination of ewes (specifics)
Joining:	• Management of ram condition before joining • Testing rams for faults prior to joining • Percentage of rams to ewes at joining • Length of joining period • Age structure of the flock • Age at which maiden ewes are joined • Testing rams for faults • Use of teaser prior to joining • Lambing time
Pre-lambing:	• Differential management of maiden ewes (specifics) • Differential management of merino and first cross ewes (specifics) • Monitoring of ewe condition during gestation – visual, condition scoring or weighing (specifics) • Nutritional management of ewes through gestation (specifics) • Classing of dry ewes – visual or scanned • Culling of dry ewes • Classing of twins and singles – visual

Stage of Reproductive Cycle and Interviewees Management Practices	Possible Management Interventions
	or scanned • Differential management of twins and singles (specifics)
Lambing:	• Monitoring ewe condition – visual, condition scoring, weighing • Nutritional regime for managing ewe condition (specifics) • Monitoring and management of birthing and early stages of rearing (specifics) • Use of sheltered lambing paddocks (specifics of paddocks and how they are set up) • Differential management of twins and singles • Ewe udder assessment • Predator control (specifics) • Culling of poor mothering ewes
Marking:	• Drenching of lambs • Vaccination of lambs (specifics) • Culling of sick lambs • Mulesing • Testing for worm status and resistance • Testing for trace elements (selenium) • Management to maximize mothering-up of ewes and lambs • Collection and analysis of survival data (specifics)
Weaning to Approximately 12 months of age:	• Time from birth that lambs are weaned • Use of weaning paddocks (and how they are setup) • Weight of lambs at weaning • Parasite monitoring and control • Booster vaccinations • Ongoing monitoring of weaner condition (specifics) • Nutritional regime for managing weaner condition • Differential management of weaners in sub-optimal condition • Monitoring of weaner death and causes • Identification of dry ewes at weaning

Before we conclude move onto the next part of the discussion, are there any other issues relating to lamb and weaner survival that you would like to raise?

PARASITES

Section 2: Existing Knowledge of Worm Problem

This line of conversation is designed to determine the interviewee's perceptions in relation to the extent and nature of any nematode parasite issues that they specifically might face and their attitude toward managing those issues.

The worm disease profile in terms of the nature and scale of infection and resistance can vary considerably from region to region, but also within any given geographical area. Similarly, the definition of what is economic and practical with respect to worm management practices varies considerably from enterprise to enterprise. As such, I am very keen to better understand the nature and extent of any wormissues associated with your enterprise and how important, generally speaking, worm management is to you in the scheme of things.

Current and Historic Parasite Problems

- What types of worms do you currently find in your sheep? Has this always been the case, or has infection from other species occurred from time to time?

Farmers won't usually know the worm species in their sheep – many will never have seen a worm or had a test done to indicate the types present. There are always several species of worms on the farm simultaneously, many of which farmers will not be aware of. Need to be careful not to imply that they should know this. (Not sure of the point of this question.)

- How do you know the species of worms present in your sheep?

As above – and this really only applies where Barbers Pole Worm is present (a small part only of WA, and Australia as a whole) and there is little practical benefit in knowing the species in other situations.

- Do you, or have you ever lost sheep to a worm infection? If so, when, how many and how do you know the losses were the result of worm infection?

- Have you ever had substantial losses in production as a result of worm infection? If so, please explain the nature of this loss?

Worm Management

- In terms of all of the issues that concern you in the management of your farm business, where do the following issues sit in terms of priority and why do they have this level of priority:

    - Animal losses as the result of worm infection;
    - Production losses as the result of worm infection;
    - The development of resistance to anthelmintic treatments

- What are the main issues that take priority over managing worm infection?

Most of interest regarding sheep issues particularly, not so much to the farm as a whole (?).

- What are the main issues that are secondary to worm infection?

- Over the longer term, have these issues always had this level of priority? If not, what level of priority did they have and why?

- Would any future event affect how you prioritise worm management?

- Based on your current understanding of management practices that can be deployed to manage worm infection and resistance to drenches, do you believe they are simple and easy to put in place or complex and difficult?

- What do you believe is going to be the most likely future solution to worm management and why:

    - Genetically resistant sheep
    - Management systems that reduce the number of sheep that need to be drenched and slow the rate of resistance development
    - New drench chemicals
    - Improved pasture management strategies to avoid worm pick-up
    - New biological control methods *(eg, worm-eating fungi which can be drenched into animals; pastures containing anthelmintic compounds)*
    - Strategies to reduce the number of drenches given

- Which of these do you see as being the better solution for your enterprise and why?

Allow more than one answer .

Section 3: Details of Management Practices that are currently used to Manage Parasite Infection

This line of conversation is designed to allow the interviewee to reflect on their management practices and explain things that they do that they believe have an impact on the nematode parasitic disease profile of their enterprise and their ability to control and manage that disease profile. The interviewer will note practices that are undertaken and how those practices are undertaken.

Can we know have a discussion about specific activities that you undertake to (a) understand the nature of worm issues associated with your property and (b) manage those worm issues.

- Firstly, have you monitored worm burdens in your sheep enterprise, and is this a routine activity? If not, why not?

For worm egg counts, find out whether this is part of an annual routine or just done when want to check if worms are the cause of a problem (scouring, poor growth) or not. Secondly, how often monitored annually – ask to recall what they did last year, by sheep classes (lambs/weaners; hoggets; mature ewes; any others). This will help us position each farmer regarding worm control knowledge and actions. (Less important if farmers use other methods for monitoring, eg, just visually checking.)

- If you do monitor worm infection, can you please explain the following:

    - How you monitor worm burdens (e.g. WEC, larval differentiation, self-analysis, laboratory analysis, veterinary services etc)
    - Do you monitor drench resistance?
    - How routinely you undertake these monitoring activities and why you use this schedule?
    - How you use the results of the monitoring practices and what indicators you use to take specific actions?
    - How long you have been doing this, and anything you have changed during this time? If you have changed any practices during this time, why have you changed them?
    - What have been the main benefits of actively monitoring the worm infection in your sheep enterprise?
    - Can you explain the labour required to undertake your current monitoring activities?
    - Can you explain the costs associated with your monitoring activities and why it is a worthwhile investment?

- Could you please explain your current drenching practices, specifically:

    - Which sheep you drench and when you drench them?
    - What brands and types of drenches do you use?
    - Whether your current drenching practices have changed over time?
    - The annual cost associated with your current drenching program?
    - The labour required to undertake your current drenching program?

May be easiest to draw up a table of month by sheep class, to indicate the number of drenches and when (will vary by sheep class). Asking to focus on the previous year (if they agree it is a typical one) helps people recall.
Types/brands could be indicated in the space for each month.

- Could you please explain other management practices you undertake to manage the worms on your sheep enterprise (e.g. spelling paddocks etc)?

Section 4: Future Management of Parasites

This section is designed to determine how the interviewee sees the future of parasite management, and in particular, factors that may motivate them to change their current parasite management practices.

There is a view held by some in industry that routine, broad-spectrum drenching based on regional drenching strategies is going to become increasingly problematic from two main perspectives. Firstly, new chemicals currently in development that are designed to overcome resistance to current anthelminitic treatments are expected to be considerably more expensive than current drench treatments, with estimates being as high as 3 to 4 times the cost. Secondly, the number of markets requiring products with zero traces of certain chemicals is increasing, which could result in price discounts for products from drenched sheep.

A program is currently under development that is designed to provide a solution to these problems. Targeted treatment involves the following management interventions:

*(**Interviewers**: only introduce the appropriate targeted treatment module: essentially the first (Haemonchus)* one for the New England region, and the second for others.)

***Haemonchus* dominant regions:**
Under this program, instead of drenching all flocks on the farm when a drench for Barbers Pole Worm is considered necessary, you would decide which flocks needed treatment and drench only those. The decision on which particular flocks would be drenched would be made using a "drench decision aid" – a ready-reckoner or small computer program which uses information on the flock worm egg count and factors such as sheep age, condition score, recent rainfall etc, to indicate the risk of Barbers Pole Worm problems and best-bet drench type to be used. This requires worm egg counts to be taken from flocks at intervals during the "Barbers Pole Worm season", and it is likely that an overall saving of drenching will be made, and even if a similar number of treatments turn out to be necessary, the staggered drenching pattern will have a significant effect in reducing the development of drench resistance. Research will indicate the minimum need for worm egg counting based on peak risk times, but the effort and cost of worm egg count monitoring will often be offset by the reduction in drenching.

Mostly winter rainfall worms
Under this program, instead of drenching all sheep in a mob when they are yarded for a drench, you would drench only the individual sheep that appear likely to benefit from it. This is based on the fact that there is a big variation in a mob between sheep that cope well with worms and are not affected by them, and those which are not performing as well as possible, probably due to worms. The percentage to be drenched in a particular situation would be indicated by a ready-reckoner produced from the planned research. It would be based on: 1) the sheep class; 2) a worm egg count before drenching, 3) the average sheep condition score.

For example, for a flock of adult ewes with an average worm egg count of 500 eggs per gram and in an average of condition score 3, research may show us that 30% should be drenched. These individuals would be identified when drenching by visually assessing which 30% in any race load were the poorest sheep and drenching only these.

The program would indicate the best times that a drench decision should be made, say 3-4 times/year, so the worm egg count is only needed then, and usually on only one mob for each sheep class. Further research is planned to indicate the likely percentage of a mob to benefit from a drench where no worm egg count is available.

(End explanation of targeted treatment strategy)

This is expected to result in the drenching of typically 50% of adult sheep, which would slow the development of drench resistance across the farm to about half the rate had all been drenched. An additional benefit will be that where a mob may appear to be in good order and no drench would appear necessary, the new program would indicate a percentage in which production will be increased by drenching.

- Can you see this as being a solution that you would implement? If not why not? If so, why?

If say 'too much work" please get details, eg, don't want to do worm egg counts.
Comments on practicality are interesting, especially for identification of sheep to be drenched.
If support the targeted treatment idea, of interest to know whether for drench resistance reason, less work, less cost, etc.

- Would it be worth sacrificing a small amount of potential sheep production to keep drenches working well for the longer term ? Eg, losing 2 or 3% wool production because some worms are deliberately left in sheep to reduce the development of drench resistance. If happy with this, what amount ? eg, 2 %, 5% ? Would your view on acceptable production loss change if there was a market for zero-residue sheep products ?

- How else will you manage increasing resistance and rising costs associated with drenching chemicals?

Concluding Remarks

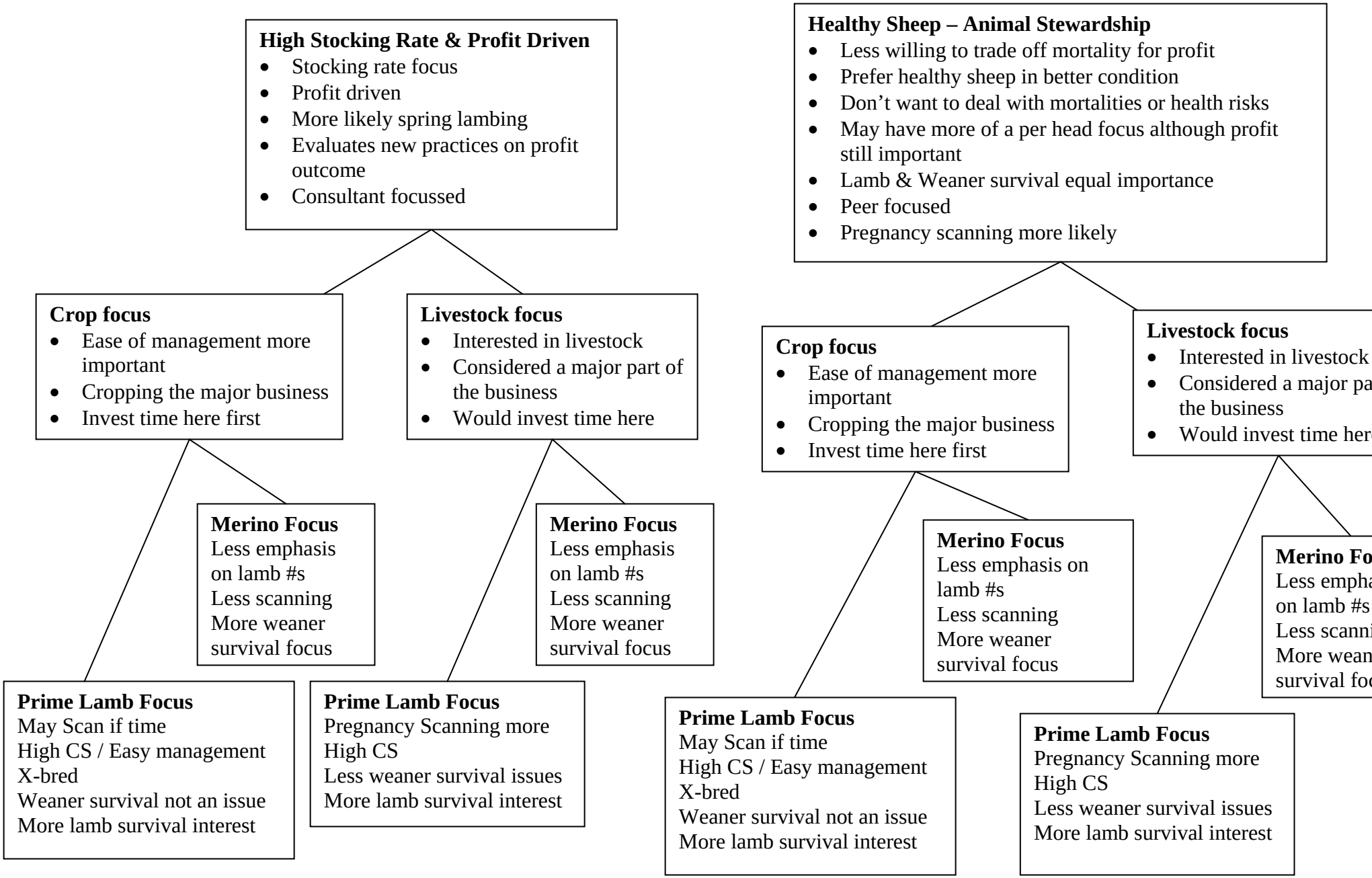
This is simply to conclude the discussion and seek any additional input from the interviewee.

Before we conclude the discussion, are there any other issues relating to parasite management that you would like to raise?

As I mentioned, this discussion will remain confidential. If you are interested in the final report we would be happy to provide you with a copy. Also, if you have any other ideas or issues you would like to discuss, please don't hesitate to contact me.

The Sheep CRC is also compiling a list of producers that might be interested in being involved in current and future projects. The involvement ranges from a 'sounding board' for concepts to active participation in trials. Would you be interested in participating, and if so, what areas are of particular interest to you?

Thank you again for your time.



Appendix 2: Segmentation Model – Part of the output from Perth Workshop (Sheep Reproduction) 10/06/2008

Appendix 3 Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:22 PM

30% drenched **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	11	CRC NSW CS 03 CRC NSW CS 04 CRC NSW RB 01 CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC NSW RB 07 CRC VIC RW 01 CRC VIC RW 02
Yes	6	CRC SA IM 07 CRC SA IM 11 CRC VIC RW 05 CRC VIC RW 06 CRC VIC RW 08 CRC WA ER 0101
No	16	CRC NSW CS 01 CRC NSW CS 05 CRC SA IM 01 CRC SA IM 04 CRC SA IM 09 CRC SA IM 12 CRC VIC RW 07 CRC WA ER 0301 CRC WA ER 0501 CRC WA ER 0801 CRC WA ER 0901 CRC WA FB 01 CRC WA FB 02 CRC WA JS 01 CRC WA JS 02 CRC WA JS 03
Maybe	17	CRC NSW CS 02 CRC SA BA 01 CRC SA IM 02 CRC SA IM 03 CRC SA IM 05 CRC SA IM 06 CRC SA IM 08 CRC SA IM 10 CRC SA SM 01 CRC VIC RW 03 CRC VIC RW 04 CRC WA ER 0201 CRC WA ER 0401 CRC WA ER 0601 CRC WA ER 0701 CRC WA ER 1001 CRC WA FB 03

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:25 PM

Check rams **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	9	CRC SA IM 02 CRC SA IM 05 CRC SA IM 10 CRC SA IM 12 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0401 CRC WA JS 03
Not Applicable	0	
Yes	27	CRC NSW CS 01 CRC NSW CS 04 CRC NSW RB 01 CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC NSW RB 07 CRC SA BA 01 CRC SA IM 03 CRC SA IM 07 CRC SA IM 11 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 06 CRC VIC RW 07 CRC WA ER 0301 CRC WA ER 0501 CRC WA ER 0601 CRC WA ER 0701 CRC WA ER 1001 CRC WA FB 01 CRC WA FB 03 CRC WA JS 02
No	14	CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 05 CRC SA IM 01 CRC SA IM 04 CRC SA IM 06 CRC SA IM 08 CRC SA IM 09 CRC VIC RW 02 CRC VIC RW 05 CRC WA ER 0801 CRC WA ER 0901 CRC WA FB 02 CRC WA JS 01

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:28 PM

Condition Score **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
Yes	16	CRC NSW CS 01 CRC NSW RB 03 CRC NSW RB 05 CRC SA BA 01 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 05 CRC VIC RW 06 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0601 CRC WA FB 02 CRC WA FB 03
No	10	CRC NSW CS 02 CRC NSW CS 03 CRC NSW RB 07 CRC SA IM 01 CRC SA IM 06 CRC SA IM 08 CRC SA IM 10 CRC WA ER 0201 CRC WA ER 0501 CRC WA ER 0801

41	Yes but only visual	Draft	24	CRC NSW CS 04 CRC NSW CS 05 CRC NSW RB 01 CRC NSW RB 02 CRC NSW RB 04 CRC NSW RB 06 CRC SA IM 02 CRC SA IM 03 CRC SA IM 04 CRC SA IM 05 CRC SA IM 07 CRC SA IM 09 CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 07 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0701 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 01 CRC WA JS 01 CRC WA JS 02 CRC WA JS 03

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:30 PM

Enterprise Main Focus **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
Crop	18	CRC NSW RB 02 CRC NSW RB 04 CRC NSW RB 07 CRC SA BA 01 CRC SA IM 01 CRC SA IM 03 CRC SA IM 04 CRC SA IM 05 CRC SA IM 06 CRC SA IM 07 CRC SA IM 08 CRC SA IM 10 CRC VIC RW 07 CRC VIC RW 08 CRC WA ER 0601 CRC WA FB 01 CRC WA FB 02 CRC WA FB 03
Livestock	30	CRC NSW CS 01 CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 04 CRC NSW CS 05 CRC NSW RB 01 CRC NSW RB 03 CRC NSW RB 05 CRC NSW RB 06 CRC SA IM 02 CRC SA IM 09 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 05 CRC VIC RW 06 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0501 CRC WA ER 0701 CRC WA ER 0801 CRC WA ER 0901 CRC WA JS 01 CRC WA JS 02 CRC WA JS 03

44	50/50	2	CRC WA ER 0401 CRC WA ER 1001

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:32 PM

Enterprise sheep focus **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
Merino	34	CRC NSW CS 01 CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 04 CRC NSW RB 01 CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC NSW RB 07 CRC SA BA 01 CRC SA IM 03 CRC SA IM 05 CRC SA IM 06 CRC SA IM 07 CRC SA IM 08 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 05 CRC VIC RW 06 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0701 CRC WA ER 0801 CRC WA ER 0901 CRC WA FB 03 CRC WA JS 01 CRC WA JS 02
Prime lamb	15	CRC NSW CS 05 CRC SA IM 01 CRC SA IM 02 CRC SA IM 04 CRC SA IM 09 CRC SA IM 10 CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 07 CRC WA ER 0601 CRC WA FB 01 CRC WA FB 02 CRC WA JS 03

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:35 PM

50/50	1	CRC WA ER 1001

farm size **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
0 to 500	5	CRC SA BA 01 CRC SA IM 08 CRC VIC RW 02 CRC VIC RW 03 CRC VIC RW 06
501 to 1000	6	CRC NSW CS 01 CRC NSW CS 04 CRC SA IM 02 CRC SA IM 04 CRC VIC RW 01 CRC VIC RW 08
1001 to 2000	24	CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 05 CRC NSW RB 01 CRC NSW RB 06 CRC NSW RB 07 CRC SA IM 06 CRC SA IM 07 CRC SA IM 10 CRC VIC RW 04 CRC VIC RW 07 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 01 CRC WA FB 03 CRC WA JS 01 CRC WA JS 02 CRC WA JS 03

47	2000 and above	Draft	15	CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC SA IM 01 CRC SA IM 03 CRC SA IM 05 CRC SA IM 09 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 05 CRC WA ER 0601 CRC WA ER 0701 CRC WA FB 02

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:36 PM

Foxes **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	3	CRC NSW CS 01 CRC VIC RW 05 CRC WA ER 0201
Not Applicable	5	CRC SA IM 02 CRC SA IM 03 CRC SA IM 05 CRC SA IM 09 CRC SA IM 10
Bait	13	CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 04 CRC NSW CS 05 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC NSW RB 07 CRC SA BA 01 CRC SA IM 01 CRC SA IM 08 CRC SA IM 11 CRC VIC RW 03
Shoot	5	CRC VIC RW 04 CRC VIC RW 06 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0801
Bait and Shoot	8	CRC SA IM 06 CRC SA IM 07 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 02 CRC WA ER 0701 CRC WA FB 02
No	16	CRC NSW RB 01 CRC NSW RB 02 CRC NSW RB 03 CRC SA IM 04 CRC VIC RW 07 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0501 CRC WA ER 0601 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 01 CRC WA FB 03 CRC WA JS 01 CRC WA JS 02 CRC WA JS 03

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:38 PM

Labour units **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
<1	2	CRC VIC RW 02 CRC WA JS 02
1 < 2	24	CRC NSW CS 01 CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 04 CRC NSW CS 05 CRC NSW RB 01 CRC NSW RB 03 CRC NSW RB 06 CRC SA BA 01 CRC SA IM 02 CRC SA IM 06 CRC SA IM 07 CRC SA IM 09 CRC SA IM 10 CRC VIC RW 03 CRC VIC RW 06 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0501 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 03 CRC WA JS 03
2 < 3	11	CRC NSW RB 02 CRC NSW RB 07 CRC SA IM 01 CRC SA IM 08 CRC VIC RW 04 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0601 CRC WA FB 01 CRC WA FB 02 CRC WA JS 01

51	=> 3	Draft	13	CRC NSW RB 04 CRC NSW RB 05 CRC SA IM 03 CRC SA IM 04 CRC SA IM 05 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 05 CRC VIC RW 07 CRC WA ER 0701 CRC WA ER 0801

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:39 PM

Lupins to rams **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	17	CRC NSW CS 02 CRC NSW CS 03 CRC SA IM 05 CRC SA IM 09 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 06 CRC VIC RW 07 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0501 CRC WA FB 01 CRC WA FB 03 CRC WA JS 03
Not Applicable	0	
Yes	18	CRC NSW CS 01 CRC NSW CS 04 CRC NSW RB 01 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 06 CRC SA BA 01 CRC SA IM 01 CRC SA IM 06 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 02 CRC WA ER 0601 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA JS 01
No	15	CRC NSW CS 05 CRC NSW RB 02 CRC NSW RB 05 CRC NSW RB 07 CRC SA IM 02 CRC SA IM 03 CRC SA IM 04 CRC SA IM 07 CRC SA IM 08 CRC SA IM 10 CRC VIC RW 01 CRC VIC RW 05 CRC WA ER 0701 CRC WA FB 02 CRC WA JS 02

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:40 PM

marking rate **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	1	CRC SA IM 12
Not Applicable	0	
<75 lambs marked	4	CRC NSW CS 03 CRC NSW RB 01 CRC WA FB 03 CRC WA JS 03
75 <85 lambs marked	11	CRC NSW CS 05 CRC NSW RB 05 CRC NSW RB 06 CRC SA IM 02 CRC VIC RW 05 CRC VIC RW 06 CRC WA ER 0301 CRC WA ER 0701 CRC WA FB 02 CRC WA JS 01 CRC WA JS 02
85 <=100 lambs marked	23	CRC NSW CS 01 CRC NSW CS 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 07 CRC SA BA 01 CRC SA IM 04 CRC SA IM 06 CRC SA IM 08 CRC SA IM 09 CRC SA IM 11 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0601 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 01

54	>100	Draft	11	CRC NSW CS 04 CRC NSW RB 02 CRC SA IM 01 CRC SA IM 03 CRC SA IM 05 CRC SA IM 07 CRC SA IM 10 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 07

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:43 PM

Number of sheep **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
<=1000	7	CRC SA BA 01 CRC SA IM 03 CRC SA IM 06 CRC SA IM 08 CRC VIC RW 07 CRC WA JS 02 CRC WA JS 03
>1000<=2000	12	CRC NSW CS 02 CRC NSW CS 04 CRC NSW CS 05 CRC SA IM 05 CRC SA IM 07 CRC SA IM 09 CRC SA IM 10 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 06
>2000<=3000	3	CRC SA IM 02 CRC SA IM 04 CRC WA FB 01
>3000<=5000	11	CRC NSW CS 01 CRC NSW CS 03 CRC NSW RB 02 CRC NSW RB 07 CRC SA IM 01 CRC VIC RW 03 CRC VIC RW 08 CRC WA ER 0301 CRC WA ER 0501 CRC WA ER 1001 CRC WA FB 02
>5000<=10000	12	CRC NSW RB 03 CRC NSW RB 05 CRC NSW RB 06 CRC SA IM 11 CRC VIC RW 04 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0601 CRC WA ER 0801 CRC WA ER 0901 CRC WA FB 03 CRC WA JS 01

>10000	5	CRC NSW RB 01 CRC NSW RB 04 CRC VIC RW 05 CRC WA ER 0401 CRC WA ER 0701

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:44 PM

Rainfall **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	1	CRC NSW RB 05
Not Applicable	0	
300- 400 Annual Rainfall	9	CRC SA IM 03 CRC SA IM 05 CRC SA IM 06 CRC SA IM 09 CRC WA ER 0701 CRC WA FB 01 CRC WA FB 02 CRC WA FB 03 CRC WA JS 02
400-650 Annual Rainfall	33	CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 06 CRC NSW RB 07 CRC SA BA 01 CRC SA IM 01 CRC SA IM 02 CRC SA IM 04 CRC SA IM 07 CRC SA IM 08 CRC SA IM 10 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 05 CRC VIC RW 06 CRC VIC RW 07 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0601 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA JS 01 CRC WA JS 03
>650 Annual Rainfall	7	CRC NSW CS 01 CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 04 CRC NSW CS 05 CRC NSW RB 01 CRC NSW RB 04

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:45 PM

Resistance Test **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	1	CRC SA IM 11
Not Applicable	9	CRC NSW CS 03 CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC NSW RB 07 CRC VIC RW 01 CRC VIC RW 02
Never	11	CRC NSW CS 05 CRC SA BA 01 CRC SA IM 01 CRC SA IM 06 CRC SA IM 08 CRC SA IM 09 CRC SA IM 10 CRC VIC RW 07 CRC WA ER 0601 CRC WA JS 02 CRC WA JS 03
within 2 years	12	CRC NSW CS 02 CRC NSW RB 01 CRC SA IM 07 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 05 CRC VIC RW 06 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0701
within 3 years	7	CRC VIC RW 03 CRC VIC RW 04 CRC WA ER 0301 CRC WA ER 0801 CRC WA ER 0901 CRC WA FB 02 CRC WA FB 03
not within last 5 years	7	CRC NSW CS 01 CRC SA IM 02 CRC SA IM 03 CRC SA IM 05 CRC WA ER 1001 CRC WA FB 01 CRC WA JS 01
No but may do	3	CRC NSW CS 04 CRC SA IM 04 CRC VIC RW 08

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:46 PM

Scanning **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	1	CRC NSW CS 03
Not Applicable	0	
Yes	30	CRC NSW CS 01 CRC NSW CS 04 CRC NSW RB 02 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC SA BA 01 CRC SA IM 01 CRC SA IM 04 CRC SA IM 05 CRC SA IM 07 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 01 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 07 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0501 CRC WA ER 0601 CRC WA ER 0701 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 03 CRC WA JS 01
No	19	CRC NSW CS 02 CRC NSW CS 05 CRC NSW RB 01 CRC NSW RB 03 CRC NSW RB 07 CRC SA IM 02 CRC SA IM 03 CRC SA IM 06 CRC SA IM 08 CRC SA IM 09 CRC SA IM 10 CRC VIC RW 02 CRC VIC RW 05 CRC VIC RW 06 CRC WA ER 0401 CRC WA FB 01 CRC WA FB 02 CRC WA JS 02 CRC WA JS 03

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:47 PM

WEC **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	1	CRC NSW CS 05
Not Applicable	2	CRC NSW CS 03 CRC VIC RW 01
Yes	35	CRC NSW CS 01 CRC NSW CS 02 CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC SA BA 01 CRC SA IM 03 CRC SA IM 04 CRC SA IM 05 CRC SA IM 07 CRC SA IM 11 CRC SA IM 12 CRC SA SM 01 CRC VIC RW 02 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 05 CRC VIC RW 06 CRC VIC RW 07 CRC VIC RW 08 CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0701 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA FB 01 CRC WA FB 02 CRC WA FB 03 CRC WA JS 01
No	12	CRC NSW CS 04 CRC NSW RB 01 CRC NSW RB 07 CRC SA IM 01 CRC SA IM 02 CRC SA IM 06 CRC SA IM 08 CRC SA IM 09 CRC SA IM 10 CRC WA ER 0601 CRC WA JS 02 CRC WA JS 03

Attribute Summary Report

Project: crc Farm cases

Generated: 15/10/2008 12:48 PM

Zone **Attribute**

Attribute Values	Total Cases	Assigned Cases
Unassigned	0	
Not Applicable	0	
Medium Rainfall Sheep Zone - Western Australia	13	CRC WA ER 0101 CRC WA ER 0201 CRC WA ER 0301 CRC WA ER 0401 CRC WA ER 0501 CRC WA ER 0601 CRC WA ER 0701 CRC WA ER 0801 CRC WA ER 0901 CRC WA ER 1001 CRC WA JS 01 CRC WA JS 02 CRC WA JS 03
Cereal Sheep Zone - WA; Vic; South Australia	13	CRC SA IM 03 CRC SA IM 05 CRC SA IM 06 CRC SA IM 07 CRC SA IM 08 CRC SA IM 09 CRC SA IM 10 CRC SA IM 11 CRC VIC RW 07 CRC VIC RW 08 CRC WA FB 01 CRC WA FB 02 CRC WA FB 03
High Rainfall Sheep Zone - Victoria; NSW	6	CRC VIC RW 01 CRC VIC RW 02 CRC VIC RW 03 CRC VIC RW 04 CRC VIC RW 05 CRC VIC RW 06
Northern Tablelands Sheep Zone - New South	5	CRC NSW CS 01 CRC NSW CS 02 CRC NSW CS 03 CRC NSW CS 04 CRC NSW CS 05
Southern Slopes Sheep Zone - NSW;Vic	7	CRC NSW RB 01 CRC NSW RB 02 CRC NSW RB 03 CRC NSW RB 04 CRC NSW RB 05 CRC NSW RB 06 CRC NSW RB 07

High Rainfall Zone SA	6	CRC SA BA 01 CRC SA IM 01 CRC SA IM 02 CRC SA IM 04 CRC SA IM 12 CRC SA SM 01

Appendix 4 Case Studies

CASE STUDY CRC WA ER 0101

Enterprise Profile

This enterprise is 1140 cleared and effective hectares. It is located approximately 30km's west of Kojonup W.A. It receives on average 550mm of rain 90% of which is received in winter, the land is undulating sand though to granite with a high gravel component.

Income wise the majority of the income comes from wool, then livestock sales and finally crop, this has varied over the last decade with prices with on several occasions equal income coming from all entities. The allocation of land to crop and sheep has also varied according to the profitability of the enterprise. With the high grain prices forecast for the coming year there is a swing to more crop. Currently the land allocation mix is 85% Sheep and 25 % crop.

The sheep structure comprises 9500 sheep with roughly 65% merino and 35% Cross Bred, the Ewes are kept to 6.5 years of age. The weaner wethers are sold at around 15 months to export.

Production Goals

There are no overall production goals, previously there have been specific goals, an example is achieving 50kgs of wool per hectare, and these are now more subconscious goals. They are still currently pushing it as hard as the current system can cope with. It would take real system change for them to achieve higher yields, which there is not the motivation to do however they are expecting to be able to achieve higher stocking rates with more land going to crop, as summer stocking rates will be easier to manage with more stubble.

Sheep Production

The current stocking rate is around 13.5, this is managed by deferring pastures by grazing crop stubbles through to the point that they have to be cropped, they are confinement fed in these paddocks as well if the season is late in breaking. After this the sheep are moved though fenced off creeks and bush so as to let the pasture get away. The sheep are then set stocked on the deferred pasture paddocks just before lambing so they have the best nutrition possible.
The hoggets are currently culled on wool quality and wool weights, they are then utilized in the crossbred operation. All the maidens are wet and dried, if they are twice dry in the first two years then they are culled.

NRM

All the creek lines that need to be fenced off have been. Salty areas have been fenced off to allow for remanent vegetation regrowth (this has been very successful). Once this remanent vegetation gets to a good hight they are grazed briefly, particularly in the last two poor years where all feed possible has been required.

Non Sheep Enterprise

Cropping is the other enterprise, this is seeded by own labour and harvested by a contractor.

Management of this enterprise has changed over time through use of ideas off friends and neighbours. There is a straight forward format that is followed to. Makes observation as a paddock comes out of a crop rotation, is it too fertile, has too much gone on, was it an economical paddock, the whole farm has now been cropped and management is very much in tune with what each paddock can do.

Is now using knife points so has changed machinery and cropping technique over time. There have also been changes in crop rotations from one in one out to multiple crops. Because it works and allows the better paddocks to be cropped more.

Labour

This is family operation, with 1 full time member. There is contractors used for harvesting, some help is used for crutching and shearing is full contract. About 75% of time is spent on the sheep enterprise

Sources of Information

Management utilizes a variety of sources, including consultants and agronomists. He also gets information from peers and neighbours. Gets ideas from the press that he won't necessarily act on but it plants a seed that might be followed up in conversation and may then lead to something happening.

Importance of Lamb and Weaner Survival

In terms of priority, stocking rate, having healthy fit stock take priority over abortive losses, lamb losses and weaner losses, this is due to the belief that they have more impact on the profitability of the business. He is still conscience of lamb and weaner survival importance. This level of priority has remained the same. It was felt that in good seasons it was more important to prioritize loss prevention as they were the years that the business really needed to achieve its potential. It was also believed that it would not be hard to improve survival as the main requirement is feeding the ewe and weaner, however this had to be economical to justify.

Causes of Lamb and Weaner Loss and Management Interventions

The marking rate on sheep joined over recent times has averaged between 85 and 90 percent.

- Conception Rates are believed to be in the mid 90's this comes from general observation and scanning that was completed last year for the purpose of selling dry ewes.
- They do not know of losses that occur before birth or if it is an issue.
- It is believed that 10 %(depending on season) are lost between marking and birth. This is based on number of dead lambs observed in paddock, however this is usually made up by twins. The majority of these die at birth. These rates vary from year to year and are very much driven by the condition of the ewe and natural selection .Again these beliefs are based on observations and the connection is made between dead sheep and the poor season.

- Very few lambs were lost between marking and weaning, based on counting marked lambs and weaners.
- Approximately 5% are lost as weaners, again based on counts between weaning and fisrt shearing. The majority happen early on between December and January, this is believed to be caused by the transferring from green feed and milk to dry feed and grain.

Observations of Reproduction cycle

Pre-joining

- Ewes are drenched
- Rams are fed and maintained in excellent condition
- Ewes are fed on a rising plane of nutrition if possible, definitely not decreasing, fed lupins, amount depending on feed quality
- Weaners get 2 chances of having a lamb then culled
- Older ewes (5 ½) get culled if lighter condition, default mouthing

Joining

- Joined for 6 weeks, 5 weeks are enough
- Join for July lambing (February)- would like to go later but is concerned about condition of ewe at joining, the later joining is the poorer the pasture and the more feed required to keep them in condition.
- Early joining still being fed lupins, most years will feed through joining.

Pre-lambing

- Prepare paddocks so there is enough feed to lamb in,(deferment of grazing paddocks)
- Sheep are kept in good condition(not fat)
- Maidens are drenched, depending of the condition of the sheep. They are drenched regardless of condition in a bad year, as insurance.

Lambing

- Is largely a hands free affair, the sheep are not disturbed
- Preferential paddocks are sought out for lambing ewes , however its not always possible

Marking

- Vaccinate the lambs
- Scabby mouth for the weathers
- Cull sick lambs
- Selenium in the vaccination, the rest is spread on paddocks

Weaning to First Shearing

- Set up clean paddocks with good clover low grass so they don’t get grass seeds
- They are drenched into clean paddocks
- Vitamin E has been used when required/ advised.

- Prioritise summer feed, oat stubble
- There is mystery regarding weaner survival
- Wondering if they need older ewes to help them learn/

Parasites Current and Historic Problems

Not really sure about the type of worms that the sheep have, have known in the past but doesn't really care as he has a system for drenching and is informed of the type and if a different type of drench is required . There have never been any major losses from worms; occasionally the odd sheep may have an impact. There was some production
Losses last October when a mob was going backwards when they shouldn't be. Essentially they have a solid system and this prevents any major issues.

Worm Management

Of the issues presented by worm management, resistance to drenches is one that stands out as an issue for the future, animal losses is not an issue as there is a program in place that manages it. Sub clinical losses are important, but not as important as the other two issues as there are not a lot that can be done.

Worm management is closely related to sheep health and this is a priority for the enterprise. Its part of the system that just happens, it's still something that they focus on. Sheep health has always important as the profitability of the business depends on it. If resistance starts to have an impact then it might take up more time, but it won't make it any more important.

Management doesn't feel that different techniques that could be used to delay resistance are difficult to implement such as drenching at different times, drench resistance testing and leaving some sheep undrenched.

Practice Change and the Future

Genetically resistant sheep is seen as the long term solution to worm management because it would save time and money.

Grazing management strategies are something that has been tried in the past. This involved using older wethers natural worm resistance to give paddocks a worm break, weaners were then swapped with the wethers in July or August. This would work just as good as drenching. They now run a ewe dominant flock so this is no longer possible.

Management Practices Currently Used to Manage Parasite Infection

Worm monitoring occurs when management feels it needs to be done. When sticking to the routine of giving a summer drench, he see no reason to test them, however if as they did three years ago and not summer drench then monitoring occurs (this was due to sheep being in

excessively good condition and the opportunity was taken not to drench). Also during the winter if slightly concerned about worms then they will test, however if really concerned then will go straight in and give them a drench. There has also been a bad experience with winter egg counts where advice has said not to drench and the sheep have got considerably worse.

Samples are analysed by a vet, and drench resistance test every 2 years as he doesn't believe it's necessary every year. Regarding advice for drench resistance, resistance levels to various drenches are observed and then decision according to sheep type and the cost of chemical, there is no hard line strategy. Options are sought so as to be able to use an abamectin rather than a moxidectin, however they would pay 3 times the amount for a drench that worked.

Drench resistance testing has been occurring for the last 15 years, this has led to drenches useful life being extended, with Combination drenches still having some usefulness if need be.

It is considered easy to get the sample, about half an hour and the cost is $50. as mentioned this has been a worthwhile investment as it has helped extend the life of the drenches.

Current Drenching Practice

- Sheep going onto stubbles get drenched primarily with a moxidectin, because it kills all worms, this constitutes half the flock.
- The other half go onto pastures, these are drenched with another clear drench.
- 5% of adult ewes are left undrenched, these sheep are then mixed with other sheep later in the year so as to swap worms and slow resistance.
- The practice of leaving 5% has been in practice for the last two years and started as a result of fear of getting resistance
- Drenching currently costs approximately $3500 and takes about a week to complete
-

Future Management of Parasites- Drenching 30%

The manager currently has confidence in the current system being used, and was unsure about the subjectiveness of visually assessing sheep to be drenched, however believes worms will continue to be an issue. If this system could be proven then a drenching program where less are drenched could be an option. As they have already started down this road with current system it would not be a huge leap.

This business is already demonstrated sacrificing some production to extend the life of its drenching products and feels this is a "good investment". Future resistance shall be taken through on farm techniques such as the current drench program and through genetics as his stud is focused on worm resistance as one of its main criteria

CASE STUDY CRC WA ER 0201

Enterprise Profile

The enterprise is 1500 arable hectares. It is located approximately 20 km's west of Kojonup. The soil types are undulating duplex sandy loam over clay. The property receives on average 550 mm, most of which falls in the growing season of April to December.
Income is spread over wool , meat and crop, this varies with prices received however the general mix is 40% wool, 20% sheep and lamb sales and 40% crop. This has changed over the last decade with a swing towards more prime lamb which has resulted in livestock sales increasing by 10%. The allocation of land has not changed much with 30% of the arable land going to crop and the remaining 70% going to sheep.
The sheep structure comprises 8500 sheep run in 20 mobs through the winter, this is split 50/50 between a self replacing merino flock and a developing shedding fibre flock. The wether weaner lambs from the merino flock are sold at 11 months. The shedding flock are at various stages of F1, F2 and F3, The wether lambs are sold as prime lambs and the ewes are all still retained as the flock is developed. They are also developing a stud from this enterprise

Production Goals

The production goals are about being profitable while keeping the farm sustainable and keeping the work sustainable. A balanced lifestyle is important.

Sheep Production

The current stocking rate is around 13.5, this is managed by deferring pastures through grazing crop stubbles, they are moved though fenced off creeks they contain salt water Couch grass and bush to let the pasture get away. The sheep are then set stocked just before lambing.
Reproduction goals for the merinos are greater than 90% lambing and the shedding sheep is looking for 100% +, they are also mating ewe lambs from this enterprise as they develop earlier.
Breeding wise, the merino enterprise is looking to take the focus off fineness and more to wool cut, maiden ewes are culled if they fail to have a lamb. The shedding enterprise is very much focused on fertility and fecundity, they are still building numbers so not culling to heavily. Looking to breed a very maternal type.

NRM

All the creek lines are fenced off, investigating perennials, utilizes no till seeding technology which minimizes washing out of paddocks.

Non Sheep Enterprise

The non sheep enterprise is cropping, this is all done by the owner except for the harvesting, they are very cautious about overcapitalising, and that's why there is no harvester. Is very aware about having the right gear for their scale of cropping enterprise.

There has been a gradual change in the technical area of the operation, however there has been very little system/crop rotation change over the last decade. This is because of satisfaction with how the system works. The biggest change previously came from when the wool price crashed and a necessity to change drove the enterprise to investigate how to improve cropping technique. This is also the case with the shedding enterprise as there is concern with the future of the wool industry thus the is insurance being put in place by having a shedding flock that could quite quickly become the entire flock if need be. They also now use an agronomist.

Labour

This is family operation, 1 full time member and another working part time, lamb marking, crutching and shearing is all contracted out. Approximately 85% of the time is spent on the sheep enterprise. A driver is employed at seeding time and also some contract spraying is utilized.

Sources of Information

The enterprise gets information from a number of sources, this varies from utilizing an agronomist, to doing its own research. They also receive farm journals and Ag department memo's which are found to be useful.

Importance of Lamb and Weaner Survival

Lamb and weaner survival is important to the enterprise however it is very much under control and its drivers are well understood. Of a higher priority to the enterprise is management of worm control and maintaining a sustainably profitable stocking rate. The main issue that is secondary to survival is the future of the wool enterprise, this is based on concerns of the future of the wool industry in general.

Over the longer term, these issues have maintained their priority, this is because it has worked and a belief of focusing on things that drive profit in the business. If major losses started to occur in lambing or weaning then this would raise the priority of survival.

There is Recognition that management practices that are available to help decrease losses are reasonably easy to put in place and utilizes tools when needed, examples of this is scanning in a poor season and drafting off the tail of a weaner mob and feeding them separately. Has also taken on drenching with long acting drench to given better protection to ewes during laming

Causes of Lamb and Weaner Loss and Management Interventions

The marking rate on sheep joined over recent times has averaged between 85 and 90 percent.

- Conception Rates are believed to be in the mid 90's, this is known due to scanning which was done last year for the first time in a while due to the cost of feeding dry ewes.
- They do not know of losses that occur before birth and don't think it is an issue
- It is believed that a significant amount of losses occur between birth and marking and a significant amount of these are twins, this is due to marking approx 96% from sheep scanned while also seeing dead lambs on the ground, thus presuming allot of ewes have twins then many must die. There is hope that moving to a more maternal ewe type might solve this problem. Most losses a perceived to die at birth or in the first 24 hours, reasons for these losses are exposure to poor conditions due to full wool sheep not seeking shelter. Dystocia is another issue, which leads to dead lambs being born.

- Very few lambs were lost between marking and weaning, based on counting marked lambs and weaners.
- Approximately 2% are lost as weaners, again based on counts between weaning and first shearing. This is due to ill thrift and poor condition due to worms. This could also be a carry over from the mothers being light due to worm problems which result in light lambs and light weaners

Observations of the Reproduction Cycle

Pre-joining

- Ewes are flushed with lupins before mating for the purpose of feeding the egg in the ewe.
- Winter lambing allows ewes three good weeks of green feed after weaning for ewes to put allot of weight back on before summer and joining. This in turn improves conception rates.
- Seeking out more fertile breed in the shedding sheep
- Rams are fed and maintained in excellent condition
- Weaners get 1 chances of having a lamb then culled
- Considered vaccinating ewes

Joining

- Joined at 1.5% Rams + 1 Ram
- Old Rams with young ewes and old ewes with young rams
- Time of joining determined by august sheering, lamb wounds need to be healed before shearing

Pre-lambing

- Prepare paddocks so there is enough feed to lamb in,(deferment of grazing paddocks)
- Sheep are kept in a fair condition
- Ewes are given a long lasting drench capsule which is given 3 weeks before lambing to ensure good health. Its expensive and difficult however it works very well.

Lambing

- Ewes are checked daily, if ewes are seen that are down or are having trouble lambing assistance will be given. However it is still seen to be a relatively hands free operation
- Have attempted separation of twins before, however it is hard to get scanners good enough to identify them. Believes that most ewes have twins and treat them accordingly, feed etc.
- Tries to give sheep good sheltered paddocks, however it doesn’t seem to make a difference as they are in full wool and appear to be happy to stay exposed while having lambs. Believes this is a real issue
- Believes merinos are fundamentally stupid compared to other sheep breeds. They excessive trouble keeping twin alive regardless of condition.

Marking

- Vaccinate the lambs 5 in1 s
- Will give vitamin B if the season dictates(an excellent season)
- Scabby mouth for the weathers
- Cull sick lambs

Weaning to First Shearing

- They are drenched into clean stubbles.
- Selenium chip is spread throughout the farm
- .They are given the priority stubbles
- Fed low amounts of grain over summer
- Weaners are monitored more than other stock on the farm

The big question regarding survival in this entity is impact of having lambing full wool ewes. He would like to see some research in this area to see if shorn ewes are more inclined to seek shelter for lambing than full wool ewes as he believes it is having a major impact on lamb survival.

Parasites Current and Historic Problems

There is knowledge of the main types of worms present in the flock, these being the brown stomach worm and the black scour worm. Barbers pole has never been an issue. This is known through the analysis from Fecal worm egg counts (FWEC). There have been some instances from losses, 20 were lost last year, this is known as the mob recovered directly as a result of a drench. It is believed that over time there has been low levels of wool production and some lack in growth rates from young sheep due to worm infections, generally it is felt a few sheep are lost every year to worms.

Worm Management

Worms are seen as a big issue in this enterprise and a lot of work goes towards managing them. Of the issues presented by worms, drench resistance is seen as having the highest priority, the other issues are dealt with as a matter of course. Very close to worms if not on the same level is lice infestations and Lice resistance. This is seen as a huge problem, something that might even need more immediate attention than worms.
Managing worms has always had a high priority and managing resistance has always been an issue since the manager took over his position. This will always be the way as it is a function of running a high stocking rate in this environment, however a new drench would definitely take the pressure off. Management believes there are two choices, have low stress sheep (i.e. lightly stocked system) or manage drench resistance.
Management are already taking up modern drenching techniques of leaving 5% undrenched as well as utilizing capsules to manage worms better. Its definitely more complex than previous systems however is happy with the effectiveness, especially of the capsules.

Practice Change and the Future

There is interest in genetically resistant sheep as a solution and are already working towards this end as would be the ultimate solution to worms. As mentioned they have already shown an interest in drenching reduced amounts of sheep so as to delay resistance. Through using the capsule (quite expensive) they have demonstrated that they will use an expensive drench if it works , thus the prospect of a new drench, regardless if it costs more will be well received.

Management Practices Currently Used to Manage Parasite Infection

Worm monitoring has occurred in the past however has been a bit remise at the current moment and feels some work needs to be done in this area. Has purchased microscope and rest of kit , but this has not been at the top of the list of things to get done.
Generally monitoring gets done in autumn before all the sheep get drenched pre lambing. The egg counts are sent to a vet for analysis and advice. Drench resistance gets monitored every few years and is due to be done this year.
They have been monitoring worms for the last 15 years and started doing this from advice from the local sheep consultancy along with leaving %5 undrenched which occurred several years ago. However they are not sure of any benefits received from the system changes they have put in place as they still have drench resistance. They live with a constant burden and its all about having sheep being in good enough condition and of tolerable stress levels to handle the worms. It takes around 20 minutes to collect the sample and costs around $20, this is felt to be a worthwhile investment as it results in some better production.

Current Drenching Practice

- Weaners are drenched at weaning onto a clean stubble
- Ewes are given a capsule 3 weeks before lambing, This is a capsule that contains several smaller capsules of different drenches that are released over an extended period of time , the cost is Approx $3.20 per capsule. The process of inserting the capsule is quite complex and only 250 are done per hour.
- Weaners are also drenched again in autumn
- Drenching practices have changed over time according to advice and development of resistance , originally everything was drenched in summer
- Drenching takes 2 people just over 2 weeks and costs around 13000.

Other management techniques to manage worms are to run dry ewes separately and to not drench 5% these are then run over the farm.

Future Management of Parasites – Drenching 30%

The management can’t see this as being a solution as it would be too difficult to select which sheep to drench, especially if they have a good coverage of wool. Sheep weren’t perceived to vary that much that such a decision could be made. He also observed there were several types of sheep, some that were fat and full of worms and some that were poor converters and had no worms and wondered how that could be taken into account. There was also a concern of bringing sheep in 4 or 5 times a year as every time sheep were brought in this increased stress levels which inturn may affect worm burdens.
Management are already sacrificing production to extend the life of drenches and estimate that 2% of production may be lost. Losing any more was not an option and felt there may be animal welfare risks, as it may lead to massive losses of livestock if things went wrong.

In summary management would like to reinforce the importance of managing lice and the fact that they maybe more of an issue than worms in the current future.

CASESTUDY CRC WA ER 0301

Enterprise Profile

The enterprise is 1200 arable hectares. It is located approximately 50 km's south west of Kojonup. The soil types are undulating duplex sandy loam over clay. The property receives on average 585mm, about 550 of which falls in the growing season, the soil types are a mixture of undulating gravely loams, sandy loams and grey sands.
Income is mixed, on average 65% income from wool and merino sheep sales, 10% Prime lambs, 10% crop, 5% vines and 10% from land leased to blue gums. The land allocation translates to 150 hectares of crop, 600 HA for sheep and 125 for trees .This area varies in accordance to the season, as this dictates the possible stocking rates that can be run. Given an early break the sheep can be pushed onto less area and more land can be cropped.
The sheep structure comprises 5000 sheep run in 8 mobs through the winter, this is comprised of 1000 ewes to XB and 2000 self replacing merinos. The terminal sires used is Black Faced Suffolk's. Breeding wise they look for easy care sheep. The ewes are kept until there mouths have broken and the wool has lost its style. The wethers are kept till 3 year olds then sold as shippers.

Production Goals

There is a production focus on the farm, at the moment they are keen to push the farm quite hard but are not keen to do this for ever. Cropping was focused upon for several years and now the push is definitely on sheep.

Sheep Production

Wants to run stock on average above 12 DSE and have great quality pastures to enable this, while having pride in the property and not running it down. Want to spend many years on the farm and want to maintain its beauty. Paddocks are deferred in autumn to enhance pasture growth rates, sheep are then set stocked for lambing and in the spring sheep are moved around so as to manipulate pastures.
Generally the ewes have good lambing rates which enables them to cull heavily and thus to have sheep that can handle higher stocking rates. Maternally, the ewes get two chances of having a lamb through there life and then they will be culled, would like to be tougher in this department , however the type of merino are late maturing and is not seen as fair.

NRM

There is a lot of NRM that happens over the farm, fencing off bush, putting drains to deal with run off, also looking into perennials to see what place they have on the farm. It is a very important part of the enterprise.

Non Sheep Enterprise

Non Sheep enterprise is comprised of cropping and vines
Cropping- All the seeding is completed by enterprise, this is mainly for sheep feed, however in the better years some cash crop is also put in and some labour is employed in these years. This has changed over the years from maximum tillage to minimum tillage. Low capital input in this

system. Very focused on getting soil tests done using the correct inputs. feels that they understand the profit drivers and focus on them.
Vineyard- Managed and run by the business, this has changed over time and has become automated over time, they seek out allot of advice in this area.

Labour

Husband and wife are seen as 2 full time labour units who do everything, crutching and shearing are full contract. All the vineyard work is done by the couple except for picking. 90% of the time is spent on the sheep enterprise.

Sources of Information

Gets information from other farmers, the media.(the country hour and rural press), journals, going to seminars that are important. Is reasonability fussy with seminars they attend.

Importance of Lamb and Weaner Survival

Lamb and weaner survival is vital to this enterprise, it is considered to be the start of the chain, if there are good numbers of lambs then culling can be heavier and refinement of the right type of sheep for the enterprise can happen sooner. This is perceived to be on the same level of importance as stocking rate.
Following this comes wool quality the general robustness of the sheep, this is seen as sheep that can go the distance and survive when things get tough, and they also need to be able to cope with worms. Originally robustness was the priority, however through research and over time stocking rate was identified as more of a profit driver and was pursued.
Issues that might influence the importance of abortive, lamb and weaner survival might be the continuing hike in grain prices, this would be due to the fact that more crop may go in and as a result there would be less time for all aspects of the sheep system this included. Banning of the live sheep market may lead to focusing on growing wool rather than the meat market as this would have a huge impact on all sheep meat prices, lamb included.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception Rates are believed to be in the mid 80’s, this is known due to scanning which is done annually.
- Losses prior to birth in the last 2 poor years have been 12% this is known through knowing conception rates and marking rates and not seeing the dead lambs in the paddock. However it was recognized that even going around the sheep 3 times a week that it is hard to count the dead lambs. This is again driven by pasture availability and health of the ewe.
- 5% are lost between lambing and marking this is fundamentally driven by food availability to the ewe and the health of the ewe, this is known through own observations and research. Depending on seasons these rates vary from year to year. it is also believed that most of the losses happen soon after birth again this is through observation.
- Only about 3% of losses occur between marking and weaning, again ewe condition drives this

- Approximately 7 or 8% are lost as weaners, again based on counts between weaning and first shearing. Again this is driven by the condition of the ewe during lambing and the health and the condition of the weaner.
- In poorer season believes weaner management needs to be better.
- Information has also been gained about all the above topics from sheep nutrition workshops and other seminars.

Observations of the Reproduction Cycle

Pre-joining

- Ewes are fed lupins with the aim getting to around 45 kg's, this is visually monitored
- The rams are fed grain 6 to 8 weeks before joining and their health is very important.
- Some breeding pressure put on ewes through culling after being twice dry.

Joining

- Joined to Rams at 1.5%
- Joining is for 6 weeks
- First of February joining for a first of July lambing. Believes ewes are at their peak fertility levels during this time

Pre-lambing

- Preg testing just for singles
- For the first hundred days they are fed to maintain them in score 2 to 2.5
- The last hundred days feed increases up to lambing.
- Emphasized the importance of ewe condition at day 100
- Ewes are drenched 2.5 weeks before lambing with a drench that gives 97.5% effectiveness.
- Paddocks are selected for shelter and quality of pasture.

Lambing

- Some predator control
- Relatively hands free, goes around the sheep 3 times a week.

Marking

- Vaccinate the lambs 3 in1 s
- Arthritis vaccination
- Scabby guard for the weathers
- Cull sick lambs.
- Trisolfurin on mulsed lambs

Weaning to First Shearing

- Weaners are tested and drenched and put onto a clean paddock if possible
- Selenium bullet

- Depending when the season dries off Vitamin e is drenched
- A preventative jet is given to stop flies
- Weaners are monitored more than other stock on the farm.
- A feeding regime is put in place, small amounts of feed given early and they are visually assessed.
- Is looking at putting weaners into smaller mobs and setting up feeders in their paddocks so as to give them a better chance of survival. Maybe even give them pellets and minerals.
- Do what it takes to improve their survival rates.

The manager noted that a lot of his responses are heavily influenced by the last two years as they have been very poor .

Parasites Current and Historic Problems

There is a high awareness of worm types. Brown stomach is the main type and there have also been infestations of Barbers Pole worms. They are aware of this through Fecal worm egg counts (FWEC) and analysis. Regarding the Barbers Pole worm this was recognized through the condition of the sheep- white lips and gums and a swollen neck.
There have been some major losses from worms in the past. In 2000 a mob of maiden ewes were tested and the advice was to continue monitoring and treat if required , they then began to lamb and then crashed, losses were around the 20% mark for the ewes and 50% for lambs. It was recognized to be worms through improvement in sheep post drenching.
This has changed his approach to drenching in the current program, if there are egg counts close to 400 before lambing then they will be drenched.
In general the worm impact on production losses is seen through poor weaner growth and death. This is also due to being focused on cropping during the time of year when weaners are most vulnerable. Testing Barbers Pole can take quite a while get results, this can lead to more losses

Worm Management

Worm management, associated losses and the development of drench resistance are all rated very highly. Stocking rate still takes priority, however on a technical level worm management and weaner survival come in on the next level, after these come culling for wool type and conformation of the sheep.
Experience and seeing the impact of worms on sheep annually as well off farm research has reinforced its priority over time. It is believed that it will always remain a high priority to the enterprise. Resistance as an issue is already being dealt with and the last few years have been spent dealing with it. They have gone from summer drenching to monitoring and treating.
Other possible management techniques such as cell grazing could be implemented, however these are seen as intense and difficult to manage.

Practice Change and the Future

Management believes breeding for resistant sheep, new drenches and systems that reduce the number of drenches needed are all likely future solutions to worm management. Of these breeding resistant sheep is a long term goal as it would make the operation more efficient.
Management strategies that reduce number of drenches that need to be given appear to be a clear way to slow resistance. Strategies that focus on animal health and feeding regimes to naturally

hold off worms through sheep being in better condition are also another possible solution. This could be done through perennials for out of season green feed and ensuring young sheep in particular are taken care of.

Management Practices Currently Used to Manage Parasite Infection

Worm monitoring occurs annually by having FWEC completed and analysed by the local vet. Drench resistance tests are completed every 3 to 4 years.

FWEC are completed when ever necessary, as there is no summer drenching program this is quite a regular procedure. Results are analysed by the local vet and advice is acted upon. This is in conjunction with giving vet information about sheep program and what condition the sheep are in.

Monitoring and drench resistance test have been happening since 1985.Drenching practices have changed over the last 2 years from summer drenching to monitoring the ewes and treating them when needed, this has occurred in response to increased fear of drench resistance.

The benefit from monitoring sheep has been improved animal health, less deaths and better production. It is also felt that drench efficiency has been extended.

It takes approximately 20 minutes to take a sample and approximately 2 hours to do all the mobs, this will be done 6 or 8 times a year with a cost of 50$ per test.

Current Drenching Practice

- Monitor and drench all sheep.
- All varieties of drench are used
- Cost is approximately $5000 and takes approximately 2 weeks a year.

Other management practices that occur are spelling of paddocks for drenched sheep to go on to as well as rotation of paddocks containing dry and wet sheep.

Future Management of Parasites – Drenching 30%

Not interested in this solution. This is due to concern that there may be sheep missed that require drenching resulting in sheep needing to be brought in several weeks later to be redrench the prospect of this is a “management nightmare”.
Not sure that the visual appraisal is enough to prove that sheep need a drench. This is a “dangerous” thing to do.
Not prepared to lose production to extend drenches life, feels that is what the current system is doing. Can’t afford to leave sheep undrenched as the current system relies on drench being effective. Maybe it might be ok if you were under stocked and had fat sheep however they “don’t have that much room to move so it has to be right the first time”, peace of mind is also important.
Future management of costs and resistance shall be managed through pasture management and having healthy stock.

CASESTUDY CRC WA ER 0401

Enterprise Profile

The enterprise is 2000 arable hectares. It is located approximately 60 km's south west of Kojonup. The soil types are a mixture of well drained gravels and paperbark flats with everything in between, there is very little heavy soil on the property. The property receives on average 600 mm, about 560 of which falls in the growing season.
Income is mixed, on average 35% of income from wool sales, 15% from meat sales and 50% from cropping (there is some contracting income here). This is represented by 50% area to crop and 50% to Sheep. This has remained consistent for the last decade.
The sheep structure comprises 14000 sheep run in 12 mobs through the winter. This comprises 4500 merino ewes, wethers that are kept till 3 year olds and some sheep that are traded depending on the season.

Production Goals

The production goals for the farm are to grow the operation, after being focused on funding succession for many years they are aiming at giving their children the best education opportunities possible. They are focused on running a profitable and responsible business, believe its important to look after the assets and are very aware of the costs of "mining "the land and not giving it back.

Sheep Production

The stocking goal is 11 DSE per winter grazed hectare, this can go out to 14 DSE and has dropped as low as 9 depending on the season. The focus is on maintaining cut while reducing micron. Sheep are important to the business as 40 of the farm is poor cropping country and won't be cropped. Aims to achieve 60 kgs of wool as an aim, more difficult now as crop gets a lot of the better country where before it went to the sheep.
Sheep are differed on cropping country to let the pastures get away and when possible grass and clover seed is harvested and spread over the pasture paddocks.
As mentioned traits selected for is micron and wool cut. Sheep are culled on wool colour, fecal worm egg count. Easy care type sheep are important. Ewe numbers are being built up so culling is not too heavy
Economically it is felt that the operation would be better off with a larger proportion of ewes rather than running so many wethers however after watching the stress farmers who have done this have put themselves under over the last few very poor years it is not an option. There is no escape without wethers, it's a great relief valve for the enterprise.

NRM

Have fenced off nearly all the remanent vegetation that will regenerate and look after its self, this is quite difficult as kangaroos eat a lot of the shoots. Everything is fenced to soil type and fertilized to soil type. Perennial pastures are being explored, however with the native wildlife these pastures need to able being set stocked. Drains are being used to remove water from flat country. Looking at farming the flat country differently as it will go bare otherwise.

Non Sheep Enterprise

Cropping enterprise rotates through several years, currently at a 3 year rotation, this depends on weed control and current gross margin for sheep. There has been change in cropping business from full cut disturbance to Zero till, allot more stubble is retained and since taking wheat out stubble burning has nearly been stopped.

Labour

2 full time labour units and about a month of casual labour are required. Crutching is full contract and shearing cost plus with no permanent labour required in the shed. All the cropping is completed by the full time labour.

Sources of Information

Gets information from independent consultants, reads a lot of scientific journals, attends allot of good seminar, very picky in this area. Participates in trials if he can see benefits for there operation.

Importance of Lamb and Weaner Survival

The enterprise is happy get a 75% to 85% weaning, particularly while wool is above $5 dollars, they are not hung up on achieving high numbers as long as they can sustain their self replacing flock. However currently sub 75% and looking for answers.
Has no idea about abortive losses and not too concerned. Lamb and weaner losses are felt to be directly attributed to management and labour spent on these factors. Stocking rate is a priority to these factors as is achieving 60 kgs per hectare of wool. Underpinning all of the above is the physiological welfare and A1 husbandry of the sheep this is just a given. “If you’re not prepared to do this then you should just run wethers”.
The priorities haven’t changed over time however when the farm was smaller they pushed everything hard as every post had to be a winner, they cut 60 kgs regularly and ration grazed when things were tight, however now they have expanded and scale allows them not to survive the bad years without going so hard.
Issues that might change this priority may be if animal welfare becomes an issue however this is probably more of an issue for those who live on a highway and are more in the public eye.
Management practices to improve survival are simple to put in place however the economics of this are hard to justify, examples of this is preg scanning and separating twins . “Cant understand why after two inches of rain people are bothering to do this when they are going to have grass coming out their ears this year”.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception Rates are unknown, only preg scan in poor season, has been high when this occurs. Don’t believe its economic to preg scan.
- Losses prior to birth are believed to not be significant
- Losses between birth and marking are thought to be 10% as no scanning and not in the habit of picking up dead lambs, however would not be surprised if it was quite high, also believes a lot of these occur at birth. Believes a weather event can have a big impact on lamb survival. This is regardless of shelter. This comes from seeing a lot of dead lambs

after a winter storm. Also believes birth weight is a big driver. Perhaps foxes also have an impact however unsure.

- According to numbers business loses about 3% between marking and weaning, this is caused by arthritis, impact of mulesing and miss mothering.
- Weaner losses are between 1-2% again this is known through shearing numbers. This is caused by a combination marking issues and mismanagement, an example of this is a fly attack last summer where losses occurred, worm management is also important.
- Generally this is a combination of observation, experience and looking for reasons for things happening.
- Would like to be able to cull ewes that lost lambs, believes this is extremely heritable (according to CSIRO paper read).

Observations of the Reproduction Cycle

Pre-joining

- If the previous season is poor then the ewes will be weaned on time to ensure the ewe has the best chance of putting condition on in time for joining.
- If farm received a summer rain that degrades dry pasture then the sale sheep are shorn early and sold so as to give better feed to the ewes.
- Aim at keeping ewes in good condition, usually some hand feeding starts mid February.
- Rams are fed up in early summer
- Some breeding pressure put on ewes through culling after being twice dry.

Joining

- Joined in late February.
- Joining is for 6 weeks, used to join for 5 however not seeing a tail of lambs from the last week and it was convenient to go for 6 this year.
- Rams Joined at 1.5% to 2% for maidens.
- Ewes are put on the remnants of a fodder crop to try to improve there condition.

Pre-lambing

- The tail of the ewe mobs will be separated and given a higher feed ration to get them up to par with the rest off the ewes.
- FWEC are taken and drenched if need be.
- All sheep will be on cropping paddock to defer the lambing paddocks for as long as possible.

Lambing

- Some predator control
- Not keen on feeding lambing ewes. Last year had the option to spread urea on pasture or feed and the urea option worked well as the pasture responded.
- Are into minimum intervention.

Marking

- Vaccinate the lambs with pk teck selenium? 3 in1 s
- Arthritis vaccination
- Scabby guard for the weathers
- Cull sick lambs.
- If it is a lush spring cobalt will also be given

Weaning to First Shearing

- Shall get an effective drench through drench resistance testing
- Drenched onto standing oat crop , where they stay till April at about 40DSE
- They are jetted with vetrizon for flies as a preventative measure.
- Water quality has to be good
- Likes to make sure everything is right for them so there are no excuses for them to die.
- Also has been impressed by the welfare advantages of clipped lambs, thinks it didn't knock them around as much as surgical mulesing.

Parasites Current and Historic Problems

Worms are recognized to be brown stomach and black scour worms this is identified through FWEC results
They lost 100 out of 1500 hoggets last year. They were grazing a tight pasture and did not recognize the problem quickly enough. Knows that this was the problem due to response of drench after treatment. Have also had production losses in wethers, this occurred last summer when they were grazing rain affected stubbles. The wethers were on track for the export market when a worm infestation set them back, 20% instead of 70% made the export market, 40% of the remaining sheep were sold as forward stores with a $6discount and the rest are still trying to be fattened.

Worm Management

Worm management associated losses and worm resistance are an integral part of managing sheep. Deaths and production losses particularly are unacceptable. Management felt that "if you're not across these issues then you should be somewhere else". Stocking Rate was still believed be the priority as it drives profit however if worms are not controlled then there would be no stock! Other general sheep management came secondary to worm and general parasite control. Worms have always been prioritized as such. This is because worm management has always been a critical part of animal health and substandard control will not give you an economic farming enterprise.
Loss of effective drench or non appearance of a new type would make worm management even more important, this is why FWEC is an import breeding. Also scouring will be more costly with non mulesed sheep as they will be more inclined to get struck by flies.
It is understood that management options that could be put in place vary in time and cost. The breeding option can be slow and relatively inexpensive or if solely focused on and embryo transfer technology, excreta was used it could be very expensive and completed in a few years time. The current 50/50 cropping mix and running large amounts of wethers is a great help in

managing worms as the wethers handle the worms very well and the cropping paddocks are a great dumping ground for worm eggs.

Practice Change and the Future

There is strong faith in all the future technologies available for worm control and it is believed that it will be a combination of breeding (long term), new drenches, and pasture management will be the solution. It was suggested in particularly that a focus should be given on in paddock spraying, why not when praying red legged earth mites can't a spray be used to kill the larvae as well. The same for the cropping faze with other bugs. The big prize however will be working to the genetically resistant sheep as time wise and cost efficient wise this is the only long term solution.

Management Practices Currently Used to Manage Parasite Infection

Worm monitoring is a routine activity, resistance testing also occurs every 2 years and has done so since 1985. Young sheep are monitored at the break of the season, young ewes are egg counted pre marking (so they can be drenched at marking), older ewes are monitored and drenched.
The samples are analysed and advice received from vets and consultants, generally make their own decisions based on advice rather than blind faith.

Since starting the practice in 1985 have learnt when its important to monitor sheep and also which drenches to get tested and what not to worry about. This has all come from experience. The major benefits have been a more profitable sheep enterprise and the extended life of drenches used. Monitoring takes about 2 days of time per year, again over time have become smarter and more efficient at doing this. The annual cost is around $500 and the advice is inbuilt in consulting fee.

Current Drenching Practice

- Weaners are drenched onto stubbles
- Young ewes monitored just before marking and treated at marking if need be.
- All wethers are summer drenched- 5% of the older wethers are left undrenched and strategically rotated around paddocks over the whole farm
- All young sheep are monitored and drenched if need be at the break of the season.
- Drenching takes about 2 weeks and costs approximately $10000
- As previously mentioned utilizing wethers and crop stubbles is also another part of worm management.
- New sheep coming onto the farm are all drenched.

Future Management of Parasites – Drenching 30%

Feels the solution will work however as they are running a low input labour system, running sheep through the yards 3 or 4 times a year really concerns the management. Time wise they would prefer to hone the current system, this might mean drafting the tail off the mob and drench the 30% that appear that need the treatment. This is quite easy with a bike in a laneway. There is acknowledgement that probably only 5 % or 10% only require drenching.
The business is already sacrificing production through leaving 5% present in the flock. Also in the years when they use a less effective drench there is more scouring and dags which results in

less wool. Welfare is a big concern and is not sure how going past 5% undrenched will be managed.
If the 30% option can’t work then the “whole package will be the long term solution”.

CASESTUDY CRC WA ER 0501

Enterprise Profile

The enterprise is located 20 km's North of Kojonup and is 1013 Hectares, 772 of which is arable. Rainfall is 450 mm with most of it falling in the growing season. Soil types can be described as undulating gravel on clay represented by Wandoo and Jarrah trees. Income is mixed with 55% coming from wool, 26% coming from sheep and 19% from crops. Land allocation is 65% sheep 35% crop.

Sheep numbers have varied depending on the amount of crop this has ranged between 3500-5500 sheep over time. Over winter these are split between 13- 14 Mobs. 75% are self replacing merinos and 35% are joined to terminal sires.

The sheep are mostly set stocked, however over time with more crop being planted there has been more stubbles and this has given them more opportunity to defer pasture paddocks at the break of the season so as give pasture more opportunity to grow.

Rams are selected on above average wool production, body weight and finer micron. Breeding pressure is placed on the ewe hoggets through weighing being part of the selection criteria. Body weight is seen as being correlated with fertility. If ewes miss twice in the first 2 years they are culled.

Production Goals

There has been renewed production pressure on the operation with a family member being more involved in the operation. This had led to production being ramped up to fund this involvement and the potential succession in the future. Keeping the farm in good condition is just a given and wont be compromised.

Sheep Production

The main sheep production goal is the increasing of stocking rate while at the same time maintaining lambing percentage and thus increasing lambs per hectare .They also want to maintain wool cut per Hectare.

This has changed from mainly being focused on achieving the highest lamb percentage possible. The reason for this change has been through research and information received based on factual benchmarking.

NRM

All of the creeks and bush have been fenced off and trees planted. Drains have also been put in in salty areas.

Non Sheep Enterprise

The cropping enterprise originally only produced oats for the sheep. Now there is a mix of cash crops grown and longer term paddock rotations are in place, with the better paddocks being given to this enterprise. They now also use an agronomist for advice. The machinery used is reliable

second had equipment that suits the size of the business. They seed the crop themselves and get a contractor to harvest it for them.

Labour

1.5 labour units are involved, this involves classing during shearing, pushing up sheep at crutching and doing their own marking. They do there own seeding and employ contractors for spraying and harvesting. Approximately 80% of the time is spent on the sheep system.

Sources of Information

Information comes from an independent agronomist for crops and pastures, attending seminars, subscribing to journals and the rural press. They are also members of a local farm production group as they believe they have different environment to south Kojonup.

Importance of Lamb and Weaner Survival

Nutrition and animal health are seen to be the most important drivers of production on the farm. Once these are covered everything else is generally ok.
Of the lamb survival issues, abortive losses are not a concern as they don't believe there are any problems, weaner losses are also minimal lamb losses are important as this is where the biggest losses occur and they would like to improve on this.
Nutrition has always been the priority due to the welfare of the sheep and the economic benefits that this gives.
Due to the current cost of grain they are considering decreasing the amount of grain fed to ewes over summer and the cost efficiency of doing this while sacrificing some lambing percentage at the same time. The economics of this are seen as quite complex as lambing percentage drives the ability to cull heavily, also the amount fed over summer and autumn drives lamb size which drives weaner size and thus weaner mortality, so its not easy to work out.
Other management practices that could be used to improve survival rates are fundamentally giving more nutrition to the ewe and the lamb. This is difficult especially in a poor season when no matter how much is fed it doesn't seem to effect survival. This also tends to lead to mismothering. In a good season survival doesn't seem to be an issue.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception rates are approximately 90%, have scanned before
- Is not aware of abortive losses, don't think many are lost
- 5-10% lost between birth and marking, this is mainly at birth, the main cause of this due to lack of feed and poor weather events. During poor season has also seen many ewes walk away from twin lambs.
- Not many losses between marking and birth
- 2 % lost as weaners mainly through poor condition, mineral deficiency, (lost some to cobalt deficiency)flies and natural selection.

This is based on observations, counting sheep at various processing times and picking up dead lambs.

Observations of Reproduction Cycle

Pre-joining

- Rams are fed 6 weeks prior to joining
- Ewes are fed oats and lupins starting 2 weeks pre joining , this is increased by 50% 1 week before joining and maintained for 4 weeks then reduced, this has been believed to increase lambing by 10%
- Rams testicles are checked
- Rams are drenched

Joining

- Ewes are joined in February for fecundity and time of lambing purposes
- 2% Rams and 3% for maidens
- Joining goes for 6 weeks

Pre-lambing

- Feeding continues to break of the season
- Maiden ewes and rams are drenched
- Maiden ewes and ewes that have missed the previous year will be scanned along with ewes that are going to be sold at the end of the year.

Lambing

- Feeding if need be
- Sheep get checked every second day, if a mob having problems then every day and lambs get pulled if need be. Most assists result with a dead lamb

Marking

- Wet and dry ewes, separate and treat differently so as to give lactating ewes priority feeding
- Ewes that are in their last year that are dry are sold so as to give more pasture to the sheep that need it
- Glanvac 3s vaccination
- Arthritis – Airyvac
- Used to drench lambs however observation over time convinced them it was not worthwhile.

Weaning to First Shearing

- Second vaccination
- Selenium bullet
- Drenched after harvest onto stubbles towards the end of December.
- Weaned on to spray topped paddock with low levels of lupins being fed, this is increased to 50 grams per head per day on stubbles and oats as quality of stubbles decreases

- Stock licks given
- Crutched wigged and Jowled in early December to help with fly control and grass seed control
- Will jet when necessary.
- Arthritis is a concern in merino lambs can lose 2%, doesn't seem to matter what is done, Mulesing in paddock and good hygiene doesn't make a difference.

Parasites Current and Historic Problems

Are generally aware of worms however not concerned as uses broad spectrum drenches. Has never had major losses from worms. Notices hoggets falling away during autumn and presumes there is some minor loss in production, however they are treated soon after as a matter of course.

Worm Management

Nutrition and animal health are priorities for the business. However due to there being a very effective worm management system in place, losses and production losses are minimal , therefore it is felt to be very much in control. This then makes lamb and weaner mortality more of a priority as this is felt to be more out of management's control and thus requiring more management. Worm management is seen as "like putting fertilizer on, you just have to do it".
Of the issues presented by worm management, resistance has the highest priority as losses are under control. If resistance becomes worse than this would prioritise worm management.
Current available management practices that could be used to defer resistance such as taking egg counts, drenching when necessary and leaving some unbranched are seen as difficult time wise and based on reports farmers who have utilised it as being unreliable. Examples are farmers who have not drenched in summer, made errors with autumn monitoring and then have had lambing ewes crashing with worm problems, which is seen as unacceptable.

Prefers the preventative method as it is reliable, does not believe the AG department as they have been wrong before.

Practice Change and the Future

They see the future of worm management involving a combination of different strategies such as genetically resistant sheep and a combination of improved pasture management strategies and improved sheep nutrition. This is because new drenches will only get resistance, and people are demanding less and less chemicals in their food. For this reason they also don't believe in chemical shearing or chemical mulesing.

Management Practices Currently used to Manage Parasite Infection

Worm burdens have been monitored occasionally in the past out of interest and to also analyse drench resistance. The business is closely involved with their neighbour and now base drenching chemical on the neighbours drench resistance tests.
The enterprise has a summer drenching program where all the sheep are drenched regardless of worm burden, thus monitoring is seen as a pointless exercise.
When the tests have been done, they have been processed, analysed and advice given by a vet.
Current Drenching Practice

- All sheep are drenched in December and January
- Maidens, weaners and Rams are drenched in April
- All sheep are drenched on to clean stubbles if possible.

Drenching Method

- Muster late morning, Drench next morning, return to paddock after drenching.
- This method of emptying sheep for 12 hours and not putting them back in the paddock for 6 hours is believed to improve effectiveness of drenching from 80% to 90/95%.
- History of resistance tests and rotations of chemicals have been kept for the last 20 years. Currently rotating between Ramitin combination and Abamectin.
- Culls poor doing sheep that are more susceptible to worms.
- Drenching takes approximately 1 week and costs $3900

Future Management of Parasites – Drenching 30%

For all the reasons already given previously regarding leaving sheep undrenched, (such as unreliability of system) they don't feel this system would work.

The mechanics of actually selecting and doing it are quite easy, however the impact on other parts of sheep management are not acceptable.

The same can be said for the impact losing production, its not worth the risk.

The business will look towards the solutions of integrating worm resistant sheep and pasture and nutrition solutions to solve the problem of drench resistance.

CASESTUDY CRC WA ER 0601

Enterprise Profile

The enterprise is 2576 ha. It is located approximately 30 km's south west of Kojonup. The soil types can be described as undulating medium heavy loam, granite and iron stone Rainfall received is approximately 500 mm 80% of which falls in the growing season.
Income is mixed between 10% wool, 25% lamb sales and 60% from cropping and 5% from other sheep sales. The allocation of land is the reverse this with 60% going to sheep and 40% going to crop. This has moved over the past decade with more area going into crop and move towards prime lamb production.
The sheep enterprise comprises 7500 ewes. 40% of these are 1st cross boarder Leicester merino cross mated to Poll Dorset, 40% are merinos mated to boarder Leicester's, and 20% are merinos mates to Poll Dorset. Trades merino ewes and keeps them for 3 or 4 years apart from the boarder Leicester ewe lambs every thing else is sold as lambs.

Production Goals

Whole farm production goals are to maximize production of every hectare of land, this involves growing the most profitable crops possible and growing as much meat per hectare as possible. They ask a lot of the land but are very focused on giving back to it as well. They are also keen to increase the size of the operation. Having said all this management are also determined to spend as much time with their children as possible and this rates as highly as the production of the farm.

Sheep Production

They aim to achieve12 to 15 DSE per winter grazed hectare depending on the season, 10 years ago this was only 8. To do this they have done a lot of work on pastures and fencing off of crop areas and pasture areas with pastures fenced to pasture type. The ewes are joined and left on stubbles for as long as possible, the purpose being to let pastures get away at lambing time, this is seen as vital in an early winter lambing system .
Regarding breeding, rams are purchased that have low fat and high growth rates, with a definite maternal push on the ewe side. The Merino's purchased are a large plain framed animal from the wheat belt, local sheep are too small. All the ewes are preg tested and they are culled if they are dry. If the ewes lose a lamb they are also culled.

NRM

All of the creeks and bush have been fenced off and trees planted. Deep Drains have also been put in so as to reduce rising water levels. Most dams have big drains leading into them to harvest the water. As mentioned earlier giving back to the farm is important.

Non Sheep Enterprise

The cropping enterprise is a big business; there has been a big increase in focus over time. They have gone from full cut combine to now having an air seeder with knife points and Zero tillage. They also now employ an agronomist. They see themselves as high input croppers in both

machinery and fertilizer. They can see themselves getting into guidance systems soon. The main reason for purchasing the air seeder was the ability to get the crop in quicker and to be able to traverse between farms more conveniently. Combine is still in the shed in case of very wet year. Has been into 1 pass technology for a approx 15 years, - change is due to time manage and economic advantages.

Labour

2 full time labour units and employ .8 of unit. They do all there own seeding and harvesting. Shearing is full contract and they push up for the crutching contactors. About 60% of time is spent on sheep.

Sources of Information

Information comes from an independent agronomist for crops and pastures. Stock agents are another source of information. Reads allot of the rural press and other information that goes over the desk. Information from peers and own experience are also important.

Importance of Lamb and Weaner Survival

As this is a meat based sheep system, Lamb survival is critical, weaner survival is not as important as most of the lambs are gone before this happens. Weaner survival ejt the XB sheep that remain is a non issue in compassion to how it was with merino lambs. However sheep nutrition and animal health take priority over this issue and are seen to be intertwined with the success of the lambing enterprise. Marketing of lambs and lamb weight off the farm has the next priority. This has always been the way as they see this as the most profitable way to run the enterprise. If the sheep aren't healthy and issues arise, then time management gets put out and this is vital to the business. Also experience has shown them the cost of taking eye of the health of the sheep particularly in a bad year.
They have identified the current time of lambing to have the biggest influence on losses at lambing (lack of green feed in May and early June). They would change this if consumer demand dictated a later lambing date rather then the current one which makes it necessary to have all the lambs ready to go by the end of the year (all lambs are sold to export market). If they had a self replacing merino flock they would look to lamb in August as it is seen as an easier system and would result in better lambing percentages as there is no shortage of feed for ewes. With the current meat based system to change time of lambing would take whole system change.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception rates are 90% (scan for singles).
- Losses prior to birth are thought to be 5%, this calculated through conception rates, marking rates and numbers of dead lambs on the ground or lack there of, it is still an estimate. Not sure what causes this- perhaps clover issues and a major stress issue. Also the law of averages dictate that some will miscarry
- Losses between birth and marking are estimated to be 10 to 12% percent however when taking into account the amount of twins in the mob it may be higher. 95% of these happen at birth , this is known as the dead lambs are picked up. This varies very much with the season and is mainly due to lack of feed and mismothering due to disturbance from

feeding sheep through this time. Also predation through wedge tail eagles. Bad wether can also have an impact.

- Average lambing % with dries in is 95% and with dries out its 100%
- Very few are lost between marking and weaning.
- Weaners losses are minimal, less than a percent, in exceptionally bad years will lose some more , may have been a selenium issue.

Observations of the Reproduction Cycle

Pre-joining

- Rams are kept in good health
- Their testacies are checked
- Rams receive lupins 2 weeks before joining .
- Ensure they are free from fly strike
- Breeding pressure put on ewes through culling after being once dry.
- Ewes are drenched onto stubbles prior to mating.
- Focus is placed on ensuring a rising plane of nutrition is given to the ewes.
- Sick ewes are culled.
- The rams are a high fecund breed
- The Rams all come from twin or triplet baring ewes.

Joining

- Rams are joined @ 2%
- Joining is for 6 weeks

Pre-lambing

- Maintaining ewe in condition score 2 to 3, this done through hands on and observing the sheep.
- Scans ewes , Dries are sold so more feed for the joined ewes.
- Is looking at drenching with long acting capsules.

Lambing

- If there is good feed then there is some monitoring but not much. If poor feed then monitoring 3 or 4 days a week as well as feeding lambing ewes. Lambing ewes are assisted
- Pastures are deferred so as to try to give them as much feed as possible.

Marking

- 5 in 1 vaccine used.
- Scabby guard all lambs
- Lambs not going to export are tailed.
- 1st cross ewe lambs are mulesed

Weaning to First Shearing

- Lambs are drenched in august
- 1st cross ewe lambs that are being retained are drenched onto stubbles.
- Maintained in general good health.

Reinforce fact that Time of lambing is the biggest driver of lamb mortality, however the market drives time of lambing.

Parasites Current and Historic Problems

Generally aware of the worm varieties that are on the farm, have had black sour and brown stomach worm. Once had barbers pole in sheep purchased from south coast. Sheep looked good but started dying, identified through FWEC, treated and problem ceased. 25 sheep were lost. Over time have lost production , an example was last years weaners that got down in condition and proceeded to get even worse due to worms. Production losses are seen as when lambs don't reach target weights and fail to reach intended export market.

Worm Management

Managing both animal loses and production losses(lambs failing to make intended market) are both very important and along with sheep nutrition and general animal health take priority over lambing issues and are seen to be intertwined with the success of the lambing enterprise . Marketing of lambs and lamb weight off the farm has the next priority. This has always been the way as they see this as the most profitable way to run the enterprise. If the sheep aren't healthy and issues arise, then time management gets put out and this is vital to the business. Also experience has shown them what can happen when eyes are taken of the health of the sheep particularly in a bad year. Drench resistance is not a big issue as a lot of ewes are traded therefore it is felt that little control can occur here.

If worms became resistant to all drenches then the business would have to rethink its management system- this would not be a resistance management solution for as mentioned they trade sheep.

Some of the options out there to manage worms such as leaving sheep undrenched are mechanically easy to implement how ever I can't see how they would work and they are not pertinent to the sheep trading system.

Practice Change and the future

Believes the future solutions to worm management will be new drench chemicals. They currently employ pasture management strategies utilizing stubbles and setting up clean paddocks for lambing.

New drenches will be the best option for their system as they will then be able to continue the effective system that is already in place and it would be another tool in the management of mixed sheep that come onto the farm. It would also be the easiest option.

Management Practices Currently Used to Manage Parasite Infection

Worm burdens have been measured over time, probably 4 years out of 10, it was done to measure worm burdens so as to put a strategy in place of when to drench, this was put in place and advice followed, the results from this was seen as a "Disaster", sheep were in poor condition all year, sheep that were advised to only use less than effective drench on died. This put them off

monitoring and acting on the results in general. They tried this three times over thee different years and the results were the same every year.
Following this they went back to summer drenching with a broad spectrum drenching system of rotating moxidectin, abomectines and combinations.
Current Drenching Practice

- Drench all sheep in winter with abamectin and maxi min(minerals)
- December Drench all sheep
- It takes 2 people about 2 weeks to do all the drenching and it costs $4000
- Pasture management (rotation) is also a big part of this as well.

Future Management of Parasites – Drenching 30%

The business is open to new strategies if they are proven and if the economics are right. Issues such as lifting production of sheep that don't look like they are suffering is something that the business found very interesting, as it may result in economic benefits.
They are very much aware that they have to produce what the consumers want. Thus if there were marketing advantages and incentives to not drenching sheep then options would be looked at. "there is no point growing lambs if no one will buy them, have to provide what the customer wants".
The business would be prepared to lose as little production as possible if it helped market their product. There would need to be evidence it worked and the economics of it would have to add up.
Other ways of managing resistance and rising costs are seen to be keeping aware of new strategies and being open to new ideas. They not happy with current options through bad experience but this would not stop them from trying different ones and being involved in trials to do so.

CASESTUDY CRC WA ER 0701

Enterprise Profile

The enterprise is 4600 cleared and effective hectares. It is located approximately 40 km's North, North East of Kojonup. The soil types are a mixture of undulating granite hills, valley floors that are prone to salt and everything in between. The property receives on average 350 mm, about 320 of which falls in the growing season. The enterprises are mixed between Wool, prime lamb, cropping and contracting. The area is split between 3000 Ha of grazing and 1600 Ha of crop
There are 17500 sheep which are run in 12 mobs through the winter. This comprises a small stud of 350, 6000 merino ewes, and 2300 ewes joined to Hamshires and Samms. They like the Hamshires as they have black faces for ease of management. The rest is made up of wethers which are generally kept till 3 year olds. Ewes are kept until their mouths have broken.

Production Goals

Goals for the operation are to provide a mix of income streams, do it all consistently well, rather than perfect "would rather get 7 out of 10 twice rather than 10 and 3" .maintaining the land in good condition is also important.

Sheep Production

Management are keen to increase wool cut per hectare, they also want to run an easy care extensive operation that utilizes all the pasture that they can. A good indication for them is come the end of autumn all the pastures and stubbles have been eaten down and most of the grain in the silo has been eaten, they then they have done it just right. This translates to a stocking rate between 10 -12 DSE WGH depending on the season.
Currently the grazing strategy is to defer pastures at the break of the season, set stock during winter and to move sheep around in late spring so as to manipulate pastures for the following year. This has changed allot over time as earlier there used to be less deferment, less fertilizer and less management in general. There is also more perennials and more efficient use of fertilizer, its not wasted on poor soil. The changes have proven themselves over time through improving gross margins.
Breeding wise they are aiming for a plain bodied easy care sheep without blowing out micron and cut, they are also looking at FWEC as a factor. The ewes get two chances to have a lamb and are then culled.

NRM

There had been an extensive landcare program this has been done to reclaim land, (there is lots of valley floor that is quite salty) this has involved developing raised earth beds, surface drainage and planting of more salt tolerant plants. There has also been fencing off of creek lines and remnant vegetation. NRM is a big part of the operation

Non Sheep Enterprise

This is comprised of a contracting enterprise and cropping. The contracting takes up about ½ a day a week. The cropping enterprise has a large emphasis and it is important do to it well, it also

must complement the sheep enterprise. The crop has to be a sustainable program as they would like to crop into the future. They are very aware not to “mine” the farm. Cropping management has changed over time from full cut and several workings to now using one pass, knife points, auto steer and liquid fertilizer. It is also planned well into the future, they are aware of what will go where 2 years in advance.

Labour

This operation has 4 full time units and one part time unit that is called on during intensive periods of harvest and seeding. About 60% of the time is spent on the sheep.

Sources of Information

Information is sourced from seminars, the rural media, district practice which is picked up on when out doing contract work. Consultants are employed as a sounding board for ideas. An agronomist is also used mainly for chemical solutions to weed issues.

Importance of Lamb and Weaner Survival

Abortive losses and lamb losses are not a huge concern as it is felt there is little in the current system they can do to have an impact. Weaner losses however are important as it can be managed and losses restricted. Stocking rate is a priority and this won’t be sacrificed before lamb mortality. Having said this general welfare of the stock is the number 1 priority along with nutrition. Genetics are also seen as being at the core of the sheep system due to the importance of running a healthy easy care flock. Wool quality and issues that they lack control over such as marketing are secondary to lamb and weaner survival.

These priorities have been the same for the long term because they feel they have the system right. There is an acceptance that part of running a high stocking rate is accepting a lower lamb % and they haven’t seen any economic rational to say otherwise.

This may change if it was shown through benchmarking that it is worthwhile to invest more in lamb survival.

Management techniques such as “managing ewe condition” and better matching of supply and demand of the ewe are technically difficult and time consuming and with the current price of grain it makes it hard to justify.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception Rates are 90% this is from previous scannings.
- Losses prior to birth are suspected to be up to 10%, this is from observations between scanning and lambing. Not sure why
- Losses between birth and marking could be up to 15% According to numbers counted between lambing and scanning, about 70% die at birth and quite often this is caused by cold snap or a storm. Poor ewe nutrition also has a large influence. This varies hugely between seasons. Feeding lambing ewes is also a disaster that can only add to losses. This is concluded through experience, study and observation.
- Loses between marking to weaning is around 5 to 10 % depending on season, calculated over time. This is driven by amount of pasture available for ewes. This is forced by the fact they run a high stocking rate

- Weaner losses are around 10%, again from counting. This comes from management – depends on the skill and interest level of staff. Weather events can also kill weaners (a storm post shearing)

Observations of the Reproduction Cycle

Pre-joining

- Feed lupins to stimulate ewes
- Rams are shorn early
- Rams are checked out 6-8 weeks before joining
- Ewes have a FWEC and are treated before joining.
- ewes are checked for lice and general health

Joining

- joined for 7 weeks
- joined in late January
- XB are joined in December, Conscience of not going to early so as there is feed available when they lamb
- Rams Joined at 2% to 3% for maidens.
- Teasers are used

Pre-lambing

- Feed continues
- Like to see the ewes improving during joining or at least staying at condition score2.5 until the break of season, they will then improve from then on.

Lambing

- Have tried separating twins and preferential feeding barley but not much success.
- Every 2 or 3 days they go around the ewes and pull lambs if necessary, however are not looking for trouble. Ensure that the ewes are good condition.
- Some fox control
- If they have to feed they will.

Marking

- Happens in the paddock as it helps with mothering up and stress levels (of sheep)
- Vaccinate 3-1s
- Scaby guard for wethers
- Ewes are wet and dried, this is for the purpose of culling twice dry ewes)
- Scouring lambs are drenched
- Sick lambs are culled.

Weaning to First Shearing

- Vaccinate at weaning 3 in 1 s

- Selenium with a bullet
- Manage general health
- Drenched onto hay paddocks that are clean of worms and have good regrowth.

This is the first year they have vaccinated and they are keen to see numbers on the effectiveness of it, vaccination has occurred due to pressure from family members that have returned to the farm

Parasites Current and Historic Problems

Worms are recognized to be brown stomach and black scour worms this is identified through FWEC results
Ewes were lost in autumn, they had symptoms of looking anaemic no blood vessels and generally wormy. This was confirmed by the response to drenching.
Some production loss has happened from time to time, the stand out being use of a drench that didn't work after getting poor advice. Have recently been using worm boss and are aware of production losses that can occur. However it is still hard to quantify.

Worm Management

Because worm management is closely associated with animal health it is given a high priority. Within worm management, animal loses are not a high priority as they rarely happen. Management of production losses and development of drench resistance are seen as more crucial and they have changed their management system to deal with it.
It is important that treatment fits in with other practices so as to be time efficient (such as shearing). Of recent years ensuring sheep have access to quality water has been more important then worms. Worms being an issue is seen as a management malfunction, it shouldn't happen.

Animal health and welfare has always been a priority as they allow the business to push stocking rates as hard as they do.

Resistance is a major concern and any new or better methods of handling it would change the way they manage worms.

Regarding management practices that can be used to improve worm control and resistance it is felt they are complex and that there is lack of conclusive advice regarding what works. It is felt that there is a lack of understanding of how important it is to get worm management right in a high stocking rate environment. It is also difficult to go from the silver bullet that is summer drenching to a fully integrated worm management program.

Practice Change and the Future

In the long term genetically resistant sheep are some thing that one day might be the answer however it is believed it will take a while for them to meet the other criteria that is required by a profitable sheep.
A new drench would also be welcomed, especially going into a drenching regime where less drench resistance pressure is being placed onto the product.

Management Practices Currently Used to Manage Parasite Infection

Worm monitoring is a routine procedure that has happened for the last 4 or 5 years, over the past two years it has gone from 2 to 3 times a year to 4 or 5 times a year. This has occurred due to new management practice and more of an emphasis is placed on resistance management. Before this it was a full summer drench

Self analysis is used to asses FWEC. The Worm Boss program is used to assist with recommendations, The Ag department is also consulted if it is a grey area.

Drench resistance has been monitored for the last 4 or 5 years. Worm burdens are taken at senescence before summer and at the break of the season in autumn.

When started monitoring it was based on a modified summer drench program, following messages from research and after getting more organized they have gone to a system of drenching when sheep require it. The benefits of which have been hopefully getting a better grip on drench resistance and less production loss to worms.

Monitoring and testing takes approximately 2 weeks a year, the cost of which including our labour and the purchase of equipment to do it.

Current Drenching Practice

- Weaners all get drenched onto stubbles
- All sheep get monitored at senescence and are treated if need be.
- All sheep are monitored at the break and treated if need be
- In summer use a 95% effective drench, in winter use a 75 % effective drench.
- If sheep look like they have an issue they will be monitored
- Drenching costs approximately $6500 with labour included. Time wise it is incorporated with shearing and it takes approximately 2 weeks a year to drench the required sheep.
- Utilization of clean paddock and focusing on good sheep nutrition are other management strategies that are used in conjunction with drenching.

Future Management of Parasites – Drenching 30%

There is concern about the skill level of labour required to select the bottom 30% of a mob, It is seen as something that is hard to teach. An option may be an auto draft set at a certain weight so the lighter 30% are drafted off. The labour would then not have to think about it. The gains made may even pay for the purchase of machine.(if the scale of operation was right).

Amount of production willing to be sacrificed for delaying drench resistance depends on the economics and how much grace the sacrifice would give. They already sacrificing a small amount however find it hard to put a number on the amount. Regarding marketing zero residue products this would again depend on the economics.

If resistance becomes too hard or too expensive then they shall look at the situation and the technology available at the time and make a decision. It may well mean that its time to get out of sheep. They are hoping genetics may have reached a point of being a viable answer by this stage.

Management would like to see research driven towards low input sheep and new technology to take the subjectiveness out making technical management decisions such as drenching.

CASESTUDY CRC WA ER 0801

Enterprise Profile

This enterprise is 2000 hectares, 1600 of which are cleared and effective. It is located 36 km's north west of Kojonup W.A. It receives on average 465mm of rain 90% of which is received in winter, the land is undulating sand though to granite with a high gravel component.
Income wise 22 % comes from crop, 35% from livestock sales and 43% from wool, this is reflected in the land allocation of 75% Sheep and 25% crop, this has varied very little over the last decade.
The sheep structure comprises 9743 sheep with roughly 75% merino and 25% Cross Bred, the ewes are kept to 6.5 years of age. The weaner wethers were kept to 3 years classed, however now all are kept to 2, resulting in an overall fining of the wool, they are sold to export.
The Cross bred operation uses older ewes culled for age but are still sound breeders, he uses these rather than the culled hoggets as they have a greater maternal ability, less lambing trouble, bigger lambs and more lambs, the culled hoggets are sold.
The enterprise has also been developing a self replacing, Kelso flock (high fertility composite breed) this is due to their uncertainty in the wool industry's future.
Apart from wool issues the merino ewes get culled if they are twice dry, the crossbred operation gets one chance.

Production Goals

The overall production goals for the operation are to maintain the enterprise in a highly productive manor while not "Mining" the resource and continuing to fund the succession plan in place. There is a high priority in getting purchased land up to a standard to reach its perceived production potential, primarily through fertilizer. While production is important, the operation is aware of how hard things are pushed from both an environmental, stress and a time management point of view.

Sheep Production Goals

Good lambing percentages are important, as the more lambs available means the enterprise can both cull heavier for all traits and have more for sale. High quality wool in the 19-20 micron zone is important as is whole of farm wool production. The principal would like to gain higher wool cuts per hectare however feels the negatives associated with higher production out weigh the benefits (see production goals).
The average stocking rate is between 7-8 DSE WGH, this is predominantly set stocked. They are aware of the carrying capacity of their different paddocks and stock to their perceived potential.
There is some pasture manipulation in spring through combining mobs to crash graze paddocks, this is done predominantly to prepare the paddocks for crop.
The breeding objectives of the operation are varied for the different breeds.
Merino- they are looking for long wool, plain body and a generally bigger sheep
Cross Breed – They are looking for longer body sheep
The above two are more subjectively than objectively selected where as the Composite breed element is far more objective.

Regarding in flock selection, if the merino's fail twice to have a lamb over their life, they are culled this is due to the merino element of the flock having a more highly focused wool element. The XB and composite only get one chance.

NRM

Their has been a lot of work completed in this area, plenty of Remnant vegetation fenced off, trees planted and bush fenced off. They are also looking at perennial grass strategies for salt affected country.
The farm is immaculate; the NRM is motivated to keep it that way and to restore land to make it more profitable.

Non Sheep Enterprise

This constitutes crop. They do all elements of the cropping themselves, they use machinery that is not new but reliable and currently have capacity to increase the cropping program if required. This enterprise has changed greatly over time, moving at a very early stage from working up land to spraying and one pass technology. They are currently moving from minimum tillage to no tillage.
This adoption has happened because it works for there mixed farming system. The original shift to Minimum Till meant less labour, and better yields. The current shift to no till means they can retain stubbles for longer as they don't have to burn. They trialled it last year on farm using a neighbours machine, were happy with the results and are now implementing it.

Labour

There are 3 full time labour units. Approximately 75 % of the time is spent on the sheep system. The only contracting used is at shearing and spreading the rest is all done in house. Efficiency is very important and for the sheep system this means having the animals through the yards as little as possible.

Sources of Information

The enterprise utilizes a variety of sources of information. It employs an agronomist, is a member of a localized production group, gains knowledge from the rural press and Ag memo's as well as Stock firms and agents. Members have also attended seminars and courses.
Another major source of information is their peers.

Importance of Lamb and Weaner Survival

Animal nutrition and parasite control were the major priorities for this enterprise. This was regarded as the general health of the animal and it was the foundation that the success of the sheep enterprise built itself around. Lamb and weaner survival were relatively important but not a real issue in at the current time. It was felt that if ewe nutrition and general health was compromised then lamb survival would become more of an issue. Secondary to survival came wool production and prime lamb finishing.

Theses priorities have remained the same over the enterprises history because its worked and has been reliable regardless of season year in year out.

This attitude may change if the value of lamb increased significantly and consistently to double the average of the last few years, an extreme change in price. The enterprise believes mob size and paddock size has a major influence on lamb/ weaner survival, however it would be harder to run more mobs and having large paddocks makes cropping easy.

Causes of Lamb and Weaner Loss and Management Interventions

The marking rate on sheep joined over recent times has averaged between 85 and 90 percent of ewes mated.

- Conception Rates are believed to be in the high 90's this comes from some scanning that has been done in the past and through cradle crutching in April where dry ewes can be identified (ewes joined December and January).
- They do not know of losses that occur before birth or if it was an issue.
- It is believed that 10% (depending on season) are lost between birth and marking. This is based on number of dead lambs observed in paddock, in particular when feeding lambing ewes. Another observation is that about 80% of these lambs die at birth. These rates vary from year to year, mainly due to mismothering and disturbance due to feeding in poorer seasons. Again these beliefs are based on observations.
- Very few lambs were lost between marking and weaning, based on counting marked lambs and weaners.
- Approximately 3% are lost as weaners, again based on counts between weaning and first shearing. The majority of these loses are believed, based on observation to be from arthritis.

Observations of the Reproduction cycle

Pre-joining

- Ewes are worm free and healthy, sheep are maintained and fed lupins if needed to maintain their condition.

Joining

- Rams are joined at 2%
- XBs are joined mid December for 8 weeks and merinos are joined for 6 weeks in mid January.
- 6 weeks prior to joining rams are put on an oat lupin diet.
- No young culls (wool faults) are joined to the XB operation. This is due to older ewes having better conception rates and being perceived to be better mothers also bigger ewes and better wool.

Pre-lambing

- Scanning has been used before in a very poor season to remove dry ewes so as to decrease grazing pressure, however conception rates are generally high and thus it is felt to be unnecessary.
- The ewes are crutched in April thus through observation at this time they have a good handle on conception rates.

- Sheep are continued to be fed during this period and paddocks are prepared/ deferred for lambing through grazing of cropping paddocks.

Lambing

- The amount of monitoring and assistance given to the ewes depends on the season, in an average to good season the sheep are monitored twice a week. However in a bad year when the ewes are being fed several times a week monitoring is increased and there is a greater amount of assistance given to lambing ewes.
- Fox shooting is also done for predator control, however it is felt that they are not huge part of lamb mortality.

Marking

- Lambs are mulesed at marking with analgesic and clout applied to the wound. Marking is conducted in-paddock using portable yards which improves mothering and reduces infection risk associated with mulesing.
- Dry ewes are separated in a dry year so as to reduce grazing pressure and to ensure efficient use of feed.
- Lambs are vaccinated with Glanvac 3in1
- Scabby guard for all lambs, as has had a bad infection in ewe lambs before with scabby mouth and it set them back, (Scabby Guard is compulsory for exporting wethers)
- Extremely sick lambs are culled

Weaning to First Shearing

- Weaned at 16 weeks , they are shorn at this point as well
- They are drenched into a clean paddock generally onto stubble immediately after paddock has been harvested.
- Deposal (selenium) is injected as it is a issue in the region
- Vitamin e is mixed in with grain in mid January and this is seen to have big impact on the health of the lambs.
- High Protein feed is recognized to be an important part of the lamb's nutritional requirement and closely linked with their survival. eg lupins

Parasites Current and Historic Problems

There have been no problems with worms in this enterprise, they have them however they are not aware of the specific types of worms they treat but tend to use a broad spectrum drench. Lung worm has believed to be observed occasionally. They don't believe that production losses are attributable to worms due to the fact that every time samples have been taken worm egg numbers have been minimal.

Worm Management

Of the issues presented by worm management, resistance to drenches is one that stands out as a potential issue although at the current moment it is not a problem and will not appear to be one in the immediate future given the effectiveness of all drench varieties on the property.

Sheep nutrition and pasture quality are the major priorities for this operation, these are viewed as the foundation from which the success of the sheep enterprise flows. Sheep health follows next and worm management is a big part of this. Lamb survival follows as the next most important issue.
Worm management has always had this level of priority as they believe that through effectively treating worms they will continue to not impact on their business.
If drench resistance started to be an issue then this would put more focus on its priority, as this may require system change.

Practice Change and the Future

The view was that the techniques that can be used to manage drench resistance, such as drenching partial amounts of the flock would not be difficult to implement, however feels these practices will not solve the problem and that all they are is a reaction to bad management of the problem in the first place.
They also feel that genetically resistant sheep are key part to the future and are confident they already have some. Resistant sheep would also lead to less work, less chemical and therefore less cost. Biological control could be a good solution as they may be less invasive on the sheep than chemical and it might also mean less times drenching. A pasture containing compounds would be a more efficient way of dealing with worms.
New chemicals would be good, however it's a stop gap as they will just get resistance.

Management Practices Currently used to Manage Parasite Infection

Worm monitoring has occurred from time to time, this practice has occurred from the nineties onwards, it is mainly done for testing drench resistance. Last year they monitored the lambs to see how they rated coming out of a poor season, it was more out of interest than any other reason and was the first time in 2 years that they have completed a test.
They have the tests completed by the local ag supplies shop and the analysis comes from a local vet, who also gives advice with the analysis, which they generally follow. The cost of the tests and analysis is $55.00 and it generally takes about half an hour to push a mob into a corner and to collect the sample.
They have not done more monitoring because they don't see the need to do so, they consistently have healthy sheep, a drenching system that they are happy with and little if any drench resistance.
Current Drenching Practice

- Everything is drenched in December
- It is a very thorough and precise operation, the sheep are weighed and drenched to the heaviest sheep in the mob, the drench gun is measured to make sure it is delivering the right dose.
- The sheep are brought in the night before to clean out, they are then left in the yards for 6 hours after getting drenched.
- The weaners go onto clean stubbles, and the ewes go onto as many clean stubbles & paddocks as possible.
- Currently using an abamectin based drench that is 100% effective and it is very rare for them to require re drenching, if so they would use a combination drench.
- Drenching would take 2 people about a week

There are no missed sheep, none left in the paddock, the whole operation is extremely precise, “were precise and it works” were the concluding remarks

Drench	Combo	Combo& Rametin	Abamectin	Moxidectin
Effectiveness	94%	98%	100%	100%

Future Management of Parasites – Drenching 30%

For this entity and their lack of resistance they feel this will not be an issue for many years to come.

If Drench resistance became a severe problem and the technique was proved to work then it would be contemplated, the action of classing and drenching 30% would be quite easy. However currently they only need to bring the sheep in once a year for drenching, if this meant bringing them in 3 or 4 times a year, then this would be an issue. In fact if this was the only option then they would have to contemplate getting out of sheep.

This entity is open to change if it works, they have a solid sheep system that works at the current stocking rate, one of their motivating factors for being in sheep is that they are easy and profitable. The sheep are run at a slightly low stocking rate for the rain fall and the sheep are very well looked after, this is reflected in their health and the lamb survival. The farm is immaculate and everything is done to the letter.

CASESTUDY CRC WA ER 0901

Enterprise Profile

The property comprises a 300 Ha eat of Manjimup and 1500 Ha 25 km west of Kojonup. The Manjimup property is undulating and receives approximately 600mm. Kojonup receives 550 mm. Both receive the majority of rainfall in the winter growing season. Income is mixed between 30% livestock sales, 55% wool sales 10% horticulture and 5% off farm income.
This has changed over time with a swing towards composite sheep which has increased meat sales. The orchid is now leased out instead of being managed.
Including land sown to fodder 98% of land is allocated to sheep and 2% to horticulture. Here are 12500 sheep which are run in 30 mobs during winter. The sheep are mixed between 10% 1st cross ewes, 40% merino joined to Kelso (composite breed) and 50% self replacing merino flock. There were 10000 ewes joined this year. The ewes are kept till 6.5 year olds. Weathers are traditionally sold to export at 18 months, however after the last two dry seasons this has been cut back to being sold as lambs. They are very much in an experimentation faze with the Kelso sheep which are much more meat focused and are still looking at how it functions and whether or not is more profitable then running merinos. They are also looking at running the Manjimup property in a high rotation New Zealand style intensive cell grazing operation.

Production Goals

Production goals are focusing on maximizing dollars per hectare while having an extremely efficient labour system and ensuring a balanced lifestyle. The next generation is interested in farming and this is a motivating factor. Very conscience of not accepting a lower standard of living just to be able to farm.

Sheep Production

Depending on the season the general aim is to achieve 13 DSE, look at pushing the system to the edge with out falling off the. They have now increased the percentage of ewes as they believe with the amount of sheep going out of the state system there will be opportunity to fill the gap. The grazing strategy is essentially set stocked with some movement. They grow a fodder crop for the weaners to go onto at the end of the year. The stocking rate goals have lifted in the last 10 years.
Have changed from being micron and wool cut focused and are now focusing on conception rates, FWEC and still good wool. Easy care sheep are also important.

NRM

Aware of it, they are members of local land care group, have fenced off allot of remanent vegetation and has also done a lot of engineering works through deep drainage.

Non Sheep Enterprise

This involves leasing an orchard, previously they ran it themselves it was a very involved business with a manager and casual staff. However the work did not end up justifying the income

and a good lease offer was to good to refuse. While managing it there was a lot of technology taken on board over the years

Labour

1.5 labour units used, they push up at crutching and mulesing, full contract shearing , are looking at employing sheep contractors for drenching and other husbandry if need be. 99% of time spent on sheep.

Sources of Information

Attend conferences and seminars, rural media. Subscribes to several journals and looks online. Will travel for ideas, has travelled to New Zealand to investigate sheep options. Travelled extensively overseas in the orchard business for ideas. Values time, its got to be worthwhile. Is not a disciple to consultants uses them as sounding board.

Importance of Lamb and Weaner Survival

Of the issues that lamb and weaner survival present abortive loses is something that the business wants to work out. Lamb losses are reasonably seasonal and weaner mortality is more of an economic decision in that depending on the market and the cost of grain it may be cheaper to lose a few than to spend much time and energy trying to save them. This falls inline with the issues that have a higher priority to survival, these are establishing and maintaining efficient economies of scale and efficient management and labour systems. Issues that follow survival is marketing, welfare groups, and things that are generally outsides the business control.
This has always been the priorities however increasing sheep numbers has reinforced this issue. This could change if there was a change in the markets and the economics of increasing lamb survival worked. Increased knowledge of issues will lead to change if it is seen to be worth while. Management options to improve survival are seen as relatively easy depending on the amount of labour and intensity of system that is being run. Again if the money was there it might be an option however currently its seen as a fringe issue.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception Rates with the aid of some scanning is 95% for older sheep and 85% for younger sheep.
- Losses prior to birth are suspected to be high particularly in young sheep- this is concluded through knowing conception rates, marking rates and not seeing many dead lambs in paddocks. Not sure what causes it. Maybe brucellosis, maybe the effect of drenching with Ramitin.
- Losses between birth and marking, approximately 5% to 10% this is attributable to bad weather events where many lambs are lost. Most of the loses are at birth, thinks a lot of it is seasonal however not really sure what drives it, this is established through observation.
- Losses between marking and weaning is between 5-10 % again this is seasonal
- Weaner losses 5-10% maybe more, again it is seasonal so related to nutrition, also management has a role, have lost some to flies and worms. There is also natural attrition which is part of running high numbers.

Observations of the Reproduction cycle

Pre-joining

- Using a highly fecund breed in both ewe and rams
- Ewes are maintained in good condition
- Lupins are fed to rams

Joining

- Believes mob size is important
- Joins on the 1st of January for marketing of lamb purposes
- Loins for 5 or 6 weeks
- Breeding pressure through 2 chances of having a lamb

Pre-lambing

- Feed continues, attempts to keep at score 3 and utilize life time wool principals
- Scans old ewes and young ewes, these are then sold if season is poor.
- Drench ewes

Lambing

- Feed if necessary.
- Relatively hands free, check maybe 3 times a week.
- Aware of colostrums issues but finds it hard to put solutions in place.(economically and physically getting ewes to eat grain when surrounded by pasture)

Marking

- Happens in the paddock as it helps with mothering up and stress
- Vaccinate 3-1S B12
- Scaby guard for wethers
- XB lambs are unmulsed and not tailed for the long tail market.

Weaning to First Shearing

- Focus on nutrition for weaners
- Some good pasture is freed up if possible
- Weaners are drenched
- The tail is drafted off and treated separately,
- Lambs are shorn to help with grass seeds.

The management cannot emphasise enough the importance improving the genetics of their sheep to handle the tough conditions. It also appears this is closely related to wool cut in that when wool cut declines the sheep's constitution improves.

Parasites Current and Historic Problems

Worms are recognized to be brown stomach and black scour worms this is identified through FWEC results. Have also had Barbers pole worms in Manjimup property. This was recognized through effected sheep being anaemic and the smell of the scour being very bad.

Lost 40 hoggets in September 2006 an employee was supposed to drench the sheep and there is some doubt if this was carried out. There was further production losses due to the remainder of the wethers not making the export market as expected this resulted in a 15$ per sheep discount in the price gained. This added up to $40,000. There is also some production loss in the odd mob of sheep that doesn't do as well as the rest.

Worm Management

Worm management is seen as something that can be controlled, it is directly related to management and therefore it is important to the business. There is no excuses for unnecessary loses that can be controlled relatively easily. Production losses are important to control especially with a system that relies on lambs making a specific market, as has been shown if this falls down it is extremely costly. Resistance is a concern however the systems available to manage it aren't currently applicable to the enterprise so not a high priority.
Greater business strategy and managing scale and labour are of more importance to the sheep enterprise, issues that are felt to be out of the control of the business such as marketing and welfare groups are less important. They find this system works and keeps them profitable. However are interested in staying up to date with change if applicable.
If total chemical resistance occurred this would definitely raise the importance of the issue as worm control is seen to be directly related to gross margin.
Current understanding of management practices to improve control of resistance is that they change too often, there appears to be a lack of consistency in advice. There also appears to be a lot of "Fads" that come and go. Due to the intensity of the business they can't afford to be the "test pilots". They are to close to the edge and can't afford mistakes.

Practice Change and the Future

They see genetics as a big part of the solution and are participating by utilizing FWEC in breeding program. Management programs to reduce the amount of sheep to be drenched appeal as a low cost solution. New Drench chemical would allow for the current program to run for longer. Believes pasture management strategies are already out there however are difficult to implement without crop stubbles. Also Believes there is too much focus on controlling worms inside the sheep and there should be more focus on the worm in the paddock, an example might be work done on spraying worms in paddocks when time right spraying occurs.

Management Practices Currently Used to Manage Parasite Infection

Monitoring has occurred in the past, this has been quite sporadic, it has been used mainly as a problem solving tool. They find it is too expensive to uses as a routine activity. They don't believe in the accuracy of FWEC in that they are not indicative of the worm burden of the whole mob. Observes that healthy sheep can have lots of worms, as too can sick sheep.
When taking a sample it has been analysed at a laboratory and advice has come from a vet, however a lot of the advice is coming from people with a lot less experience than the manager

Resistance testing gets checked every now and again as it is quite expensive to complete it as often as recommended. Monitoring has generally occurred when it first became popular however most times its been a wast of time as they have generally always drenched. There for its felt that it has not been a worth while investment.
Current Drenching Practice

- Weaners all get drenched onto a clean paddock, that's had a 3 week break
- Could also be drenched onto a stubble if needed later.
- Ewes receive a late summer drench comprising Ramitin and combination which has no resistance.
- All ewes get a pre lambing drench.
- Hoggets get a long acting Cydectin needle
- Have trialled long acting capsules however they are not economical and not easy to use.
- If sheep are not looking good in the spring (no excuse not to) they will be drenched with an 85% effective combination drench.
- Drenching cost approximately $15000 and takes 2 people 3 weeks to complete.

Future Management of Parasites – Drenching 30%

Suggested that this was academic crap and that there have never been premiums paid in the sheep industry or the fruit industry. Only discounts.
The actual process of doing it was too subjective, which is a real issue if labour is employed. It was felt that it was hard enough to get the sheep drenched properly let alone getting them to judge the condition of the animal. The manager (as previously explained) also has a fundamental problem with FWEC accuracy.
They felt the idea was good however on ground level its not realistic. It needs to be more concrete and objective than this.
They have also been involved in lifetime wool where a fundamental process of condition scoring was advised, which was very easy and good idea however no one does it. If they are not going to do that there is no way they are going to drench the bottom 30%.
Regarding the idea of forsaking production for increased drench life span is not possible in this business as at its high stocking rate and high percentage of ewes there is not the flexibility to allow for mistakes to happen. Drenching must be proactive rather than reactive. However maybe in a lower stocked system it might work.
Resistance will continue to be lived with and they shall continue to look at research until a solution that fits their system is found.

CASE STUDY CRC WA ER 1001

Enterprise Profile

The property comprises 2000 Hectares, 1200 owned and 800 of which is leased (This is the 1st year of the lease) . It is located approximately 35 km's south of Kojonup in the Cranbrook shire. The farm is a mixture of undulating sandy gravels, and receives on average 450- 500 mm of rain which falls mainly in the growing season. Income is mixed between 25% livestock sales, 25% wool sales 50%. This is represented with land allocation being split 50/50 between crop and Sheep.
10 to 15 years ago the mix was 75% wool 5% livestock sales and 20% crop. In response to poor prices for wool, prime lambs were introduced and more area was allocated to crop.
There are 4200 ewes which are run in 6 mobs with all joined to terminal sires, all lambs are to be sold by the 1st of February. Ewes are purchased as 2 year olds from reputable breeders. No real concern of body type or wool quality, the priority is a well conformed and constituted sheep that will go the distance as the sheep are kept to 8 or 9 years of age.
White Suffolk's are used and high ebv Rams are selected for high growth rates.

Production Goals

Production goals are to make as much money as possible by producing as much product as possible. High Inputs are seen as vital to achieve sustainable high outputs. There is a big focus on growing the business and a lot of personal sacrifices are being made to do so.

Sheep Production

The aim is to achieve 12 DSE per Winter Grazed Hectare on an average season, however this is seasonally adjusted. Another aim is to cut 5.5 kg's of wool per head, this is also seen as an indicator that the sheep have achieved appropriate nutrition for the year. The focus with lambs is to have them all sold by the first week of February, this has not been achieved as often as the owner would like. Previously this has been attempted through a combination of pasture, stubbles and hand feeding. This year it shall be attempted through the use of a fodder crop. This is seen as maybe not the most economic option however as the business has taken on a lease and will be stretched labour wise and it is seen as the most reliable way of finishing lambs.
Ewes are sold in November and purchased over the summer depending as the opportunity arises. Grazing strategy is to utilize stubbles over summer and defer sheep on them through late autumn so as to allow winter grazed paddocks the best start possible.

NRM

Strategically plants perennials, thousands of trees have been planted, surface water management through drainage. All bush on the property is fenced off.

Non Sheep Enterprise

The cropping enterprise has changed over time from full cut to minimum tillage, paddock rotations have also changed from 2 year rotations to 4 or 5 year rotations so as to utilize better

paddocks this was enabled by the introduction of canola as a break crop and also minimum tillage as the paddocks could only handle full cultivation for two years.
Cropping is also seen as an essential part of the sheep system in that it allows them to run the sheep system they want (hi stocking rates) rate through use of summer stubbles and deferment opportunities for pasture.

Labour

1 labour unit plus some seasonal labour for crutching and shearing, lamb marking is completed by the owner with some casual help. There is also some casual labour at harvest. Approximately 40% of time is spent on the sheep enterprise.

Sources of Information

Most information comes from farm consultants, seminars are also attended and journals subscribed to, However allot of the information gained is bounced off the consultant as well

Importance of Lamb and Weaner Survival

Of the issues that lamb and weaner survival present abortive loses are not important as they are believed to be minimal, Lamb and weaner losses are under control and the big drivers(nutrition) are perceived to be currently managed by feeding or dictated by the season.
Maintaining the sheep in excellent condition is seen as having the highest priority in the sheep operation, this is due to the belief that this drives the success of the sheep business. This belief has come from research, personal observation and most importantly being involved in sheep benchmarking and observing what is driving gross margins.(It was interesting to note that is wasn't until they observed how their benchmarking data sat amongst other farmers benchmarking that they started paying attention to what their farm consultant was telling them re what drives profit in their enterprise).
Finishing lambs on time is also on the same level as sheep nutrition and is also an area that management has had difficulty with, after some research fodder crops are being trialled this year to help achieve this goal.
Management efficiency or ease of management is seen as coming secondary to lamb and weaner losses. This is due to the requirement to generate cash and do what ever it takes to do so. This originally had the highest priority when the current manager took over the farm, stocking rates were kept low and there was no motivation at the time to push the system.
Refining lamb and weaner survival to pick up the small percentage perceived to be lost was something that might occur in the future once refinement of perceived key drivers such as stocking rate and nutrition are sorted out. The business also believes that the other option that could improve lambing percentages is to feed more, this is seen as simple however as feeding levels are already high the cost effectiveness of feeding more is in doubt.

Causes of Lamb and Weaner Loss and Management Interventions

- Conception Rates averages 85% . (scans in poor years so as to off load stock and drop back stocking rate)
- Losses prior to birth are thought not to be an issue
- Losses between birth and marking are approximately 5%, this is thought to be driven primarily by the nutrition of the ewe. Evidence of this is seen by the difference in marking

rates between ewes lambing in good paddocks and those in poorer paddocks. Through observation 50% of these die at birth.(picking up dead lambs)

- Losses between marking and weaning is minimal, half a % at most, losses are generally attributable to fly strike.
- Weaner losses are also minimal and are caused by misadventure, flies etc. This was not the case with Merino weaners where nutrition was vital to their survival.

Observations of the Reproduction cycle

Pre-joining

- Use of Cross bred Rams.
- Ewes are maintained in good condition, condition score 2.5 -3
- Lupins are fed to rams to get them as fat as possible (begins 2 months prior to joining)
- Rams testicles are checked
- Rams are also checked for lameness

Joining

- Rams are joined at 1.5%
- Joined for 5 weeks
- Joined at the 1st of February as ewes are seen to be at peak fertility and there is no need for teasers.

Pre-lambing

- Ewes are vaccinated
- Ewes are scanned in poor seasons and dry sheep removed so as to focus on the pregnant sheep
- Sheep are kept in good condition

Lambing

- Feed if necessary.
- Relatively hands free , check maybe 2 times a week.
- Not so concerned about shelter, feels the better the condition of the ewe the less weather is an issue

Marking

- Lambs are tailed and marked
- Lambs are vaccinated with a 3 in 1 drench
- Selenium is not required, they may get some over the summer
- Lambs are scratched with Scabby Guard
- Lambs in July and feels this is a good time to lamb as there is generally plenty of feed around for the ewes.

Weaning to First Shearing

- Weaned at 11 weeks
- Drenched on to rested paddocks
- Drenched again on to stubbles
- Vaccinated again
- Feeding becomes important in mid November as senescence takes place and feed quality declines.

Parasites Current and Historic Problems

Worms are identified as being the standard type of worms, Barbers Pole is not an issue and has never been. Worms are identified through FWEC which have occurred in the past.
Small amounts of sheep have been lost over time to worms, this was once identified through an autopsy being done by a Vet, (they were particularly big lambs and showed no obvious worm issues) on other occasions the health of the mob has improved after drenching.
Production losses have occurred from time to time however this has been identified as resulting more from nutrition than from worms.

Worm Management

Sheep loses and production loses to worms are not seen as an issue as they are controlled by the current drenching strategy. Drench resistance is perceived to perhaps be a future problem, however currently it is also managed by drench resistance tests and rotating drench varieties.
Sheep nutrition was seen to have a higher priority than worm management and was the key to the sheep system. Through having better sheep nutrition it was believed worm management was made less of an issue as sheep were less susceptible to worms.
Worm management has always been excellent and it was not known if this was from good management or good luck however it was suspected that it was linked once again to good sheep nutrition.
Management's attitude to worms would change if major production or sheep losses occurred due to an infestation. This would definitely put focus back onto this topic.
Drench rotation, monitoring and drenching when need be rather than summer drench and leaving 5% undrenched are seen as ways of managing drench resistance. Drench rotation is currently happening, monitoring and drenching is seen as also being easy and is recognised as being the required option one day however summer drenching is easier as monitoring and "management " is not required (one less thing to think about). Leaving 5% undrenched may occur in the future as wethers may appear back in the system. Management is not keen to leave 5% of ewes undrenched as issues may arise during lambing however would be happy to use the concept with wethers as there is less risk.

Practice Change and the Future

Worm resistant sheep and management strategies focusing on nutrition are seen to be the future of worm resistance management, this is due to resistant sheep requiring less management and less labour due to lack of drenching as well as less cost. Management can't understand why better nutrition is not being pushed as a solution to worm issues, it is seen as one of the easiest and most obvious solutions. New types of drench are seen to be a tool rather than a solution as they too will inevitably get resistance.

Management Practices Currently Used to Manage Parasite Infection

Monitoring occurs with the weaner flock when the season dictates, if it is a poor season and there is some suspicion there is a problem then a sample will be taken apart from this there is no need to monitor worm burdens as the sheep are all drenched in the summer.
Resistance tests are taken every 5 years as it is felt to be the appropriate period of time between tests.
When samples are taken they are sent to the local Ag supplies for analysis, this is then discussed with the farm management consultant and appropriate action taken.
The benefits of monitoring weaners have been identifying worms as a problem or ruling worms out and identifying other issues and avoiding drenching when not necessary.
The cost of testing last time it was completed was approximately $50 with a drench resistance test costing $200. It takes about half an hour to collect the sample- sheep are simply pushed into the corner of a paddock
Current Drenching Practice

- Weaners all get drenched onto a deferred paddock
- Weaners are also then drenched onto Barley stubble.
- All ewes are drenched onto stubbles
- Drenches are rotated between Ivermectin, Abamectin, Moxidectin and Ramitin
- Injectable drench- Weaner guard has been tried, it worked however it was too expensive and didn't do a better job than traditional drenches.
- Drenching costs between $3500 and $4000 depending on which drench is used.
- It normally takes 1 person about 2 weeks all up.
- Drenching always takes place onto spelled paddocks and stubbles.
- Sheep are always kept in great condition as it is believed it helps them to handle worms

For a period of time 5% of the ewes were left undrenched, however due to information received regarding the risks involved, this practice was ceased. As previously mentioned this might be renewed with the inclusion of Wethers in the system.
All decisions regarding drenching are based on the advice of the Farm management consultant.

Future Management of Parasites – Drenching 30%

Has reservations regarding the effectiveness of the technique (was sceptical that fat sheep did not necessarily have any worms), however if it was demonstrated to be effective and proved to work (replicated trial data) then they would use it. The sheep were already brought in 3 or 4 times a year and it would not be a problem to incorporate it into the other processes.
Production losses were prepared to be inflicted so as to extend the life of current drench types, this would only be in the order of 2 or 3%. As mentioned this may be looked at with the introduction of Wethers. However none drenching was not an option to meet high premiums as it was felt that the prices would never be high enough to compensate for the losses sustained.
In summary management would like to reinforce the importance of nutrition for both lamb survival and worm management and would like to see more work done in this area.

CASE STUDY CRC WA JS 01

Enterprise Profile

This enterprise is 1180 cleared and effective hectares. It is located approximately 8km's south west of Darkan W.A. Average rainfall is approximately 550mm/year with mainly gravel soils and granite out crops. The topography of the properties range from undulating to very undulating in some parts.
Wool is produced over the whole property, whilst 60% of the land is allocated to merino breeding and 40% to prime lambs. The sheep structure comprises 5000 ewes (plus lambs) & 2200 hogget's, with self-replacing merino ewes, with a portion joined to terminal sires for prime lamb production (3000 to terminal sires, 2000 to merino rams).

Production Goals

The overall production goals are profit driven. They would like to ultimately crop more of their land to theoretically increase profit. As a breeding enterprise they would like to slowly expand the breeding part and produced performance enhanced rams. Smaller goals include cutting more wool per hectare as well as slowly increase stocking rates.

Sheep Production

The current stocking rate is around 9.5 sheep/hectare. Lupins are fed to rams 6 weeks prior to joining. Rams undergo a visual test for faults prior to joining. There are approximately 2% rams and 2.5% rams with the maiden ewes on joining and the rams are with the ewes for about 6 weeks. Maiden merino rams are progeny tested and go in with older more experiences ewes.

Ewes are scanned for single and multiples in the progeny flock only and dry ewes are usually culled. There is continuous visual monitoring of ewes prior to lambing and increased feed is available if needed. At lambing, the ewes are checked daily. Each individual ewe is not CS but the flock is managed visually. Hay is offered during lambing if necessary. Lambing paddocks on both properties have a large amount of natural shelter such as outcrops and vegetation. Baiting for predators is only implemented on one property only due to baiting too risky with domestic sheep dogs at the home property.

Culling of sick lambs is only implemented if the lamb is very sick, otherwise nature takes it course.

NRM

None specifically, but do record native flower species as well as all creek lines that need to be fenced off have been.

Non Sheep Enterprise

Cropping is the other enterprise, this is seeded by own labour and harvested by own labour. All crops are used for sheep feed on the property. Crops planted are a standing oat crop.

Labour

This is family operation, with 2 full time members. Other labour is drawn from co-operative breading schemes (Ram buying clients help out with collection data for ram worm samples). Usually about 8-10 people needed per year for a day to sample rams.

Sources of Information

Management utilizes a variety of sources. They primarily rely on consultants. He also gets information from peers and neighbours, as well as DAFWA

Importance of Lamb and Weaner Survival

In terms of priority weaner losses have a very high priority. This is due to the belief that they have more impact on the profitability of the business than lamb and abortive losses. This level of priority has remained the same over time. Abortive losses are not seen as a problem (as they are un sure of how many they have) but if the issue was to arise, it would be of a high priority.

Causes of Lamb and Weaner Loss and Management Interventions

Conception Rates are believed to be 85-88% and this is derived from scanning. They scan every ewe each year. Wet and dry only.
They do not know of abortive losses (too hard to measure) or if it is an issue, but doubts that it is.
Lamb losses between birth and marking is about 8%. The majority of these losses are from pests (eagles). This is based on visual estimates and seeing the eagles attack the lambs.
Very few lambs were lost between marking and weaning, based on counting marked lambs and weaners, approximately 2-3%
Approximately 2-3% are lost as weaners, again based on counts between weaning and first shearing.

Observations of the Reproduction Cycle

Pre-joining
Ewes are vaccinated
Rams are fed lupins and maintained in excellent condition (CS 3.5)
Ewes are fed on a rising plane of nutrition if possible, definitely not decreasing, fed lupins, and maintained at approximately 3.5
Rams under go visual tests for physical faults prior to joining
Joining
Joined for 6 weeks.
Top selected maiden merino rams for use in breeding scheme are progeny tested to aid in genetic progress across the flock. 2 external ram sources are tested each year as well.
Pre-lambing
Prepare paddocks so there is enough feed to lamb in, as well as source suitable paddock with a large amount of natural shelter (rock out crops etc.)
Sheep are kept in good condition.
There is continuous visual monitoring of ewes prior to lambing and increased feed is available if needed.
Dry ewes from scanning are culled immediately from the wool breeding flock.
Lambing

Daily checking of lambs & ewes.
Prime lambs lamb in June
Merino's for wool production lamb in July
Marking
Vaccinate the lambs, scabby mouth for the weathers.
Culling/disposal of sick lambs is only implemented if the lamb is very sick, otherwise nature takes it course.
No blood tests are used to test for trace elements, how ever; the lambs receive selenium bullets (based on past history).
Weaning to First Shearing
They are drenched into clean, none lambing paddocks and lambs are placed into a standing oat crop harvested post senescence at weaning. Young ram hoggets are monitored visually and individually tested when the flock average is 500 eggs/gram.

Parasites Current and Historic Problems

Due to the breeding enterprise on this property they test to WEC to receive a breeding index for the rams. The main types of worms from WEC are Barbers Pole & tape worm, brown stomach worm. The only time they have lost sheep due to parasite control was when a mob of weaners were left in for a WEC much longer than they should have been due to a sudden family emergency which took them away from the farm. It should be noted that this was a once off occurrence that could not have been prevented. Upon return to the farm the sheep had approximately 1300 eggs per gram. They lost approximately 20 sheep (died and culled). On average, they struggle to receive the minimum WEC for an index, highlighting very sound parasite control methods.

Worm Management

The development of resistance to anthelmintic treatments is seen as the highest priority. Production losses due to worm infection are seen as a low priority as it is generally not evident with in this enterprise. Animal losses as the result of worm infection is seen as the lowest priority as it is seen as a management issue and can be easily avoided.
Major events that would have them re-asses their current management practices would be dramatic increase in costs of drenches (e.g. unable financially to continue) or resistance to drenches impacting the sheep. They mainly use Abamectin & Cydectin as the main drenches and currently spend about $4000 P.A on drenches.
Management feels that some parasite control methods require a large amount of time and there fore are not practical, others like drenching are relatively easy with great benefits. They see the main benefits of actively monitoring the worm infection in your sheep enterprise is knowing what is going on with your sheep and prevention is seen as a better management method over controlling worm out breaks.

Practice Change and the Future

Management practices have not changed a large amount over the past years. The main changes are basic changes, such as changing drench types (e.g. moving from clear & white drenches). New drench chemicals are seen as the easiest and quickest management solution to resistance. Genetically resistant sheep is seen as the long term solution to worm management because it would save time and money. It is currently already being included in the breeding side of the

enterprise, how ever management noted that this is at the detriment of other breeding traits, such ad FD or SS.

Management Practices Currently used to manage Parasite Infection

Worm monitoring occurs annually in young rams, where the do a WEC. Labour drawn from ram buyer clients of the co-operative breeding scheme. Usually about 8-10 people needed per year for a day to sample rams and costs approximately $1400 P.A.
Ewes receive one drench in summer and one in winter at the same time as crutching. Hogget rams receive a drench at spring sheering before placed into standing oat crop & again if they get to 500 eggs/gram when tested. Ewe lambs are drenched at shearing prior to going into a standing oat crop. Fodder crop provides lambs with clean paddocks.

Future Management of Parasites – Drenching 30%

The manager currently has a large amount of confidence in the current system being used, due to the lack of parasite problems they are faced with. They are unsure of the practicality of the targets treatment method. They feel it would require a larger amount of labour and this is not a practical solution due to financial and time constraints. They are also unsure of this advice due to DAFWA giving out previous advice on parasite control a number of times, which has not worked effectively.

CASE STUDY CRC WA JS 02

Enterprise Profile

The entire property consists of 800 acres, 500 acres of which is used for blue gum plantations which management are is not responsible for and is leased to another party. Management leases 300 acres. The property is located approximately 15km west of Kendenup. Rainfall is approximately 450ml/year with mainly gravel and sandy loams and some granite out crops. The topography of the property is slightly undulating.
Wool and prime lambs are produced over the whole property (300 acres).
The sheep structure comprises of approximately 700 ewes, all of which are joined to terminal sires for prime lamb production.

Production Goals

The overall production goals are profit driven. Management leases the land off a third party to farm sheep. It is their long term goal to eventually own their own land and ultimately be profitable. Currently, management have other jobs in town to assist them financially. Their short term production goal is to increase lambing rate.

Sheep Production

The current stocking rate is around 2 sheep/acre. Rams under go a visual test for faults prior to joining. There are 14 rams used to service the ewes and the rams are with the ewes for about 6 weeks to 9 weeks. The amount of time the rams are in with the ewes varies year to year due to family commitments (holidays, other work commitments etc.)
Oats and hay are offered to ewes prior to joining. Ewes are not scanned. Management believes that scanning is too expensive for the service they provide and believe that it is not accurate enough. Management also pointed out that as they do not cull dry ewes, knowing that a ewe is pregnant will not change their management routine. There is continuous visual monitoring of ewes prior to lambing. At lambing the ewes are checked regularly (approximately twice a week) Oats and hay are offered during lambing if needed. Lambing paddocks on both properties have a large amount of natural shelter such as outcrops and vegetation. But management have found that the heavier the vegetation the more likely lamb losses occur. Management believes that predators, such as foxes and eagles are responsible for this, using the vegetation as a habitat. There is no baiting of predators (foxes) on the property due to neighbouring properties having domestic dogs, as well as management using a domestic dog on the property.
During lambing, if management is on the property with out the children, sick and injured lambs are killed. If children are present, all lambs are bought home and hand reared (depending on the nature of the injuries).

NRM

None specifically employed on the 300 acres. Spelling of paddocks is occasionally used when feed in the paddock is dropping. This is decided by a visual assessment of the FOO and a decision to spell is made.

Non Sheep Enterprise

None.

Labour

This is family operation. Major management events such as marking, drenching etc. use each family member (2 adults, 2 children aged 9 and 11). Otherwise, management consists of just 1 adult, who spends approximately 10 hours a week on the property. This is not a full time position, and management has another full time job in town.

Sources of Information

Management utilizes a variety of sources. They primarily use their knowledge as a mean of making a decision which has been passed down from older generations. They also get ideas from various media sources such as the farm weekly and radio. They do not employ any consultants or source any other paid information.

Importance of Lamb and Weaner Survival

In terms of priority lamb losses have a very high priority over losses at weaning or abortive losses. This is due to the fact that sheep are not kept until weaning age. Lambs are sold prior to weaning age. This level of priority has remained the same over time. Abortive losses are not seen as a problem as they are unsure if they have any due to not scanning.

Causes of Lamb and Weaner Loss and Management Interventions

As they do not scanned, it is very hard to accurately judge loss numbers. 80% of ewes have lambs. They do not know of abortive losses as they do not scan,
Lamb losses between birth and marking is about 2-3%. The majority of these losses are from predators (foxes). This is based on visual estimates and seeing the eagles foxes attack the lambs as well as finding mauled carcasses.
Very few lambs were lost between marking and selling (they do not keep lambs until weaning age), approximately 2-3%.

Observations of the Reproduction Cycle

Pre-joining
Ewes are not vaccinated. They have never been vaccinated and do fine, so management see no need to vaccinate.
Rams are not fed hard but seem to maintain a good condition regardless (CS 3.0)
Ewes are fed oats and hay if deemed necessary – this decision is made via visual observation.
Rams and ewes under go visual tests for physical faults prior to joining.

Joining
Joined for 6 weeks to 8 weeks, some times longer depending on family commitments.

Pre-lambing
Prepare paddocks so there is enough feed to lamb in, as well as source suitable paddock with a large amount of natural shelter (rock out crops etc.)
Sheep are kept in good condition.

There is continuous visual monitoring of ewes prior to lambing and increased feed is available if needed.

Lambing
Twice weekly checking of lambs and ewes during the lambing period. Ewes lamb in May.

Marking
Vaccinate the lambs
Culling of sick lambs depends on if the children are around. If they aren't lambs are culled, if they are, lambs are usually hand reared, depending on severity of injury/sickness.
No blood tests are used to test for trace elements, how ever; the lambs receive selenium bullets (based on past history).

Parasites Current and Historic Problems

Management feels that parasite control is not a major problem, as there has never been an incident with worms. They have never lost a sheep to parasites or feel that they have lost any production due to parasite control.

Worm Management

Animal losses as the result of worm, the development of resistance to anthelmintic treatments, and production losses due to parasite infection are all seen as having the same priority and all have a very high priority.
Major events that would have them re-asses their current management practices would be dramatic increase in costs of drenches (e.g. unable to financially to continue) or resistance to drenches impacting the sheep. They mainly use Abamectin & Cydectin as the main drenches and currently spend about $1000 P.A on drenches.
Management feels that the majority of parasite control methods are easy and simple to put on place, but others require a large amount of time and are more expensive. They do not do a WEC as they have not lost a sheep or had any production losses from worm infections.

Practice Change and the Future

Management practices have not changed in a large amount over the past years. The main changes are basic changes, such as changing drench types (e.g. moving from move from clear & white drenches).
Management systems that reduce the number of sheep that need to be drenched and slow the rate of resistance development as well as new drench chemicals are seen as the easiest and quickest management solution to resistance.
Genetically resistant sheep is seen as the long term solution to worm management but management feel that it is unrealistic in terms of time constraints (takes too long to develop) and the cost of genetically resistant sheep would be very expensive. Ultimately, they do not think it will ever happen.

Management Practices Currently Used to Manage Parasite Infection

Sheep are drenched every 14 to 16 weeks depending on conditions. Ewes and lambs are drenched at marking. The annual cost associated with current drench practices is approximately

$1000 p.a. Only one person is needed for drenching, how ever, family members often help out as needed.

Future Management of Parasites – Drenching 30%

Management have a large amount of faith in their management style. It works very effectively for them and they see it as being in expensive and it does not take a lot of time or labour. The new targeted treatment raises concerns with them such as missing one sheep with worms, as well as increased costs and labour associated with it. As they do not do a WEC, they feel the amount of labour this treatment needs is unsuitable for their system.

CASE STUDY CRC WA JS 03

Enterprise Profile

The whole property consists of 609 acres, and is located in Napier. Rainfall is approximately 500ml/year with mainly gravel and sandy loams and some granite out crops. The topography of the property is slightly undulating.
Wool and prime lambs are produced over approximately half of the property (300 acres). The sheep structure comprises of approximately 600 ewes, joined to terminal sires to produce prime lambs.
In terms of profit 50% is produced from prime labs, 25% from wool production and 25% from cattle production.

Production Goals

The overall production goals are profit driven. They do not have specific production goals but do it for the love of farming and the satisfaction of it. The long term production goal is increasing the stocking rate of their cattle enterprise and decreasing the stocking rate of their sheep enterprise (they ultimately want to have ¾ of the property allocated to cattle, and ¼ to sheep).

Sheep Production

The current stocking rate is around 2 sheep/acre. Rams under go a visual test for faults prior to joining. There are 20 rams used to service the ewes and the rams are with the ewes for about 6 weeks.
Oats and hay are offered to ewes prior to joining. Ewes are not scanned. Management believes that scanning is too expensive for the service they provide and scanning the ewes would not change any management routines, as each ewe is treated the same. They would not cull dry ewes if they were scanned. Ewes are kept for approximately 4 years, then every sheep on the property is sold, and a whole new mob of ewes are brought in.
Ewes are fed oats and hay 4 weeks prior to joining. The rams are not dry fed at all, unless their condition is very bad (less than 2 CS). Ewes are vaccinated and drenched prior to joining. Maiden ewes are joined at hogget age and are kept in a separate mob. There is continuous visual monitoring of ewes prior to lambing. At lambing (lamb in May) the ewes are checked twice a day. Oats and hay are offered during lambing if needed. Lambing paddocks on both properties have a large amount of natural shelter such as outcrops and vegetation. Management controls predators (foxes) by shooting. They used to bait for foxes but have stopped this in the past few years due to having domestic dogs on the property.
Management does not cull sick ewes or lambs, and prefers to let nature take its course. No lambs are hand reared. Every animal (sheep, cattle & family pets (dogs and horses) on the property is drenched at the break of both seasons.

NRM

None specifically employed on the property. Spelling of paddocks is rare, and only done if the paddock is in very bad condition. Rotational grazing is used (between cattle and sheep) but not from a NRM point of view. It is used for parasite control.

Non Sheep Enterprise

Management have approximately 85 cows. They are used for meat production. Approximately 25% of the totally income is from the cattle enterprise.

Labour

This is family operation. Management consists of just 1 adult, who works full time on the farm. No paid labour is employed. Family members sometimes help out at large scale events (marking etc.).

Sources of Information

Management utilizes a variety of sources. They primarily use their knowledge as a mean of making a decision which has been passed down from older generations. They use other family members as a source of information as well as using media such as newspapers and the radio. They do not employ any consultants or source any other paid information.

Importance of Lamb and Weaner Survival

In terms of priority lamb losses have a very high priority. This is due to the fact that sheep are not kept until weaning age. Lambs are sold prior to weaning age. This level of priority has remained the same over time. Abortive losses are not seen as a problem as they are unsure if they have any due to not scanning.

Causes of Lamb and Weaner Loss and Management Interventions

As they do not scanned, it is very hard to accurately judge loss numbers. 75% of ewes have lambs. They do not know of abortive losses as they do not scan,
Lamb losses between birth and marking is about 2-3%. The majority of these losses are from predators (foxes). This is based on visual estimates and seeing the foxes attack the lambs as well as finding mauled carcasses.
Very few lambs were lost between are lost between marking and weaning, approximately 1%. No weaner losses are evident on this property.

Observations of the Reproduction Cycle

Pre-joining
Ewes are not vaccinated but all are drenched.
Rams are not dry fed unless in very poor condition.
Ewes are fed oats and hay if deemed necessary – this decision is made via visual observation.
Rams and ewes under go visual tests for physical faults prior to joining.
Joining
Joined for 6 weeks.
Maiden ewes are joined as hoggets and kept in a separate mob.
Pre-lambing
Sheep are kept in good condition.
There is continuous visual monitoring of ewes prior to lambing and increased feed is available if needed.
Lambing
Ewes are checked twice daily.

Ewes lamb in May.
No sick/injured lams or ewes are culled – let nature take its course.
Marking
Vaccinate & drench the lambs
No culling of sick lambs.
No mulesing as lambs go to butchers.
No blood tests are used to test for trace elements, how ever; the lambs receive selenium bullets (based on past history).

Parasites Current and Historic Problems

Management feels that parasite control is not a major problem, as there has never been an incident with worms. They have never lost a sheep to parasites or feel that they have lost any production due to parasite control.

Worm Management

Animal losses as the result of worm and production losses due to parasite infection both have a very high priority. Of a lesser priority is the development of resistance to anthelmintic treatments. This is due to management not having a worm problem on the property, and never finding drenches that fail to work.
Major events that would have them re-asses their current management practices would include lose of use (drenches fail to get rid of worms) and dramatic increase in costs of drenches (e.g. unable to financially to continue). They mainly use Abamectin, Cydectin and Ivermectin as the main drenches and currently spend about $1500 P.A on drenches.
Management feels that the majority of parasite control methods are easy and simple to put on place, but some require more time and money than others. An example given here was WEC. Management see it is as relatively simple but takes more time and money. They do not feel that WEC is a valuable tool for them due to their current system working well.

Practice Change and the Future

Management practices have not changed in a large amount over the past years. The main changes are basic changes, such as changing drench types.
Genetically resistant sheep is seen as the long term solution to worm management and is viewed very favourably by management, how ever they are concerned about the time and the cost it will take to produce genetically resistant sheep. New drench chemicals are believed to be the most likely future solution to worm management. This is due to the fact that they are the “easiest and quickest to develop” and will not cost a lot.

Management Practices Currently Used to Manage Parasite Infection

Sheep are drenched on the break of the summer and winter seasons. Ewes are drenched prior to joining and ewes and lambs are drenched at marking. The annual cost associated with current drench practices is approximately $1500 p.a. Only one person is needed for drenching.

Future Management of Parasites

Management have a large amount of faith in their own management style and would be very hesitant to change practices as the current management system works very effectively for them.

Any system change would have to be trialed many times before hand and basically be proven to be better management technique. The new targeted treatment raises concerns with them such as missing one sheep with worms, as well as increased costs and labour associated with it. As they do not do a WEC, they feel the amount of labour this treatment needs is unsuitable for their system. Management has a very strong production philosophy of “if its not broken, don’t fix it” and would be very wary of trying anything new, as they are very happy with how things are going in their current system.
They will manage increasing resistance and rising costs with drenches by hoping the price of their produce increasing, and will keep going with sheep as long as financially possible. In the long term, if it is not financially viably to continue to farm sheep, cattle and cropping is seen as a very real option.

One issue that was raised was lice control. They currently use a spray on treatment (Zapp) to control lice. They feel that “lice are a much bigger concern for them than worms”. They would like to see new legislation to make dipping compulsory.

CASE STUDY CRC SA BA 01

Enterprise Profile

This is a small farm run by the owner.
The property is 380ha and is 30km NW of Port Lincoln in South Australia. The long term average annual rainfall is 500mm. Soil is sandy loam over a gravel seam, over clay. It is undulating.
The sheep enterprise is a self replacing Merino enterprise of 500 ewes run on 90ha of winter pasture. The other enterprise on the farm is crops, which use the remaining 290ha. The cropping now brings in 67% of the income and the sheep 33%. Ten years ago this was the reverse. However, the sheep are still important as it could turn around.

Labour

Currently about 17 percent of his time is spent on sheep work. He employs labour only for shearing, crutching, seeding and uses contractors to spread lime and gypsum and to cart all produce

Production Goals

The aim is to produce money in a sustainable mixed farming system. The aim of the sheep enterprise is to produce good quality wool in an easy-care system. Since labour is limiting and more income now comes from cropping, Merinos are run because they are low input. Mating, a proportion of the flock to terminal sires may be more profitable but the farmer has always thought it too much work (feeding, weighing, marketing etc) however he is reviewing this. He considers buying ewes could be a problem.

Sheep Production

Flock Structure -Ewes are run in two mobs of 250 each. Weaners / hoggets are in another mob of 200. The wethers are sold as lambs whenever is convenient
Stocking rate is well above the district average - which has worked well until the recent drought years. Stocking rate is 14 to 18 DSE per winter grazed ha while the district is about 12 DSE. Sheep are rotationally grazed.
Selection Process - Ram source has changed a number of times in recent years. Rams are selected for white wool, strong frame, wool weight and about 20 micron wool (rams). Visual and performance (Sheep Genetics) measurements are used. Rams need to be above the average of the flock they come from. He finds accessing the Sheep Genetics figures on the internet is too difficult. “I don’t have the patience for that”.

NRM

The farmer has constructed contours, fenced off creek lines, planted some trees, spread lime and gypsum and converted to no-till seeding. He monitors saline areas.

Non Sheep Enterprise

Crops are sown continuously on the better land. No till is used. Stubbles are grazed. Rotation is lupins, canola, wheat and barley. This management has changed dramatically over the last ten years.

Sources of Information

The main sources of information are the agronomist, Industry newsletters and local PIRSA staff. "Ground Cover" magazine is the best and most positive information. He does not receive the Stock Journal as he considers it "full of bad news". Stock Agents and other farmers are not used other than "for interest". A Sheep Production Group run by local PIRSA staff was excellent.

Importance of Lamb and Weaner Survival

Lamb and weaner survival issues -Aver the last three year the lambing percent has averaged over 100 percent, however the farmer considers his average in recent years has been 90 to 95 percent. About 20 years ago, before management was improved, the average was 75 to 85 percent.

Causes of Lamb and Weaner Loss and Management Interventions

The farmer believes the current

- conception rate – 110 to 140 %
- losses prior to birth – no idea
- losses birth to marking – 5 to 10 %
- losses marking to weaning – 5 %
- weaner losses – 10 %

He considers the weaner losses are the biggest worry and the worst part of his management system. He says there is just too much going on when he should be looking after the weaners. Some of the drinking water may be a bit salty for them.
The farmer measures these variables by pregnancy scanning (for the last 2 years) and counting lambs. Dead lambs were counted one year.
Proportion of Lamb losses at Birth - Considered to be low – about 4 %. He used to pick up dead lambs and count them but now there are not enough to worry about it.
He has made changes to achieve this Ie. fox baiting (80 to 100 baits taken each year), feeding lupins to the ewes.
Before the management changed he considered the losses were about 8%. Now in good years they are 2%. This is mainly due to ewe nutrition and fox baiting. Good lambing paddocks are chosen.
Main causes of losses are:

- abortive losses – no idea
- lamb losses – foxes, crows
- weaner losses – nutrition, worms, flies and straying / theft

Losses (other than abortive) can be seen. Fences are all new (due to fire) but lambs still get out.

Lamb and Weaner survival management

Priority of Issues -

- Abortive Losses – low priority because I cant do much about it

- Lamb losses – high priority because it drives production. Losses affect income (of any type)
- Weaner losses – high priority because its economic

Issues that take priority over losses
Work - at harvest mainly. Being a sole-operator some things do not get done.
What are the main issues secondary to losses?
Having good sheep yards.
Has the priority changed?
Cropping has taken over as the main income earnt.
Future events that could affect priorities
Price of weaners - if it would mean I could employ someone.
The farmer believes that changes that could be used to reduce losses are simple and easy. The problem is the farm size and lack of time.

Observations on Reproduction Cycle

Note – Only the practices that are carried out are listed here.

Pre-joining

Monitoring ewe condition – visually and hands-on.
Nutritional regime – feeding lupins. Aim for condition score 3.

Joining

Management of ram condition – give lupins for 6 weeks pre joining.
Testing rams for faults – poor condition, or unhealthy, rams are not put out
Age of mating maidens – 18 months.
% of rams – best rams for wool put out at 0.8% for 3 weeks then another 0.8% put out for remaining 3 weeks.
Length of joining – 6 weeks.
Age structure – ewes culled at 5.5 or 6.5 years old.
Lambing time – June.

Pre-lambing

Nutritional management of ewes through gestation
– feed 0.5kg of lupins a week. At about day 60 and day 100, double this for about a week (he read somewhere that these were critical weeks).
Classing of dry ewes – ewes were scanned the last two years but not this year (lack of time). Before that did udder testing at marking. Dry ewes are run with the hoggets until most are culled.
Classing of twins / singles – scanning
Differential management of twins
– twinning mob put into the best, most convenient, lambing paddock.

Lambing

Nutritional regime for managing ewes

– feed lupins twice a week until they start to waste some

Monitoring of birthing – have a quick look only.

Use of sheltered lambing paddocks
– have 2 good paddocks.

Differential management of twins / singles
– Yes. As above.

Predator control – bait for foxes.

Marking

Vaccination of lambs – 5:1 vaccine with Glanvac

Mulesing

Mules – normally do. Will only do half the ewes this year (the most wrinkly) and no wether lambs.

Weaning to 12 months

Time of weaning – 14 weeks from start of lambing (used to be 20 weeks) Lambs not big enough as weaned later.

Use of weaning paddock – plan a paddock now. Paddock is not grazed by lambing ewes and feed is left to grow.

Parasite monitoring – if the weaners are scouring, or poor, I do a worm test.

Ongoing monitoring of weaners
– only do it in the paddock. This is my biggest problem.

Nutritional regime – feed lupins - but not enough. Should feed them ad lib but I would run out of lupins in October or November.

PARASITES Current and Historic problems

The farmer believes current worms are black scour worms and small brown stomach worms. He said occasionally there have been haemonchus which he said are "not meant" to be a problem in the district.

He knew the species of the worm from worm tests he has done (through PIRSA). The Haemonchus were identified by sign of "bottle jaw" and the fact that this disappeared within days of drench.

Losses from worm infections

He has not lost sheep from worms for a long time e.g. 20 years. At that time he would see skinny or scouring sheep and he assumed it was worms. He used to drench every time the sheep were in the yards. He assumes there was significant production loss at this time.

Worm management

Priority of these issues

Deaths as a result of worms. - Not a priority because he does not have deaths now due to improved management.

Production losses - not a priority

Development of resistance to drenches

- A high priority. A meeting where Ian Carmichael spoke to a Sheep Production Group "scared the pants off me". He said he now rotates between drenches. Note: this is rotating between Ivermec and Cydectin. He assumes white and clear drenches do not work and has not used Combination drenches.

The sheep issues that take priority over managing worm infection are

- production issues
- sheep nutrition and pasture management.
- All other sheep issues are secondary to worm infection.

The priority level of worm management has changed greatly over the last two years.
This is a result of the Sheep Group meeting and reading he has done since then. He does not consider worms are a big problem but they could become a problem eg if resistant worms are brought in, in sheep from the South East.
The future event that would affect the priority is development of drench resistance.
The farmer believes managing worm infection and resistance should be easy. You need to make the decision. However, it's just another thing to overcome and be aware of.

Most likely future solutions to parasite problems are considered to be (in priority order)

1 Genetically resistant sheep
2 Strategies to reduce the number of drenches given
3 Management systems to reduce the number of sheep that need to be drenched and slow the rate of resistance
4 Improved pasture management strategies to avoid worm pick-up
5 New biological control methods
6 New drench chemicals – will not be relied on

The best strategies for his enterprise are seen to be

- Strategies to reduce the number of drenches given

He assumes stud breeders will improve genetic resistance to worms.

Management Practices Currently used to Manage Parasite Infection

Worm burdens have been monitored over the last two years. He does a worm test before he drenches. Ewes are tested in October or November. They are normally drenched regardless of the result (as it is the first summer drench). He still feels the test is worthwhile for the information gained.
Weaners are tested in September or October and only drenched if the advisor says they need it. A test and a retest later is seen as a way to see the build up of worms. He says a drench and then a test after two weeks would be a good idea. He did not do this as he "took his eye off the ball". He said he needed to write it down in the diary.
Rams are not tested but given two or three drenches a year. When rams are purchased they are normally drenched by the breeder otherwise they are drenched off the truck.

Note

Previous to the Sheep Group meeting he routinely gave a double summer drench. Ivermectin has been used ever since it came out. He has used Cydectin for two years row. He is aware he needs to look for another drench.
Worm burdens (WEC) have been monitored over the last two years through PIRSA. Drench resistance has not been monitored although the farmer has thought about it.
He uses the results of the worm test to know if he has a problem. Other than for the first summer drench he does not drench unless a high test result is received.
The benefits of monitoring worm infection are the sheep appear healthier (but you still need to keep your "eye on the ball").
The labour required to worm test is "not much but you have to do it". You have to take the dung samples to Port Lincoln early in the week. His wife goes to Lincoln but before the PIRSA office is open. Often it involves a special trip to Port Lincoln (45 minute return trip). It requires planning. Four tests at one and a quarter hour each equals five hours.
The cost associated with monitoring would be;

test costs	4 @ $27	= $ 108
travel	4 @ 60km @ 50c / km	= $ 120
		= $ 228

Resistance testing

He said he would probably have done it is he had a simple step-by-step instructions of what to do. He gave the example of spraying a crop with chemicals. He said it would take too much time to read the labels (eg. three chemicals) and it would mostly be irrelevant information. He just rings his agronomist who tells him exactly what needs to be done.
He said he would do a simple drench resistance test – not the full test.

Drenching Program

Mob	First drench	Second	Third
Ewes	November	? (see note)	
Ewes	November	?	
Weaners / Hoggets	October (if high test result)	November	
Rams	November	January	?

Note ?
Ewes will be evaluated visually in the paddock during summer / autumn. If they are poor, or scouring, they would be tested and drenched if high worm egg count.
The annual cost of drenching is about one and a half days of own work and about 20L drum of drench ($600).
Other practices used to control worms includes grazing stubbles over summer.

Practice Change and the Future

The future scenario was read out to the farmer and then he was asked:
"Can you see this as being a solution that you would implement"?
His answer;
No. If I get the sheep in the yards to drench I would do the whole lot. I would need a lot of convincing to take this approach.

We don't have the worm problems the other areas do. We are not attuned to all the future issues. If I did not drench all the sheep a "wormy" sheep not drenched would go out and reinfect all the others and the mob would have to be drenched again. The cost of the drench is not an issue. If it cost $1 a sheep I would still drench the lot. However, if I needed to drench each mob four times a year I may change.
If I could draft some of the mob off and do an on-farm worm test then I could leave some undrenched. Economics is my first consideration, ie the benefits of doing something not the cost of doing it.
The farmer would be prepared to sacrifice up to 5 % of production if it was necessary to avoid drench resistance. However, he believes this would put more pressure on stud breeders to breed worm resistant sheep.

Future Management of Parasites – Drenching 30%

How else will you manage increasing resistance and rising costs associated wit drenching -Rely on genetics. Hope that someone else solves the problem. Don't purchase sheep from anyone (although he has to buy rams – AI unpractical). If buy sheep he would isolate them and drench.

CASE STUDY SA IM 03

Enterprise Profile

The interviewee in this case study has had management responsibilities of the business for 25 years. The interviewee is in his late 40's, is married with 4 children (one son working on property) and has a secondary education.
This business operates approximately 2400 hectares near Keith in the Upper South East of South Australia. The business consists of two properties, with the 'home' property of 1750 hectares, 8 kilometres south of Keith, composed of brown loam to grey sand over clay soils.
The second property consisting of a 650 hectare dryland lucerne block is approximately 12 kilometres west of Keith and is predominated by grey sand over clay soils. This second property was purchased approximately 2 years ago. This new block has approximately 500 hectares sown to lucerne.
The long term average rainfall is 450 mm, although over the last 10 years this has been about 400mm.
The business operates a mixed enterprise system with sheep, cropping and lucerne enterprises. The sheep enterprise returns approximately 30% of gross farm income and consists of wool production from a self replacing Poll Merino flock, a ram breeding flock and sale of surplus sheep.

Production Goals

Business Goals

To be in the top 10% for everything. Make good business decisions and achieve financial stability.
The interviewee however later made the concession that it may not be in the 10% for return per hectare. Interviewee had a higher priority for looking after sheep better, having good healthy sheep and no lambing problems.

Labour

The business operates with 5 labour units (this includes the interviewee and son) and engages contractors for ancillary services such as windrowing, crutching and shearing. Employing staff was regarded as a cheap outlay. Lifestyle was an important factor in the use of labour in this business. Labour is divided across the enterprises with 40% time to lucerne, 30% to sheep, 20% to cropping and 10% for infrastructure maintenance.
Business has approximately 94% equity.

Sheep Production

Sheep enterprise goals

Breed a dual purpose sheep that is in the top 10% for characteristics.

Enterprise details

Sheep

Income from sheep has reduced from about 50% 20 years ago and moved to a greater emphasis on lucerne. This change has been a result of changing commodity prices.
Ram breeding enterprise

A ram breeding enterprise is run with 900 ewes producing 250 ram lambs. Breeding goal is to produce 22 micron wool, 8 kilograms per head wool cut and high fertility.
One sire is introduced per year from Moorundie Park and selected visually. Measurements are available but not really used. Approximately 120 rams are sold each year in August.

Non Sheep Enterprise

Crop
Approximately 600-800 hectares are cropped each year with canola, wheat, barley, beans in rotation. Approximately 75% of the sown area on the home property is continuously cropped
Lucerne enterprise
Hay and lucerne seed produced.

Stocking rate
The interviewee did not know the stocking rate but it was estimated to be approximately 6.6 DSE/winter grazed hectare.
Grazing strategy
Sheep graze the dryland lucerne from April to August on the west property & from September to May are moved to the home property on 400 hectares of irrigated lucerne.
Home property – paddock size ranges from 15-30 hectares.
New property has 28 paddocks with an average size of 20 hectares (with a laneway down the middle).

NRM

Planted 4-5,00 trees on fence lines and laneways. Won't be planting on every fenceline as it was felt that trees result in a production cost.

Sources of Information

Interviewee stressed he was not a good reader but talked to people including sale reps, agronomist, vet and San Jolly.

Causes of Lamb and Weaner Loss and Management Interventions

Current lamb and weaner survival issues
Conception rate is believed to be about 125-140%.
Abortive losses - minimal
Lambing loss of 20% from marking to lambing.
Marking to shearing - minimal loss (1%)

Importance of Lamb and Weaner Survival

Lamb and weaner survival management
Medium priority

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival
Pre-joining
Rams are examined prior to mating.

Ewes are teased 12 days before joining with treated wethers.

Joining

Teasers are removed at joining in November. Ewes are joined in mobs of about 400-500 with 1% + 1 rams for 7 weeks. Ewes are estimated to be in condition score 4 at mating and weighing approximately 80 kilograms.

Visually assess condition score – stock agents have taught him what to look for.

Ewes are run on stubble and estimated to be in CS 3.5

Pre-lambing

Ewes are fed hay 3 times a week and grain 3 times a week.

Lactovite blocks are also used from 6 weeks prior to lambing until 2-3 weeks into lactation. Ewes are crutched in March and jetted with Clik. Has used Clik for last two years.

Lambing

April lambing. Lamb in small mobs of approximately 200 ewes (have had up to 28 ewe mobs). Ewes are fed grain three times a week to support milk production. Maiden ewes are lambed down in mixed age mobs to ensure they are settled down.

Average lamb marking % is 100. Maidens average 85%. Aware that this could probably be improved if moved to a later lambing. However he has chosen to be in the Stud ram market, therefore he needs to lamb early to have sale stock on weights/size to compete in market.

Marking

Occurs approximately 7 weeks after the start of lambing (20th May). Lambs are vaccinated with a 6 in 1, Glanvac, Vit B12 and selenium. Pain relief has been used with mulesing for last 3 years.

Weaning – occurs July 15 -20. Weaners are given a booster vaccination and drenched with Cydectin. Aim to get ewes in CS 3 (visual assessment) as quick as possible post **weaning.**

Sale ewes are shorn in early August whilst the remainder are shorn early September.

Ewes are CFA at 5.5 years of age and sold in October.

Worm Management

Worms are only of medium priority – comfortable with current strategy

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites

A drench resistance test was completed about 15 years ago, at which time there was an issue with clear drenches. A complete test has not been done since. Ivomec capsule was used 10 years ago when a problem occurred.

Worm egg counts are done on weaners monthly after weaning (late July) until Christmas.

A count is done in March on all sheep. Results determine paddock usage and timing of drenches.

Hoggets worm egg count in May

Worm egg count done on ewes in mid August. All sale ewes are given a drench, regardless of results of test, for presentation reasons.

All sheep normally receive two summer drenches. The first summer drench of Rametin Combo is given as soon as the feed starts to dry off (in November). Rametin product has been used for the last 6 to 7 years. There are some concerns with using Rametin on young stock that is why two different drench types are used in the one year. Lost a farm dog this year due to the drench.

The second summer treatment is with Cydectin Ewe Guard given in February.

Not confident in faecal egg count for second summer drench. With an early lambing need to be 100% sure worms are controlled in summer.

Believes should use nature to assist in controlling worms (i.e. summer drench) and believes his business is a long way from reaching a problem point.

Future Management of Parasites – Drenching 30%

Future management of parasites

Not convinced that worms are a major issue and that the current management strategy is working and should continue to do so. Would drench a proportion of sheep in a mob, if that was the only strategy forward. Would need to see that there is a problem and that the current strategy needs to change.

Would forgo approximately $1.50 per sheep (20c+/kg wool) to avoid extra crutching costs.

Other issues

Currently lambs in April to ensure sheep are lambs are ‘mature’ before summer, avoid the need to control grasses in spring (grasses are good early feed) and no supplementary feeding is necessary to lambs in spring. Realises that effort for lambing at this time is high he is happy with that.

Aware that by changing to a later lambing (May) that the break would be at the tip, possibly get 10-15% more lambs, lower micron, wean 5% more lambs, however there would be a need to double shear (leading to possibly an issue with lice) and control grasses.

Concerned about the mulesing issue and the 2010 deadline. He believes that the clips and injection is not the complete answer. Has used pain relief and believes this has made a difference with improvements in mothering up. He hasn’t concluded whether mulesing will stop or not on his property in 2010.

Clips are an issue with his lucerne hay enterprise. His son is also not particularly interested in sheep and won’t be interested in crutching sheep twice.

CASE STUDY SA IM 05

Enterprise Profile

The interviewee in this case study has been involved in the operation of the farm business for approximately 28 years. The interviewee is in 50's, is married with 2 children and has a tertiary education. The farm business supports two families plus the parents (parents are retired but still own land and lease it to the business). The daughter has been working on the property for about 3-4 years and has an interest in running the livestock enterprises.

Business Profile

This business operates approximately 7850 hectares (includes 560 hectare of leased land) near Coomandook in the upper South-East of South Australia. The business is composed of six properties ranging from undulating deep sand hills to sand over clay/rubble. The properties are all located within the district with an annual rainfall ranging from 330 mm to 450mm. The business operates predominantly a cropping and hay enterprise with supplementary wool, prime lamb and cattle enterprises.

The crop income accounts for approximately 85% of gross income, with wool, lambs and cattle accounting for 4.5%, 4.5% and 6% of gross income respectively. The sheep enterprise consumes about 0.8 of a labour unit. The sheep enterprises consists of a 1200 Merino ewe self replacing flock (SRF) and a 600 Merino ewe first cross lamb enterprise.

Labour

The business operates with 6 labour units, this includes the interviewee, brother and daughter. The business engages contractors for ancillary services such as fencing, claying and shearing.

Production Goals

Business Goals

To be profitable, provide a good education to the children and provide them with the opportunity to join the business (have a working succession plan). Provide an adequate life for himself and for retirement. Be innovative and an employer of choice.

Sheep Production

Sheep enterprise goals

Reduce micron (have decreased micron by about 2 over last 3-4 years). Currently adults 20-21.9, aiming for 20 microns.

Develop dual purpose sheep, with progeny that perform well in a feedlot.

Enterprise details

Sheep

The business has been involved with the Superior Wool Syndicate since 2000.

Approximately 50% of the SRF ewes (last two age groups) are artificially inseminated. Have been using AI for about 7 years.

Shearing is in March.

Normally keep wethers for the shipping trade until 1.5 year old. As a result of the dry seasons the wethers will be sold as lambs.

Non Sheep Enterprise

Cropping

Approximately 5500 hectares are continuously cropped with wheat, barley, peas and beans. No till has been used since the mid 80's, with total no till for the last 6 years.
Brother records cropping information on computer (PAM)

Cattle

The cattle enterprise consists of a 200 Angus cow herd producing vealers (>300 kg liveweight) all year round off lucerne based pastures. Replacement heifers are purchased in December to February.
Yearlings are produced all year round. The business has an arrangement with a wholesaler for disposal of approximately 75% of vealers with the remainder being sold through sale yards.
A Limousin bull is being tried to produce a leaner carcass for the market in November to January. The Angus yearlings tend to get too fat during this period when lucerne is at its flush.

Stocking rate

Was not sure but estimated to be approximately 4 DSE/wgha (sheep & cattle).

Grazing strategy

Paddock size ranges from 20-30 hectares with lucerne paddocks up to 50-100 hectare paddocks.
The ewes are run in 7 mobs (4 Mo ewe & 2-3 XB).
Feed is sown early – sheep are then grazed on this and lucerne in short rotations. Sheep are not given access to lucerne over the summer.
Cattle & sheep are grazed separately.

NRM

Fencing to soil type.

Sources of Information

Uses a number of sources including chemical reseller agronomist, superior wool syndicate members, Bill Walker (classer), publications (SA No Till, PIRSA publications) and attends seminars e.g. Elders (ELMS). Uses the Lambing Calendar.

Importance of Lamb and Weaner Survival

Although cropping is the major enterprise on this property sheep reproduction is an important issue. The program developed to reduce micron supports this.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management

Conception – unsure (160% lambing in scanned mob of twins)
Abortive losses - unsure
Lamb losses – 20% due to weather
Marking - < 5% from mulesing
Weaning to shearing – not an issue – minimal losses
Ewe mortality is generally less than 4%

Observations on Reproduction Cycle

Management practices – lamb and weaner survival

Pre-lambing
Teasers have been used for the first time with all ewes this year (2008). Prior to this, teasers were only used with the AI ewes.
Ewes are grazed on stubbles, the focus being preparation of paddocks for cropping. The ewes may be given a light rate of lupins to assist in the eating down of the stubbles.
Ewes are visually assessed – more labour, more handling and time are the main reason suggested for not condition scoring. This business also runs a number of properties on which the sheep yards are not the best, therefore sheep are handled as little as possible.
Joining
AI flock – Artificially inseminated in February. 10 days after AI backup rams are placed with ewes for 25 days
Natural mating: Five week joining using 1% +1 (XB flock in January and SRF in February). Ewes are run in age groups until pregnancy testing. All ewes have been pregnancy scanned for multiples this year. Have been scanning the SRF ewes for 4 years. Ewes scanned with twins are provided with more feed (amount will depend on paddock feed available). Dry ewes from the prime lamb flock are sold, the SRF ewes are given a second chance.
Supplementary feed prior to lambing and during lambing with screenings & lupins (100g/hd/day). Feed twice per week. Quantity supplied determined by time feeder is opened. Stubbles are grazed down to minimum cover (1 tonne/ha).
Shearing in March.
Lambing
Prime lambs drop in June whilst the Merinos lamb in early July.
Ewes are crutched & use CLIK prior to marking.
Marking
Lambs are marked in late August. Flystrike is an issue with later lambs. Propose to use Trisolfen this year. Lambs are vaccinated with Glanvac B12.
Average lamb marking 90-92% for SRF (includes AI ewes) and 100% + for prime lamb ewes. Expectation is 100% lamb marking.
In 2007 101% for Merinos and 118% for prime lamb flock – best ever had – this improvement is put down to better management of twinning ewes and improved nutrition (i.e. sowing more sheep feed)
Weaning
Lambs are weaned in mid October and placed on hay paddocks. They are vaccinated (Glanvac B12) and treated with CLIK. Lambs are drenched if they are going into a hay paddock.

Parasites Current and Historic problems

Parasite Management
Parasites are regarded as highly important, although worms have only been a minor issue in the past. After a property purchase four years ago there appeared to be some problems with sheep scouring – internal parasites were the cause.
Ostertagia appear to be the predominant worm from test results

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites
All sheep receive one summer drench before going on to stubbles. Have been alternating between ML drenches for last 5-6 years.

Wether weaners purchased from KI in December were drenched with combination/ML on recommendation from local agent.
Faecal egg counts were done for the first time in 2007 on the encouragement of a drench company. Young sheep were sampled before the summer drench – results indicated low counts but sheep still drenched.
A drench resistance test was done in early 90's – this test indicated a resistance to white and clear drenches.

Practice Change and the Future

Worm Management

Future Management of Parasites – Drenching 30%

Future management of parasites
The system would have to be demonstrated before drenching only a proportion of a mob. Would need clear guidelines on which sheep need a drench.

CASE STUDY CRC SA IM 06

Enterprise Profile

This case study incorporates the responses from the interviewee and his wife. The interviewee has been involved in the operation of the farm business for approximately 30 years, is in early 60's, has 2 sons (off farm - mechanic and plumber) and has a secondary education (worked in the banking industry until 30). The wife assists with the book keeping and some daily operational work. There were some suggestions that retirement may occur in five years.

Business Profile

This business operates approximately 1619 hectares near Sherlock in the Mallee of South Australia. The property receives a long term average rainfall of 330 mm and the landscape is typified by undulating country of shallow sandy loam (high pH (8-11)) over limestone, interspersed with sandy and stony ridges. Most country needs to be stone rolled prior after seeding.

The business operates a cropping and Merino (self replacing) sheep enterprise.

Both sheep and crop each account for approximately 50% of gross income. It is estimated that the time spent on each enterprise can be equally split between the two enterprises.

Labour

The business operates with 1 labour unit and engages local assistance for ancillary services such as shearing. Commented on the complexity of the book work required with hiring labour (tax, super, workcover).

The interviewee favours sheep due to the high fuel and fertiliser costs.

Production Goals

Business Goals

Be more efficient and increase returns from what they currently have. Pleasant lifestyle

Sheep enterprise goals

The business has a focus on reducing SD and increasing frame size. A micron of about 21 microns is desired (currently ewes average 22).

Sheep Production

Enterprise details

Sheep

This business runs an 800 Merino ewe self replacing flock, with wether lambs being sold in October. Wool production has always been the key focus of this property, although for a two year period (10 years ago) cross bred lamb production was tried. Fly problems saw the lamb enterprise discontinued.

Typically lambing was in March/April with a July/August shearing. A shift to a later lambing (July) and summer (January) shearing was initiated in 1994 following a series of dry starts and a presentation by Brian Ashton (RSSA).

The business has incorporated Soft Rolling Skins (SRS) into the sheep breeding strategy since 2000. This has created some issues with overlength wool. Therefore for the last two years, ewe

weaners have been shorn as hoggets in September and then again as maidens in May. They are then shorn as adults in the following January.

Non Sheep Enterprise

Cropping

Approximately 800 hectares are cropped annually to wheat, barley and oats (grain and hay for feed). A phase system of 2 to 3 years crop followed by 2 to 3 years pasture is used. The 5 year average yields are wheat 1t/ha, barley 1.2 t/ha and oats 1 t/ha. Frost is an issue with wheat.
Approximately 100 hectares are re-sown to medics each year. Enough feed reserves of oats and hay for two years are stored on-farm.

Stocking rate

2.5 DSE/wgha

Grazing strategy

Paddocks are defer grazed at the start of the season with paddocks to be cropped being grazed first. The renovated paddocks or oats are grazed for 4-6 weeks if required.
Paddocks are generally set stocked as paddock size ranges from 80 to 120, therefore rotational grazing is not practical.

NRM

There are small amounts of scrub in every paddock. Approximately 120 hectares of scrub exists on the property with a proportion of this being double fenced.

Sources of Information

Information sources include the Stock Journal and, Beyond the Bale.
The interviewee is a member of the local Agricultural Bureau and attends various field days/training courses (e.g. chemical course, mulesing accreditation, SRS course). Ram breeders have been used to source information and the interviewee's brother is also consulted.
The internet is used by the wife but not by the interviewee.

Causes of Lamb and Weaner Loss and Management Interventions

Current lamb and weaner survival issues

Conception rates - unsure
It has been observed that the incidence of twins and triplets has increased over recent years with the incorporation of SRS lines being considered the main contributing factor.
Lambing losses are regarded to be minimal (6%).
Minimal losses from marking.
The average lamb marking percentage is 100% (for last 5 years). This average has increased from 85% since lambing later. In 2007 lamb marking percentage averaged 112% (range of 117 to 100%).

Importance of Lamb and Weaner Survival

Lamb and weaner survival management

Of medium importance. Sheep a low priority during seeding.

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival

Pre-joining

Rams are supplemented with screenings and lupins four weeks before joining

Joining

Ewes are shorn in January. Rams (2%) are placed with the ewes at the end of January for a 6 week joining. Scanning was not regarded as a worthwhile operation with labour concerns and extra handling being the main reasons.

Fox control has been undertaken for the last three years, during February-May before the break of the season & lambing.

Ewes are supplemented from about March/April. Hay is initially fed out, followed by screenings as required. Visual observation of the sheep determines the amount of feed required and, as such ewes are not weighed or condition scored.

Ewes are given a Glanvac 6in1 vaccination 6 weeks before lambing.

Lambing

Ewes are kept in age groups and lamb in July. Crows are considered to be an issue at lambing.

Marking

Lambs marked six weeks after lambing starts, given Glanvac 3 and Vit B12. As a result of an issue with arthritis in lambs, Eryvac has been used at marking for the last two years. This has resulted in virtually no cases of the disease, from an incidence of approximately 2-6%. Tri Solfen was used on one mob last year with minimal benefit. It was believed that the wounds didn't heal as well as untreated lambs, and there appeared to be minimal benefits to mothering up.

Weaning

Ewe lambs are weaned at the end of September. A booster Glanvac 3, Vit B12 and Scabiguard are given. Wether lambs are kept on the ewes until sale in October.

Parasites Current and Historic problems

Parasite Management

Parasites are a low priority and not be regarded to be a problem or significant issue on this property.

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites

No faecal egg counts or drench resistance testing has been done. A strategy of tagging and then culling 'dirty' ewes is used.

Lambs are given a weaning drench at the end of September. All sheep then receive a summer (December/January) drench before going on to stubbles. Then depending on the year and paddocks, the weaners may get a drench at the end of January/February when they are shifted between paddocks.

Ivomec is generally used in summer, with rotation to a clear every three years. A white drench is used in winter, if needed.

Future Management of Parasites – Drenching 30%

Future management of parasites

Strategies are not expected to change from what is currently used on the farm. The interviewee has already considered drenching parts of mobs.

CASE STUDY SA IM 07

Enterprise Profile

The interviewee in this case study has been involved in the operation of the farm business for approximately 30 years. The interviewee is in his 50's, is married with 3 adult children and has a secondary education.
This business operates 1070 hectares near Tarlee in the Mid-North of South Australia.
The property consists of approximately 390 hectares of 'hill' country which is predominantly native pasture and 680 hectares of undulating lower country that has been improved with sub clovers. The 'hill' block was purchased in 1995 and is still being developed with paddock subdivision and water supplies.
The business consists of cropping enterprises producing canola, wheat and barley and, sheep enterprises producing first cross ewes, Merino and Merino/BL lambs and wool.
In previous years (600-1500) lambs have been purchased in November and finished on stubble agistment and sold February.
The long term average rainfall for this property is 450 mm.
The cropping enterprises contribute approximately 60% to the gross farm income whilst the sheep enterprise contributes 40%. Despite the gross return break-up, the estimated time spent on the cropping enterprises is 30% whilst the sheep enterprises consume 70% of time.

Labour

The business operates with 1 labour unit, and engages contractors and casual labour for ancillary services such as shearing, mulesing, crutching, spraying and fencing.

Production Goals

Business Goals
Environmentally and economically sustainable property
Sheep enterprise goals
For Merino self replacing flock are using Centre Plus genetics to achieve a 20 micron flock with good muscling and high lambing percentage.

Sheep Production

Enterprise details
Sheep
Approximately 1300 Merino ewes are currently run on the property; this has been decreased by about 200 over the last few years due to the dry years.
Self replacing ewe flock - 650 Merino ewes are joined with Merino rams (from Centre Plus). The remaining 650 Merino ewes are joined to Border Leicester rams from 'Inverbrackie' stud to produce first cross ewes. The Mo/BL ewe lambs are sold directly to producers in the SE in early November. The cross wethers have been normally sold in spring but due to the poor seasons & prices they have been kept through and sols at 12 months of age.
Rams from Centre Plus are selected on objective measurement first and then by visual assessment.

Stocking rate
Average stocking rate of 5-6 DSE/ha (were 6 and aiming for 7 however dry seasons have had an impact).
Grazing strategy
The Merino ewes mated to BL rams are set stocked over lambing then rotated over pasture/stubble paddocks in summer. In 2008 they have been confined fed over the summer period.
The self replacing flock ewes are run on the hills over winter and moved to the stubbles over summer (hills are destocked).

Non Sheep Enterprise

Cropping
Crops approximately 550 hectares, producing canola, wheat, barley and hay. Whilst further cropping is possible the available country is not ideally suited and there is a preference for the sheep enterprises. An increased crop area needs to be considered to assist in servicing debt.

NRM

Some fencing off of tops of hills, gullies and creeks has been undertaken.

Sources of Information

Information sources
Well networked uses Simon Ellis (livestock consultant), Tony Craddock (cropping consultant), San Jolly (contract crops for her). Chair of SA Lamb Development Team.
Attends training courses such as Grazing for Profit, Wean more lambs.

Importance of Lamb and Weaner Survival

Current lamb and weaner survival issues
Lamb survival is deemed important & high priority. A goal of increasing lamb percentage was a reason for a change to Centre Plus genetics.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management
Conception rates - 94%.
Scanning in 2008 – wet & dry SRF ewes and litter size Mo (BL) ewes (Confined ewes - scanned for multiples were 120% (poor doers) & 139% (main group). The poor doers were a group of the poorer condition ewes.
Abortive losses – unsure
Lambing losses – estimate 5-20% due to poor nutrition and birth problems.
Weaners – not an issue, although flies can significantly impact on Merino lambs in some years.

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival
Pre-joining
Rams are fed grain in feedlot for 8 weeks prior to joining.
Used to feed ewes lupins, but now bases feeding strategy on visual condition and weight of ewes.

Joining
Joining occurs in February for 6 weeks with 1.6% rams. Rams are removed at shearing. Ewes are shorn in March. In 2008 there has been an issue with hay in the backs from the confined ewes with yields down to 48%
Fox control is undertaken each year prior to lambing.
Scanning (wet/dry) has been undertaken in the past although not for a few years. Scanning of all ewes (except maidens) was undertaken in April 2008. The BL mated ewes were scanned for multiples. Twin bearing ewes will be differentially fed.
Lambing
July lambing (this has been brought back from end of July as problems occurred with getting weaners to weight by the end of the season).
Lambing percentage averages 95% (110% adults, 80-85% maidens). Flock consists of 40% maiden ewes. Interviewee believes that lambing percentage could be increased by nutrition and the use of designated lambing paddocks.
Marking - Cross bred lambs in August with the Merino lambs a few weeks later. Merino lambs and Mo/BL ewe lambs are mulesed and vaccinated (3in1).
Ewes have been fed grain for past two years prior to weaning to assist lambs getting to weight.
Weaning
Lambs weaned in early October.

Parasites Current and Historic problems

Parasite Management
Internal parasites are regarded as highly important.

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites
Faecal egg count lambs at weaning (October) and 8-10 weeks later (January). A summer drench is given to young sheep if test results indicate the need.
Ewes were not drenched in 2007 – based decision on egg count. Ewes however were given a drench in 2008 (based on test).
Drench resistance test in 2006 – ML OK. Had been using ML for the previous six years. Use a combination drench every few years.

Worm Management

Practice Change and the Future

Future management of parasites
Future strategies include grazing management (rotational grazing, pasture height), genetics (faecal egg count index), grazing management (including cattle if available) and maintaining a good nutritional balance (hence health of the stock).

Future Management of Parasites – Drenching 30%

Interviewee has already undertaken the strategy of leaving (approximately 25% of) sheep undrenched, so would be comfortable with a strategy that clearly demonstrates the value.

CASE STUDY CRC SA IM 08

Enterprise Profile

The responses to this interview were a combination of responses from the father and son involved in this business. The father in this case study has been involved in the operation of the farm business for approximately 30 years. The interviewee is in 50's, is married with 2 adult children and has a secondary education.

Business Profile

This business operates approximately 440 hectares near Freeling in the mid-North of South Australia. The business is composed of a cropping enterprise, a self replacing Merino flock and a 10 sow pig enterprise. Crop income accounts for approximately 80% of gross income, sheep 12% and pigs 8%.

The property consists of heavy black clay to red hard setting soils. The latter have potential water logging issues particularly with the legume crops. Gypsum and lime have been used in recent years to improve drainage and increase pH on the red clays.

The long term average rainfall for this property is 430 mm

Labour

The business operates with 2 labour units, this includes the son (who has been working on the property for about 6 years) and engages contractors for ancillary services such as shearing.

Production Goals

Business Goals

Sustainable farming and making a living.

Sheep enterprise goals

Aiming to decrease comfort factor

Sheep Production

Enterprise details

Sheep

Consists of a 300 Merino ewe self replacing flock. Ewe numbers have been increased (from 220) over the last four years, with wethers previously being kept longer. Wether lambs are sold in February/March. Previously these lambs would have been sold in the off shears sales at the end of October, however the recent dry seasons has reduced prices received and therefore lambs have been carried over.

Ewes are sold at 4.5 to 5.5 year olds.

Currently the adult ewes are producing 22 micron (down from 23 micron – over last five years) and hoggets 21 microns. Higher price, finer micron, high comfort factor rams have been purchased from the 'Kelvale' Merino Stud. Rams are predominantly selected visually but with some emphasis on micron & CF. A 'Profit from Merinos' seminar has been attended.

Except for the last 2-3 dry years cross bred lambs have been purchased and finished on stubbles.

Stocking rate

Approximately 8.3 DSE/wgha.

Grazing strategy

Ewes are set stocked in two mobs during lambing. Depending on the season, the ewes will be boxed into one mob and rotated around the property.

Non Sheep Enterprise

Cropping
Approximately 330 hectares of wheat, barley, peas and beans are sown annually.
A combination of conventional, minimum till and direct drilling is used. Sixty to seventy percent of the crop area is continuously cropped. The remainder is cropped year in and a year out.
Cropping is a priority in the mid May to mid June period for seeding & in December for harvest.

NRM

No major issues of concern.
A few trees have been planted in gullies.

Sources of Information

Information sources
Information is gained from a range of sources including Stock Journal, Farming Ahead, Beyond the Bale and GRDC magazines. The Rural Supplies agronomist is consulted for cropping enquiries. Member of the local Agricultural Bureaux.

Importance of Lamb and Weaner Survival

Current lamb and weaner survival issues
Aims for as many lambs on the ground.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management
Conception rates – 98%
Abortive losses - none
Lambing losses - up to 10% at lambing depending on the season and weather.
Average lamb marking percentage – 100%
Marking & weaning - minimal losses post lambing.

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival
Pre-joining
Rams are fed peas and hay 4-6 weeks before joining.
Ewes are visually assessed with condition scoring not being regarded as necessary – ‘I’m getting too old’
Joining
Ewes are joined in November using approximately 1.3% rams. The youngest rams are placed with the youngest ewes. Rams remain with the ewes until crutching in February. Ewes are run on wheat and barley stubbles first and then are moved to pea or bean stubbles in March.
No ewes are pregnancy scanned because this is only a small operation and the expense is not warranted.
Foxes have been controlled in the past but not for the last few years.

Lambing
Ewes lamb in April. Marking is completed in late May. Lambs are mulesed and given a 6 in 1 vaccination and a Vitamin B12 injection.
Supplementary feed clover hay and depending may feed grain. Has been feed testing hay for a number of years. In 2008 daughter (RSSA consultant) has worked out ewes requirements based on these test results.
Weaning
Lambs are weaned (generally two weeks before shearing) in late July/early August.
Ewes are shorn in August.

Parasite Current and Historic problems

Parasite Management
Worms are not regarded as a great issue in this area and therefore no drench resistance test or faecal egg count testing has been done. There have been no problems with worms in the past.

Worm Management

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites
Ewes are generally drenched on to stubbles in December/January, however during the last few years they have been drenched at crutching (March) for convenience reasons.
Lambs are drenched at weaning (July/August) and the ewe lambs are drenched again at crutching in March.

Practice Change and the Future

White drenches have been used for about five years. There has been some rotation with clears in the past.

Future Management of Parasites – Drenching 30%

Future management of parasites
Worms are not considered to be an issue and therefore the interviewee is not comfortable with leaving sheep undrenched. Would need to do egg counts if some sheep were left undrenched.

CASE STUDY CRC SA IM 09

Enterprise Profile

The interviewee in this case study has been involved in the operation of the farm business for approximately 50 years. The interviewee is in 60's, is married with 2 children and has a secondary education.

Business Profile

This business operates approximately 2,105 hectares on two properties (grazing is the main land use with only 20% of the area being cropped). The home property is located near Tanunda in the mid-North of South Australia and the second property is approximately 200 kilometres south in the Upper South East of South Australia near Peake.

Home: This property consists of 243 hectares of undulating country with mixed but predominantly red brown earth soils.

The long term average rainfall for this property is 475 mm

Peake: This property consists of 1862 hectares (including 243 hectares leased) composed of undulating white sands and sand over clay. The interviewee travels to the Peake block on a weekly basis. This property has gradually been built up with an initial purchase in 1999 and subsequent additions in 2002 and 2004. The contributing enterprises are cropping and first cross lamb enterprise. The long term average rainfall for this property is 325 mm.

The crop and sheep enterprises each contribute approximately 50% of income. The interviewee estimated that time also could be equally apportioned to each enterprise.

Labour

The business operates with 1.6 labour units (this includes the son who shears off farm for 4-5 months) and engages contractors for ancillary services such as fencing, sharefarmer (on Peake block for cropping enterprise).

Production Goals

Business Goals

Cropping – get most from the ground.

Maximum grazing – including grazing barley.

Sheep enterprise goals

100% lambing

Sheep Production

Enterprise details

Sheep

Approximately 1500 Merino ewes are run on the Peake property and 500 Merino ewes on the home property. Replacement ewes are purchased in as 1.5 year olds and selected for size. 1100 ewes are joined to White Suffolk rams with lambs from the home property being sold to Woolworths at 18-20 kg dressed weight (they are purchased on-farm for a per head price). Lambs are not sold in the open market due to the fluctuations in price. The Peake lambs are sold to Hardwicks, Victoria. Lambs are generally turned off in spring (august-October).

This year approximately 400 Merino ewes (at Peake) have been mated to Dohnes. Dohnes have been selected to breed ewe progeny and produce superior wether lambs (finer wool, better doers (good growth rates in first month).
150 SAMM ewe lambs purchased in 2007 – mated to Dohne rams this year (White Suffolk rams were placed with the ewes post the Dohnes).
A flock of 30 White Suffolk ewes is used to breed own rams. Rams are sourced from different studs and selected visually (90%) with minor emphasis on objective measurement. Aiming to produce a shorter ram (the longer rams appear to be slower maturing).
All grazing country is top dressed every second year at the Peake property with 80 kg/ha of super. Soil tests have been completed in the past but are not used regularly.

Stocking rate

Home: 11.7 DSE/wgha
Peake: approximately 1.5 DSE/wgha

Non Sheep Enterprise

Cropping

Home: Approximately 179 hectares of wheat, barley and peas are sown annually. Canola has been sown in the past. Paddocks are continuously cropped for 4-6 years and then sown to pasture for 4-5 years. Approximately 14 hectares are sown to oaten hay.
In 2007, 16 hectares (2x 8 hectare paddocks) of barley was used for grazing by sheep. On one of the paddocks, 4 tonne/hectare of grain was harvested.
Peake: Approximately 243 hectares of sown to barley, oats/vetch hay.
Caltrop is a problem on this property particularly with lucerne as there are no compatible sprays.
Paddock size is up to 100 hectares although a few are down to 40 hectares.

Grazing strategy

Sheep mobs are generally set stocked over 2-3 paddocks.
Approximately 200 hectares of pasture has been renovated with lucerne, veldt grass, primrose and medics on the Peake property. Approximately 80 hectares are being renovated annually. Aiming to increase ewe numbers by 500, to 2000 ewes at Peake property over the next three years following the program of pasture renovation.

NRM

At home some minor work including fencing off creeks and heritage scrub. Belong to local Landcare group. At Peake have increased area of saltbush by 12 ha (total of 32 hectares on property) on the deep sands.

Sources of Information

Member of the Angaston Agricultural Bureau. Attends seminars (e.g. ELMS, mulesing). Consults with Bruce Hancock (RSSA), Elders and crop consultant.
Attended a MMFS workshop. Doesn't believe the manual is interesting or relevant. He believed he already does most things.

Importance of Lamb and Weaner Survival

Current lamb and weaner survival issues

Medium to high priority, aiming for 100% lambing and sales.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management

Conception rate – 95%
Abortive losses – unsure
Lamb losses – 5-10%
This year in early lambing mobs 40% - lots of twin losses
Weaner losses – minimal – most lambs sols as suckers.
At Peake block lost 10% of ewes due to poor season. 4-5% would be acceptable.
Two mobs of ewes lambing in March. The resulting lambing percentages were 50% for Maiden merinos and 90% for Dohne ewes. This was the results of a period of extreme temperatures (2 weeks > 38 degrees) during lambing. Neighbours reported lamb marking percentages of 80 & 45% during this period.

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival

Pre lambing

Good quality hay is fed prior to lambing.
Drench, 3in1 vaccination and Vit B12 two weeks before lambing.
Feed rams prior to mating if necessary. Visually assess condition of sheep.

Joining

Joining occurs in October/November with 2-3% rams. Rams remain with the ewes until February/March.
Shearing is in March.
Ewes are not pregnancy scanned. Time is a factor.

Lambing

Lambing occurs in April.
Lambs early (i.e. in April) because he doesn't want to carry lambs over summer, particularly at the Peake block. Also there are problems with silvergrass in spring.
Marking – a ring is used on tails of crossbred lambs and a 3in1 vaccination and Vit B12 is given. Dohne ewe lambs are mulesed.

Weaning

Lambs are sold as suckers, if they reach target weights, if not they are weaned. This may occur at Peake; at weaning given a 3 in 1 vaccination, Vitamin B12 and A, D & E drench.

Parasites Current and Historic problems

Parasite Management

The importance and priority given to worms is different between the two properties. At the home block with higher stocking rates, worms are a medium priority. At the Peake block worms are a low priority.

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites

Faecal egg count is not a normal practice. Was a shearer for 30 years and believes can assess when a mob is infected with worms. A FEC test was completed a few years ago, 100 days after using capsules to assess performance.
A drench resistance test not done.
Home: Have been using Ivomec capsules for the last 4 years, following an issue with poor performing and scouring lambs. Since using the capsules lamb performance has improved. Capsules are given to all ewes 2 weeks before lambing. Combination drench used in 2008. Ewes are bought in August/September and given an oral drench then a capsule just before lambing.
Peake: Combination to all sheep before lambing (at shearing) in 2008. Ivomec capsule used once.

Worm Management

Practice Change and the Future

Future management of parasites
Future practices – not sure – FEC may be needed.

Future Management of Parasites – Drenching 30%

Not comfortable about leaving some sheep undrenched.

CASE STUDY CRC SA IM 10

Enterprise Profile

The interviewee in this case study has been involved in the operation of the farm business for approximately 35 years. The interviewee is 5th generation farmer, in his mid 50's, married with 3 children and has a secondary education. He likes to have time for interests outside of the farm including windsurfing, bowls, tennis and water skiing.

Business Profile

This business operates approximately 1052 hectares near Tarlee in the mid-North of South Australia. The business is composed of a cropping, sheep and cattle enterprise. The long term average rainfall for this property is 450mm

Crop income accounts for approximately 80% of gross income and livestock 20% despite the gross return breakup the estimated time spent on cropping is 40% and livestock 60%. The sheep enterprises consist of a 1100 Merino ewe first cross lamb enterprise, Poll Dorset ram flock and opportunity feedlotting and store finishing of lambs on bean stubbles.

Labour

The business operates with 1.5 labour units and engages contractors for ancillary services such as hay baling, crutching and shearing. A fulltime farmhand was engaged up until two years ago. The reason for not recruiting another fulltime person was lack of reliability ('good ones') and competition from the mining sector.

Production Goals

Business Goals

To maintain industry and district averages or better with a balanced lifestyle. Looking after the land is important.

Interviewee expressed annoyance at the poor condition and maintenance of some land in the district over the recent dry years.

Sheep enterprise goals

Maximise kg/ha meat was important.

Sheep Production

Enterprise details

Sheep

Consists of an 1100 Merino ewe flock joined to Poll Dorset rams. Lambing occurs throughout the year apart from December to January (to avoid heat and workload). Replacement ewes (1.5 year old) are purchased in March/April with frame size being the main selection criteria. Ewes are culled on mouths (up to 10 year old). Aims for an all year round turnoff of lambs. Target markets are Woolworths (42-50 Kg LW) and export (50 Kg+ LW). Lambs are sold to Woolworths on a $/hd basis although a value based on $/kg and skin price is negotiated.

Poll Dorset flock – 100 PD ewe flock producing 20-30 PD rams annually for sale to other producers. New blood is introduced every second year, with selection on visual appeal (long frame) and secondary selection on objective measurement (growth rate, muscling, negative fat).

Store lambs (200-600) are purchased in August to November and finished on bean stubbles. Opportunity feedlotting of late spring lambs.

Stocking rate

Combined sheep and cattle stocking rate 14 DSE/wgha. Estimated sheep stocking rate is 12 DSE/wgha.

Grazing strategy

Set stocked over winter, stubbles grazed over summer. All livestock are given access to hay/straw racks during the green phase. Selected sheep graze 12 hectares of lucerne.

Non Sheep Enterprise

Crop

Has been direct drilling crops for approximately 20 years, press wheels have been used for the past 3 years. Approximately 910 hectares of wheat, barley, peas, beans, canola and oaten/vetch hay are sown annually.

Cattle

Consists of a 20 cow herd producing yearlings. The bull runs with the cows all year round. The cattle are grazed only on the river flats (at 20-30 DSE/ha).

NRM

Property consists of 81 hectares of semi arable river flats sown to puccinellia, tall wheat grass and paspalum.

Sources of Information

Has a wide industry network with membership to the SA Lamb development team, Crop Science Society and Agricultural bureau. Attends field days and uses the media (Country Hour, Stock Journal). Company representatives and a cropping consultant are also used.

Importance of Lamb and Weaner Survival

Current lamb and weaner survival issues

High priority.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management

Conception rate – 90-120%

Losses from conception to marking depend on lambing time. Estimated autumn 10% loss and spring 1-2% loss.

Lamb marking percentage ranges from 95-125% depending on the season and mob. 100%+ lambing with spring lambing.

Weaner losses are low – 1-2.5%

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival

Pre-joining

Rams are supplemented with peas/beans approximately 3-4 weeks before joining.

Joining

Main joining is an 8 week mating in October to January. 3% rams used. Rams are removed from these ewes and then joined with other ewes for a further 8 weeks.
Does not pregnancy scan although has scanned occasionally in the past. Lack of labour, economies of scale and experience (trained CALM assessor) were the main reasons why scanning is not done regularly.

Lambing

Lambing occurs from May to September/October.
Depending on the break of the season the early lambing ewes are given hay and grain every second day. Sheep visually assessed – draft off poor looking sheep and treated differently.

Weaning

Approximately 40% of earlier lambs are sold off as suckers by the end of September (to Woolworths). Later lambs are weaned at 10-12 weeks minimum on to legume stubbles. Sold at export weights to T&R or TMC.

Parasites Current and Historic problems

Parasite Management

Parasites are not considered to be an issue. Whilst some scours may occur in winter, it is believed to be due to green pasture.

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites

All adult sheep receive a summer drench in January/February with a ML drench.
Not rotating drenches – have been using ML drenches for 10 years.
Prime lambs receive a drench at weaning (although 40% would be turned off as suckers).
Weaned lambs may receive a drench before going on to stubbles or into a feedlot.
No faecal egg counts or drench resistance testing has been done. Purchase ewes are generally not drenched (in most cases they have been done prior to sale).

Future Management of Parasites – Drenching 30%

Future management of parasites

Not comfortable about leaving sheep undrenched and will only change if it can be shown to be economically worthwhile.

CASE STUDY CRC SA IM 11

Enterprise Profile

The interviewee in this case study has been involved in the operation of the farm business for approximately 24 years. The interviewee is in 40's, is married with 3 children and has a tertiary education.

Business Profile

This business operates approximately 6880 hectares near Moculta in the mid-North of South Australia. The business runs cropping, sheep and cattle enterprises. The property is composed of undulating hill country (30% of property) that receives an annual rainfall of 500mm and 50% rough hilly grazing country that runs down to the Murray flats and receives an annual rainfall of approximately 330 mm. The remaining country is composed of Murray flat country that is suitable for cropping.

The sheep enterprises consist of a Merino self replacing flock and a first cross ewe enterprise. The sheep enterprise accounts for 60% of income, whilst crop and cattle account equally for the remaining 40%. The estimated time spent on each enterprise includes 60% for sheep, 30% for crop and 10% for the cattle enterprise.

Labour

The business supports two families (plus father) and operates with 3.5 labour units and engages contractors for ancillary services such as baling, harvesting and shearing.

Production Goals

Business Goals

Manage the land and make a profit. Leave the land in good condition.

Sheep enterprise goals

'We are wool producers aiming to lower micron (hoggets 17-18, flock 20-21), produce soft handling, white wool and a sheep with a good carcase'.

Sheep Production

Enterprise details

Sheep

The property runs 6000 Merino ewes with a 3500 ewe self replacing flock and a 2500 merino ewe flock crossed with East Friesian/Border Leicester rams producing first cross ewes and wethers.

Self replacing flock: Originally on East Bungaree bloodline, changed to Hazeldean in 1999. Centre Plus was tried for 3 years, but stud is in NSW (too far away) and the progeny were not performing (not enough length in the wool and wool cut was not deemed acceptable). Currently using SRS philosophy and genetics introduced from the Wallaloo Poll Merino Stud (for the last two years) on advice from Bill Walker (sheep classer). Rams are bred on-farm with a 300 nucleus ewe flock.

First cross lamb enterprise: is run in collaboration with 3 producers from the South East (of SA) who provide the East Friesian/Border Leicester rams (crosses) for the enterprise. They purchase

the ewe and wether lambs generally in October/November when they reach a weight greater than 30 kilograms. Older ewes and culls (for wool faults) from the SRF and used in this enterprise. Ewes are run in 6 mobs (based on 2 micron ranges, flats, tights and 5yo and strong wool). Sold as CFA at 6 year old.

Non Sheep Enterprise

Cropping
Approximately 400 hectares are normally sown to wheat, barley, triticale and vetch/oat hay annually. In 2008 the area of crop is being increased to 520 hectares.
Cattle
200 Angus cow herd that has been built up from 120 cows over the last 5 years. Changed from a Hereford & other crosses (Friesian) over this period. Currently autumn calving. Although planning a change to a spring calving on advice from livestock consultant. Progeny turned off at approximately 15 months (at 320-340 kg liveweight).

Stocking rate

The flats and hill country run approximately 6 DSE/wgha, while the rough hill country carries 1.5 DSE/ha. The property is currently carrying 16,000 DSE down from 21,000 DSE in September 2006 – this is a result of the dry seasons.
Average mob size is 600-800.

Grazing strategy

Set stocked over lambing. Mobs mixed at weaning and rotational grazed. Stubbles are reserved for the weaners. Sheep removed from the rough hill country over summer and released back in April, post crutching.
Paddock size is an issue with the hill country with paddocks up to 480 hectares. Average paddock size is 140-160 hectares.
In 2002, 2007 and 2008 due to the poor seasons ewes were confined fed over the summer/autumn period (December to April). In 2008 the ewes were placed on the drought-lot in February. It was felt that perhaps this should have been earlier from a ground cover perspective. Hope to have at least 600 kg DM/ha at the end of autumn.
A feed test is carried out on grain used (barley -2007, triticale in 2008). In 2008 triticale was fed at 3.5 kg/hd. A spreadsheet has been developed to monitor MJ requirements.
Listeriosis was an issue with 1 mob in feedlot resulting in 60% lambing in 2007.
Ewes are turned out of feedlot when sufficient green feed – target of 1200 kg/ha. Learnt to assess pastures through a Landcare project. Pastures From Space was ‘not quite right, not ground truthed yet.’ However could be a useful tool in the future.

NRM

The business has a program of fencing off creek lines and selected areas of bush.
Also in the program of reducing paddock size for rotational grazing purposes, advice from the consultant is sought on NRM issues.

Sources of Information

Business uses a number of consultants including Bruce Hancock (RSSA), Simon Ellis and Tony Craddock (agronomy advice). Member of a Sheeplus group.
Refers to media such as the Farm Journal and the Stock Journal.

Importance of Lamb and Weaner Survival

Current lamb and weaner survival issues

Lamb and weaner survival is a key driver of profit in the business and as such is regarded as of high importance.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management

Conception rate – 85-90%
Abortive losses - unsure
Lambing losses – don't know but assumes there would be some losses due to weather & maybe some fox predation
Weaner losses - minimal

Lamb marking percentages and ewe death rates

Year	EF Ewes	W/S ewes	Mo Ewes	Total flock	Ewe death rate	Rainfall
2000	90.6	68.3	82.1	83	6.9	
2001	87.9	66.1	87.2	86.2	3.1	575
2002	70.5	63	89.2	81.9	3.7	332
2003	77.3	94	86.5	85.4	4.2	530
2004	81.2	84.1	82.2	82.2	4.5	544
2005	73.6	74.5	91.5	84.4	3.3	650
2006	97.7	68.9	99.3	95.7	2.1	
2007	89		95.2	92.9	2.7	

Observations on the Reproduction Cycle

Management practices – lamb and weaner survival

Pre-lambing

Rams are visually checked and fed lupins for 10 weeks before joining.
Ewes – tried flushing with lupins but there was no obvious increase in lambing percentage.

Joining

Joining in January with 2.6-2.8% rams for 6 weeks. Ewes score 3 at joining.
Condition assessed hands-on, every time in yards i.e. shearing, mating groups, when bring rams in, fortnightly in feedlot. Learnt to condition score through Wean More Lambs project (Sheep plus Group), and consultant. Use of these techniques is important in knowing the health of the flock. A lack of competence and confidence were thought to be why other producers don't condition score.
Ewes are not scanned on a regular basis. Individual mobs have been scanned in the past if problems are suspected (e.g. poor condition or maidens). Whilst a rule of thumb has been developed in conjunction with consultant i.e. if season dry by end of April scan all ewes, the rule has not been followed.
Foxes are baited over some of the property.

Lambing

Lambing commences 15th May for crossbred lambs and 1st June for Merinos. This time of lambing appears right for this country which dries off earlier in the season compared to other areas.
Marking is in early July for the crossbred lambs and in late July for the Merino lambs. Lambs are mulesed (Merino lambs) and vaccinated with 6 in 1.

Weaning

Lambs weaned at 13 weeks at ewe crutching in August/September and given a vaccination and drench. Ewes are shorn in September.

Parasite Current and Historic problems

Parasite Management

Parasite management is regarded as of high importance.

Management practices – parasites

Faecal egg count every mob at start and end of summer. Reasons for testing include, better decisions (knowledge of knowing), save time and money not having to drench, take pressure off the drenches.
Weaners drenched at weaning and on to stubbles.
Ewes are monitored over summer (counts up to 350 are OK).
Drenched and vaccinated into feedlot
In 2008 two mobs were drenched with Cydectin + nilverm due to a high fec in March.
Cydectin + Nilverm have been used for the last 6years.
Drench resistance test in 2003/04 – due to do another but struggling to get high enough egg count.

Management Practices Currently used to Manage Parasite Infection

Future management of parasites

Management strategies will include monitoring (and identification of levels that we can live with), breeding (although long term) and nice if there were another drench.

Future Management of Parasites – Drenching 30%

The interviewee has partially drenched mobs in the past and would be open to using different strategies.

CASE STUDY CRC VIC RW 07

Enterprise Profile

This business operates an effective area of approximately 1100 hectares located in the district of Elmore, Victoria with various blocks that are owned, leased or share-farmed. The rainfall varies across the blocks with 410 mm on the home block and 550 mm on a southern block (just 10 miles away). The landscape is gently undulating, with productive sandy loams suitable for lucerne and cropping through to shallow grey clays over rock where water can pool in winter. The latter is sown to phalaris, fescue or Wimmera ryegrass for grazing and hay.

The current enterprise mix, in terms of land area, is 50% grain, 25% hay sold to the dairy industry and 25% sheep (lamb and first-cross ewe production). The amount of crop has been relatively constant in the past decade, though the proportion of area sown to barley has increased and this year, depending on rainfall, the family may sow more wheat since the price looks better for wheat. The sheep flock has changed from wool production to lamb production. The hay enterprise has increased over the last decade. It is conducted on a share-farm basis and therefore the scale of this enterprise increases or decreases depending on seasonal conditions.

The enterprise employs 3 permanent labor units, father and two sons (one a wool classer and one with a role with the Elmore Field Days). Shearing and scanning is done by contractors.

The business has planted trees with the 'DEEP' program and has revegetated the edges of the swamps. The dry conditions preclude further tree planting.

Enterprise Production Goals

The whole-of-farm production goals are to reduce the debt, and further the family is developing their capacity to produce lamb year-round with the goal of supplying restaurants.

With the cropping enterprise, it is not feasible to reduce cost of production without reducing income. The interviewee commented that an option would be to sell out of cropping and go totally into sheep. It would take 5 years to establish sufficient high quality pastures, and the transition is not realistic at this point as another bad year would be the end of farming for them. They are taking the risk that this cropping season will pay off, they need the higher level of return that cropping can do.

The stocking rate is 6 DSE/ha plus the sheep have access to crop stubble (based on 650 ac or 263 ha).

The production goals are to produce a target carcase weight of 21-22 kg.

260 ha is sown to lucerne which provides plenty of summer feed and good winter growth. They have been using lucerne for 20 years, with the oldest stand being 8-10 years old. Lucerne is sown with lupins underneath.

Whole-of-Enterprise Performance

While, the sheep enterprises occupy 25% of the land area and require approximately 50% of the labor on this property

The family sources information from agronomists and company representatives, neighbors, ideas from wool classing, talk at the footy and field days.

The Sheep Enterprise

Current Flock Structure

Of the 850 ewes on the property, 600 are first-cross ewes joined to Dorsets, and 250 are Merino ewes joined to Border Leicester rams to produce approximately 125 first-cross ewe lambs that move into the first-cross flock.

Selection Practices

Traits selected for the Dorset rams are plenty of length, height and generally look good. They buy the rams from a neighboring stud, and while they take note of the EBVs, 90% of the selection is visual. They spend about $350 on a ram.

The key trait for the Border Leicester rams is height, and selection is 100% visual. The Borders are sourced from a reputable local breeder.

The Merino ewes are purchased from the Bendigo Special Sale every 4 years.

Importance of Lamb and Weaner Survival to the Enterprise

Maximising lamb and weaner survival is a high priority to the business, with all activities planned around the sheep. Any issues are checked out. The father (very senior) performs the key role of checking ewes each day, and revisiting any ewes having difficulties.

Sheep Enterprise Reproductive Performance

Ewes are pregnancy scanned, with a pregnancy rate in the high 90% range. The family does not get any other information from their scanner and do not regard him as a credible source of other information.

Lambing is spread though-out autumn-winter to provide some lambs to sell all year around, and because it provides a workable number of ewes to check in a day. The cross-breds are run in 3 mobs, with the first mob due to start on 1 April, a second mob on 1 June and the ewe lambs on 1 August. The Merino ewes are due on 1 May.

While it is not possible to comment on losses prior to birth given fetuses per ewe is not assessed, it is thought not to be a problem. Lamb losses at birth can be as high as 20%, these deaths are associated with severe weather at lambing where the water pools on the ground and lambs are born onto water. Lamb deaths are also attributed to ewes only staying long enough for the first lamb to get to its feet, and foxes. The interviewee maintains the ewes in a good fat score of 3 to 4, which he finds is important for lamb survival. Ewes are shorn a few months prior to lambing which encourages them to seek feed and shelter.

The interviewer acknowledged that gestation during the hottest part of the year and frequent moving to new paddocks could reduce marking percentage.

Lamb losses between marking and weaning and post weaning are minute (<1%) in the second-cross lambs and slightly higher with the first-cross lambs (<2%). This positive result is attributed to the spread of lambing and access to barley hay and seconds grain.

The marking percentage of the mature first-cross ewes is 130%. The first-cross ewe lambs are priority fed on dryland lucerne and are joined at 8-9 months of age depending on their weight. The marking percentage is 120% from ewe lambs. Any ewes that are empty move to the next mob for joining. If they have not got in lamb by 13-14 months they are culled.

The Merino ewes are joined at 12 months of age. The Merinos average 125% marking percentage.

Ewe losses are generally low. In a bad year, losses could be as high as 4%, this was attributed to a change of feed. On another occasion polio was a cause, and in other cases ewes have been post-mortemed, but the cause was not found.
The grazing strategy is predominately set stocking since most of the paddocks are large cropping paddocks. Weaning is done by drifting the lambs off.
The business has a stock containment area which has been used with the cross-bred ewes prior to lambing. They might need to use it this year with the maiden ewes.
The property was destocked to deal with Johnes disease in the past.

Causes of Lamb and Weaner Loss and Management Interventions

Pre-joining

Prior to joining ewe are managed to a good condition which is assessed visually. High quality hay or straw is always provided.
Ewes are shorn and drenched 1-month prior to lambing.

Joining

Length of joining is 8 to 12 weeks. Ewes are culled if they fail to fall pregnant after 3 or 4 joining periods, but this is very rare.
The ram percentage is 2-2.5% for the mature ewes and 5-6% for the maidens.
Rams are visually assessed and managed to be in good condition for joining.
The cross-bred ewes are retained while they still have good teeth, up to 6 years of age. The Merinos are usually sold at 4 ½ years of age at the Bendigo Special Sale.

Pre-lambing

The ewes are managed in small mobs from 1-month prior to lambing through lambing and so there is no need for differential management of ewes.

Lambing

The ewes are monitored daily, and assistance is provided. The father takes the lead in this side of the operation. Admittedly more could be done to ensure lamb survival, but the cost-benefit isn't there if there is the need to sow/spray.
90% of paddocks have access to shelter in the form of timber or swamps.
The neighbors conduct an extensive fox baiting program negating the need to fox bait.

Marking

Lambs are vaccinated with a 5-in-1. The Merinos are mulsed prior to purchase, and no other mulesing is required.

Weaning to First Shearing

Half the lambs are sold as suckers, the rest are weaned after they reach 35 kg liveweight.

Parasites Current and Historic Problems

No sheep have been lost due to a worm infection, and the producer is not aware of any loses in production associated with worm infection.
The usual practice is to drench 2 to 3 times per year, with the first drench coinciding with entry to stubbles, the second as the green feed starts to grow and the third at shearing (Nov-Dec) to avoid handling at a later time. Occasionally fecal samples are sent for testing.
A variety of drenches are used. Drench resistance tests have not been conducted. Capsules were used one year and they worked ready well, they would use them again if they could get a subsidy.

Management practices would change if the seasons became wet again. They would do more testing. If the ewes looked loose/scouring they would drench, and if the ewes didn't pick up they seek the advice of a vet.
Management of worms is easy once you get a system in place.
The interviewee thinks that the future of worm management will include using EBVs for fecal egg count, using clean pastures and new drenches.

Future Management of Parasites – Drenching 30%

The producer said the drenching 30% program sounds fiddly and thinks visual identification would be challenging.

This producer does not think it would be worth sacrificing some sheep production to avoid drench resistance. He is a big believer of drenching as required and when the sheep are a bit light. It is really important for your lambs to get a good start. He acknowledged, if sheep was a bigger part of the business they might have a better system.

CASE STUDY CRC VIC RW 08

Enterprise Profile

This business operates an effective area 950 hectares located in the district of Raywood, north-west of Bendigo, Victoria. Two-thirds of the land is owned and one-third is leased. The average annual rainfall is 450 mm. The landscape is flat, with Red-brown duplex earth (acidic topsoil and alkaline subsoil) suitable for lucerne and cropping.

The current enterprise mix, in terms of land area, is 40-50% sheep and 50-60% dryland-crop, depending on the season. Crops include canola, wheat, barley, and oats intercropped with lucerne. Hay is also cut.

The farmer has been on the property since 1998, and made the change from fulltime employment to the farm in 2003. So far the priority has been on getting the infrastructure and paddocks in order, and setting up the farm so that it is maintenance free. He appreciates being his own boss and sees the kids much more now.

The enterprise employs 1 permanent labor unit. A helper is being sought and it is anticipated that the wife will take a role in the farm when the children get a little older.

The farmer has prepared a whole-farm plan, and is in the process of double-fencing to protect remnant vegetation and planting vegetation to reduce windspeed. A farm forestry block of sugar gums has been planted for aesthetics and superannuation.

Production Goals

The whole of farm production goals are to sow all of the farm to perennials, except for area under crop, run 3000 ewes, half joined to terminals and half to Merinos in a simple to manage system.

The 10-year sheep production plan includes increase lambing percentage to 130% and achieve wool with 18 micron and 6 kg/head, with ewes that are ideally 60 kg liveweight (maximum of 65 kg) to achieve good feed efficiency. The farmer plans to measure wool in the shed especially if premiums develop again. A major goal is maximising lambing percentage, but the farmer will be looking for a realistic balance, he doesn't want to measure everything.

They are aiming for a 10 to 15 year crop rotation because lucerne persists well and it is costly to establish. The plan is to cut cropping enterprise back to 200 ha of predominately barley, and cuts lots of hay and intercrop with lucerne.

The farmer likes lucerne because with annuals the season is finished by mid October, and the sub clover isn't productive until spring. He intercrops the lucerne with grasses (Wimmera ryegrass, Fletcha tall fescue or phalaris) to bulk up the feed in autumn-winter.

There are 200 ha of unimproved country yet to be sown to lucerne. Have access to ground water.

The family wants to earn $100 000 per enterprise ($200 000 overall), a reasonable income for himself and his wife.

Lucerne is sown at 0.5 to 2 kg/ha. It is established under canola which is cut for hay. This produces substantially more hay than lupins. They have gone away from spring sowing for greater control of weeds.

Current stocking rate is 7.8 DSE/ha, and the shortest feed time of year is April-May.

The production goals are to produce a target carcase weight of 21-22 kg

NRM

Information is sourced from his friends, DPI extension officers, Bestwool group, Grass Farms Australia (Geoff Daniels, economic analyses and ideas), consultants, seminars (e.g. MLA, Grasslands Conference), and reading. Jackarooed in Yea, Beeac and Wingeel areas, from a farm at Glenburn.

Sheep Production

Current Flock Structure

The farm currently has 1500 Merino ewes on 450 hectares. 1000 are joined to Merino rams, and 500 to White Suffolk and Poll Dorset rams. All the maiden ewes are retained (400 this year) in order to build up stock numbers.

Selection Practices

To start the flock, the farmer purchased Centre Plus ewes with good birth weights, small shoulders, milking ability and good mothering.
The traits selected for are confirmation and fertility, and for Merinos faster growth for early turnoff and early maturity for joining at 12 months of age (Riverina sheep can do this), and for terminals, good eye muscle. Commented that ASBV provide less information than what we used to get with Lambplan.
From the wool perspective, he is looking for heavier condition, so far his wool cut is up 1 kg/head. He has reduced from 22 micron to 19, and is happy with the weaners at 17 micron, with all the stock grazing lucerne. .
The producer wants ewes that he can join at 12 months of age if up to 45 kg, as the more lambs on ground, saves on depreciation cost of ewe and takes better advantage of genetic gain.
The producer has observed that his ewe weaners at 12 months of age demonstrate very good mothering ability. He was joining at 1½ years, and will now go to 12 months.

Non Sheep Enterprise

Importance of Lamb and Weaner Survival

Lambs on the ground is key to building flock numbers and driving genetic improvement.

Causes of Lamb and Weaner loss and management interventions

A scanner hasn't been used in the past couple of years because they are building stock numbers, because the timing hasn't been good with cropping, and because there are insufficient paddock to run mobs separately. So there is plenty of potential to improve marking percentage by culling.
This farmer's view of information from scanners is that yes to do talk about things, but at the end of the day you effectively perceive the information as gossip ie not necessarily credible.
The farmer has recently moved from July lambing to 25 August. Joining time is matched to go with the natural fertility of the ewes and to make the most of spring pasture growth.

There are 400 maiden ewes which are kept separate to the mature ewes. The mothering ability of the maidens appears very good, so considering putting them together for ease of management. Last year the marking percentage was 97%, that is 1170 lambs from 1200 ewes present at shearing, and 98% from the maidens. This fluctuates a little. Last year was not so good with 2 rams dying (one sudden death, cause not known, the other was run over). The farmer uses 1% plus 1 ram.
Conception rates are high, so this marking percentage represents lambs lost after birth. Ewe losses are in the order of 10-20 per year (0.7 to 1.5% per year). The number of lambs weaned is similar to number of lambs at marking. Any deaths are associated with flies or mulesing. Abortive, lamb and weaner losses will have a higher focus in the future when the place is up and running. The farm is run down at the moment and hence there is a minimal focus on the sheep. The farmer is looking for a helper.
The preferred mob size is 500 ewes as it fits well with the paddock size and is manageable when moving stock through gates.
The producer feels that he could readily increase marking percentage by 10-20 percent by improving fox control (as lambing time is out of synch with neighbors), having specialist lambing paddocks with tree plantings to reduce exposure to wind, using alpacas, shifting to April shearing to reduce stress/risk of pregnancy toxemia near shearing time and could check ewes more regularly. Strategies so far have included purchasing Centre Plus ewes with good birth weights, small shoulders, milking ability and good mothering.
The aim at least 1200, ideally 1500 kg DM/ha at lambing, as the pasture then keeps ahead of the stock. The ewes are condition scored when the ewes are in the yards for other sheep management jobs. When ewes are fed, which often is required in autumn, they are feed to maintain condition score 2.5 with 4 kg barley and canola-lucerne hay/head/week. Hay has 11 ME/kg and 10% CP. The farmer has set us a stock containment area, and sufficient hay and grain is held for feeding the ewes, with the option to sell anything that isn't used.

Parasites Current and Historic Problems

No sheep have been lost due to a worm infection. A production loss was observed in the weaners, one year, then they were pushed really hard and they were in poorer condition that the farmer had anticipated.

Management practice currently used to manage parasite infection

The usual practice has been to drench twice, in December/January and at the break. He uses observation, and if a mob doesn't look like they need it they don't get drenched. The producer has used fecal egg tests in the past to validate this practice. The producer is concerned about drench resistance and will do a test in the next couple of years, and plans to use Wormboss. So far only the weaners have been drenched this year. The producer has not used Cydectin on the farm yet, and takes the view that he still has this one 'up his sleeve'.
Other management strategies include the use of lucerne and rotational grazing, where the sheep do not need to graze close to the ground. The producer is selecting for carefree sheep to avoid dags.
Regarding the producers rating of complexity of the managing worm infection and drench resistance, the producer feels that resistance is challenging, as there is so much conflicting information available on how to deal with it.

Practice Change and the future

The future of worm management, for this producer, will include selecting sheep for resistance to worms, using a management system to drench only the stock that need it, avoiding worm pick up by using intercropping and having fresh paddocks to put sheep on, and trading cattle and dairy agistment in good years. The farmer noted that increasing stocking rate will make it more difficult to avoid stock picking up eggs.

Future Management of Parasites – Drenching 30%

The producer said the drenching 30% program sounds sensible, but would like to know more about how you choose which stock to drench – a consistent approach.
Regarding sacrificing production, the producer thinks this strategy should increase production – no need to consider a reduction in production.

CASE STUDY CRC WA FB 01

Enterprise Profile

The business operates an effective area of approximately 1640 hectares located approximately 44 km east of Moora, Western Australia. The property receives a long term average rainfall of 382mm annually. The landscape is described as undulating lands, including the highest point of two catchments with white gum, salmon gum and York gum clays, and gravely soils.

In terms of income, approximately 65% is received from crops, 10% from wool and 25% from prime lambs and sale of culled sheep. Sheep meat production is the main interest for this producer; however, most of the income comes from the cropping enterprise. Approximately 4 to 500 hectares of the effective land area is dedicated to livestock and 800 hectares to cropping.

There are approximately 2740 sheep on the property in the following mobs:

- 800 Merino ewes crossed with Texel rams for prime lambs (reduced by 900 head for 2008)
- 180 F1 crosses that are crossed with Texel rams for prime lambs
- 240 stud ewes
- 80 weaner ewes
- 80 weaner rams
- 560 two year olds to be sold
- 800 lambs

This equates to 6 DSE/ha in winter.

Production Goals

The whole farm goals are to produce over 3t/ha of wheat, which they believe is currently achievable. They also aim to sow productive pastures annually and to maintain 6-7 DSE stocking rates for meat and wool production.

Sheep Production

The major current stocking and grazing aim is to wean lambs during the spring feed drought. The stocking and grazing strategies have not changed substantially over time apart from increased autumn feeding with saltbush and hay as stubble becomes less nutritious due to increased efficiency in harvesting due to advanced technology. Sheep are genetically selected for their body structure. Selection occurs through visual assessment of animal structure, selecting animals with deep trunks, strong stance and robustness. Lambplan is used for the stud flocks as an accurate pedigree record and a guide to traits for those animals that are retained after culling

NRM

There are extensive natural resource management activities on the property, including extensive fencing of rivers, scrub and wooded areas. A flora survey conducted by the World Wildlife Fund (WWF) discovered a rare plant species in remnant woodland vegetation, which has been fenced.

Saltbush, bluebush and trees have been extensively plants in waterways, which have slowed water movements and reduced salinity. Water is also harvested with contours taking run off into dams for stock watering.

Non Sheep Enterprise

The non sheep enterprise consists of hay, wheat, barley and oat crops. However the barley and oat crops are combined as mixed hay for on-farm sheep feed. The hay and wheat are commercial crops and hay has the added benefit of reducing radish and rye-grass weed growth.

Labour

The enterprise employs 2 full time labour units of the owners, husband and wife. There is also casual family assistance for cropping. Trucking, spreading, marking and fencing is all contracted.

Sources of Information

Management utilises a variety of information sources including Department of Agriculture and Food Agmemos and media reports, attending field days, member of a farm improvement group, agronomist advice, stock agent advice, discussing problems with peers, and experience.

Importance of Lamb and Weaner Survival

The enterprise regards abortive, lamb and weaner losses as low priority. It is undesirable to see losses, but they are minimal and extra financial investment to reduce losses would not substantially improve profits. These priorities have not changed over time and are not likely to change in the future, unless losses increase substantially. These priorities may also change in the future if prices for high quality meat increase, and therefore there would be an economic benefit to reduce losses.

Causes of Lamb and Weaner Loss and Management Interventions

The current conception rate is approximately 80% for Merinos and 100% for cross bred Merino and Texels. Abortion losses are unknown but are guessed to be higher in the Merinos. Losses between birth and marking are 8-14% and weaning losses are minimal. It is believed that these rates do not vary much from year to year. These are estimated rates based on general observations, counting at marking and weaning, regular removal of carcases found in paddocks and general assumptions based on experience.
Abortive losses go unobserved but are believed to be minimal from natural causes. Lamb and weaner losses can be caused by mother rejections, season, pasture toxins caused by summer rains including rye grass and mint weed. Losses also vary with food on offer, therefore extra hay and grain are provided in poor years to discourage walking during lambing. This is based on the number of dead lambs found in paddocks and counting at marking and weaning.

Observations on Reproduction Cycle

Pre-joining

- Stud ewes are artificially inseminated
- Stud ewes are fed 5kg/wk hay to improve embryo survival
- Rams are selected visually and by assessing family types, with a preference for meaty looking rams

- Rams are fed pellets, barley/oat mix, and hay for 1-2 months prior to joining
- Ram testicles are visually assessed for faults
- Ewe condition is monitored through observation in paddocks and at shearing
- Paddocks are visually assessed for food on offer and additional feed is provided when required
- Ewes are vaccinated for tetanus, pulpy kidney, and clostridial diseases

Joining

- Join for June lambing
- Joining occurs for approximately 35 – 40 days from January to February
- 4% rams to ewes to increase number of pregnancies on the first cycle, and make up for low performance rams
- Wethers are used to tease the stud flock. (Wethers injected with Ropel)
- Maiden ewes are 18 months old when first joined.
- Pre-lambing
- Ewe condition is monitored by observation
- Ewes are fed according to their condition, on average 100-175gm p/h p/d of barley/oat mix twice a week

Lambing

- Ewes are monitored visually daily during first cycle births and every second day as the number of lambing ewes decreases
- Paddocks are frequently assessed for food on offer, but no extra feed is required normally
- Ewes are put into sheltered paddocks whenever possible
- Udders of ewes are checked during shearing
- Predators are baited and shot
- Poor mothering ewes are culled
- Marking
- Lambs are vaccinated for selenium deficiency, B12 deficiency, pulpy kidney and clostridial diseases
- Mineral blocks with calcium, zinc and magnesium are provided
- Poor condition lambs are not culled at this time
- Survival data is collected through observation and counting

Weaning to First Shearing

- Weaning occurs in early spring when lambs are 3-4 months old
- Weight of lambs at weaning is estimated to be around 25-35kg.
- Weaners are put onto clean paddocks, which have been spray topped, and have ample water, and are drenched.
- Weaners are fed oat-barley mixed hay – 100-120g/hd/d or 70g/hd/d of lupins
- Tail and runt weaners are fed separately with extra feed
- Older ewes are put in with weaners for leadership
- Weaners are visually monitored twice a week
- Weaners are drenched in autumn when they are most likely to pickup a burden
- Weaners are vaccinated with a booster to the original vaccination
- Weaner deaths are monitored, dead animals are removed from paddocks
- Flyblown sheep are isolated and treated

Dry ewes are identified and sold at weaning and lambing. Maiden ewes are given a second chance
Current management practices are found to be simple and easy but can be labour intensive. Labour is an issue and management will only invest in new labour saving technology if it works efficiently. Management believes that there seems to be few labour saving devices being developed for sheep handling. Many of the traditional tasks involving sheep husbandry have remained unchanged and require time-consuming manual labour.

The spring feed drought is also a major issue of equal importance to the autumn feed drought, however there is little research focus on the spring drought in the areas north of Perth. Researchers seem unaware of the gap between September weaning (associated with pasture senescence) and availability of crop stubbles in December.

Parasites Current and Historic problems

The species of worms found on the property include thick neck intestinal, brown stomach, and black scour worms. This is known from frequent worm tests that occurred from 1996 to 2001 (Table 1). These tests also found low occurrence of drench resistance. Testing has not occurred recently, therefore only visual assessments are made. Sheep losses are low, most often occurring in mid to late summer and suspected to be caused by barbers pole worm, however tests have not occurred to confirm this. Production losses due to worm infections have been minimal.

Table 1: Worm test results from 1996 to 2001. Other *Strongyl* types include barbers pole, brown stomach, black scour and large mouth bowel worms.

Date	**Mob tested**	***Nematodirus* (eggs/g)**	**Other Strongyle types (eggs/g)**	**Consultant Comments**
Oct 1996	• Weaners Pdk 1 • Weaners Pdk 2	• 75 • 137	• 237 • 362	Drench resistance test required for mob in Pdk 2
Nov 1997	Lambs	15	65	No drench resistance test required
Nov 1998	• Wether weaners • Cross bred weaners • Ewe weaners	• 30 • 40 • 20	• 135 • 125 • 225	No drench resistance test required
Oct 1998	Lambs	5	65	No drench resistance test required
Aug 1998	Cross bred lambs	0	20	No drench resistance test required
Oct 1999	• Lambs • Ewe hoggets	• 25 • 15	• 395 • 145	Drench resistance test required for lambs
Mar 2000	• Ewe	• 20	• 280	Ewe weaners require

	• weaners • Maiden ewes	• 0	• 160	drenching and putting onto clean paddock
Aug 2001	Ewe hoggets	20	0	Drench resistance test required for lambs

Worm Management

Loss of animals and production due to worms and development of drench resistance are moderate priority. These levels of priority have not changed over time and will not change in the future unless sheep losses increase, in which case worm tests would occur immediately. The managers are confident that their current drenching practices and management to reduce drench resistance are effective. They also believe their paddocks are clean of worms due to cropping and burning activities, and hot summers, light stocking rates that keep paddocks clean of dung and sheep in healthy condition. Worm infections vary according to season and increase when pastures are short and green. The cross bred sheep are more resistance to worm infections and can also feed on saltbush and bluebush pastures.

Practice Change and the Future

Genetically resistant sheep and management systems that reduce the number of sheep that need to be drenched are the likely future solutions of worm management. Genetically resistant sheep would be the preferred solution for the enterprise, and possibly biological control and improved pasture management. However future solutions must not involve extra labour inputs.

Management Practices Currently used to Manage Parasite Infection

Firstly sheep are monitored visually for signs of worm infection. If a substantial burden is detected faecal samples are then tested for worms and if needed, drench resistance. Young animals are usually affected first and are easier to detect visually. Visual monitoring automatically occurs every time the sheep are seen. Worm testing has not occurred in recent years. Historical monitoring involved faecal collections and analysis by the local veterinarian. Drench resistance tests were then carried out when advised to do so by the veterinarian. All adult sheep are drenched annually in the autumn when burdens are most likely to occur and are put onto clean paddocks. Ewes traditionally carry heaviest burden at time of greatest stress i.e. lambing and short pastures in early winter. As pastures increases in density and length the signs of worm burden appear to decrease. No specific brands of drench are used and purchase depends on promotional specials, but is most likely to be brands like Ivomec, Genesis, Noromec and Verbamax (all broad spectrum, short acting, and containing ivermectin).
Current management practices now involve drenching mainly in autumn rather than the traditional spring drenching onto stubbles. This practice has evolved from research by the Department of Agriculture and Food in recent years and as a result of a number of years of intensive worm egg monitoring. These management practices have not changed in recent years and will not change in the future unless a major event occurs.

Future Management of Parasites – Drenching 30%

The manager is confident that current parasite management is effective and is skeptical about drenching individual sheep based on visual assessment of condition. However an electronic

system where worm data on individuals can be collected is viewed as a more accurate way of reducing drenching. The manager believes that genetically resistant sheep would remove the need for such management. The managers believe that fly control is also an important issue that needs more research for solutions.

CASE STUDY CRC WA FB 02

Enterprise Profile

The business operates an effective area of approximately 5386 hectares across two properties located approximately 10 km east of Moora, Western Australia. The properties receive a long term average rainfall of 380-400mm annually. The landscape is described as river flats between undulating lands with mostly heavy loam soils on clay.
In terms of income, approximately 60% is received from crops, 30% from stock and 10% from wool. Sheep production is the main interest for this producer; however, most of the income comes from the cropping enterprise. Approximately 65% of the effective land area is dedicated to livestock and 35% to cropping.
There are approximately 4200 sheep on the property, of which, 1000 ewes are crossed with terminal sires to produces prime lambs, 1800 are self replacing ewes from wool production and 1100 are wethers.

Production Goals

The whole farm goals are to increase lambing percentages, increase wool and crop production, maintain good gross margins and maintain low labour inputs. Specifically for the sheep enterprise, the goals are to have earlier maturing lambs and to maintain numbers.
Whole of Enterprise Production
The enterprise runs paddocks as a 4 year rotation, with 3 years of pasture and 1 year of wheat crop. This allows for 1000 hectares of organic pastures. There has also been a gradual changeover of managers from father to son.

Sheep Production

The sheep grazing strategy is a combination of rotational and set stocking. Paddocks are intensively grazed for short periods from time to time. The system has become more intensive where sheep are pushed into new paddocks that are then closed for a short period before being re-opened into the previously grazed paddock. Historically, sheep were allowed to casually move into new paddocks.
Sheep are genetically selected for wool (feel, colour and crimp) and body structure. They currently have an average of 19-21micron fleeces. Genetic selection now also includes earlier maturing lambs. Selection occurs through visual assessment of animal structure and wool.

NRM

There have not been any significant natural resource management activities recently; however, a substantial amount of tree planting and fencing has occurred in the past.

Non Sheep Enterprise

The non sheep enterprise is cultivated cropping, all done by the managers. The operation has changed in recent years with the increased applications of chemicals and increased soil testing.

Labour

The enterprise employs 2 full time labour units including two of the owners, father and son. There are also a number of casual labourers whom are family members that help mainly with seeding and crutching. Approximately 50% of labour time is dedicated to sheep.

Sources of Information

Management utilises a variety of sources, including agronomists and the press. The most important sources on information are from peers and neighbours.

Importance of Lamb and Weaner Survival

The enterprise regard abortive and lamb losses as low priority, while weaner losses are high priority. Weaners are fed hay 4-5 days a week to minimise losses. These priorities have not changed over time and are not likely to change in the future, even if abortive and lamb losses are monitored more closely.

Causes of Lamb and Weaner Loss and Management Interventions

The current conception rate is approximately 75-80%, abortion losses 5-10%, birth losses are minimal, losses between birth and marking are 1-2% and weaner losses 1-2%. These estimates are based on general observations, counting at marking and weaning, carcases found in paddocks and general assumptions.
Abortive losses go unobserved but are believed to be minimal caused by natural causes. Lamb losses at birth are minimal, but are observed to occur more often with maiden ewes. This is based on the number of dead lambs found in paddocks. Lamb losses between birth and weaning are thought to be caused by ewe condition and lack of feed for ewes in dry seasons. Weaner losses are thought to be due to fly-strike, genetics and rye grass toxaemia.

Observations on Reproduction Cycle

Pre-joining

- Rams are selected using EBVs
- Rams are shorn and fed lupins for 6 weeks before joining
- Ewe condition is monitored through observation and occasional body condition scoring

Joining

- Join for May – August lambing
- Joining occurs for approximately 3 months from January to April
- 2% rams to ewes
- Maiden ewes are 18 months old when first joined

Pre-lambing

- Maiden ewes are fed (fed what?) and shorn, 2 year old ewes are also fed
- Ewe condition is monitored by observation and condition scoring at crutching (when crutching?)

Lambing

- Ewes are monitored visually twice a week
- Feeding is avoided where possible to minimise disturbance during lambing
- All paddocks have bush for shelter

- Udders of maidens and 2 year olds are checked
- Predators are baited and shot

Marking

- Lambs are vaccinated for pulp kidney but are not drenched
- Lambs are tailed 6 weeks before mulesing, mulesed animals are given antiseptic
- To maximise mothering up, paddocks are closed
- Survival data is collected through observation and counting

Weaning to First Shearing

- Weaning occurs when lambs are 5-6months old
- Weight of lambs at weaning is estimated to be around 25kg
- Weaners are put onto clean paddocks with ample water, grass and clover and as close to the house as possible.
- Tail and runt weaners are put on the best paddocks
- Older ewes are put in with weaners for leadership
- The weaners are fed immediately to get used to eating grains
- Weaners are fed and visually monitored 4-5 days a week (2kg oats, 1kg lupins and 1 kg hay per week)
- Weaners are drenched and vaccinated.
- Dry ewes are identified and sold at weaning and lambing. Maiden ewes are given a second chance

Current management practices are found to be simple and easy but very laborious. Rye grass toxicity is a major issue on the enterprise that the managers believe needs more attention from research for solutions.

Parasites Current and Historic problems

The species of worms found on the property is unknown; however, general assumptions are made according to historical worm monitoring and communications with local peers and neighbours. Sheep losses and production losses due to worms are unknown but are believed to be minimal.

Worm Management

Loss of animals and production due to worms is of low concern to the managers, although development of drench resistance is high priority. These levels of priority have not changed over time and will not change in the future unless something major occurs. The managers are confident that their current drenching practices and management to reduce drench resistance are effective.

Practice Change and the Future

Genetically resistant sheep, new drench chemicals, improved pasture management to avoid worm pickup, new biological controls and strategies to reduce the number of drenches given are all likely future solutions of worm management. Strategies to reduce the number of drenches given would be the preferred solution for the enterprise.

Management Practices Currently used to Manage Parasite Infection

Historically worm monitoring occurred annually after the July break in the season; however, monitoring has not occurred in recent years due to costs and poor seasons.

Historical monitoring involved faecal collections and analysis by the local veterinarian. Drench resistance tests were then carried out when advised to do so by the veterinarian.
All sheep are drenched in the summer before and after crop harvesting and are put onto clean stubble paddocks. Paddocks are regarded as clean when they have had at least 3 days over 30°C. No specific drench brands are used, usually whatever is on promotion. Costs to drench are moderate and labour inputs are high.
The current management practices are simple and easy but are laborious. These management practices have not changed over time and will not change in the future unless a major event occurs.

Future Management of Parasites – Drenching 30%

The manager is confident that current parasite management is effective and is sceptical about drenching individual sheep based on visual assessment of condition. It is believed that the proposed system would be more labour intensive and will compromise the clean status of paddocks.

CASE STUDY CRC WA FB 03

Enterprise Profile

The business operates an effective area of approximately 1466 hectares located approximately 26 km south east of Moora, Western Australia. The property receives a long term average rainfall of 344mm annually, with most rain falling between May and October. The landscape is described as undulating lands, with mostly duplex white gum gravels and York gum loams.
In terms of income, approximately 55% is received from crops, 25% from wool, 20% from sheep and cattle and 5% from intermittent commercial clover crops. Sheep wool production is the main interest for this producer; however, most of the income comes from the cropping enterprise. Approximately 45% of the effective land area is dedicated to livestock and 55% to cropping. There are approximately 6677 sheep on the property that are separated into 13 mobs. The sheep enterprise is an entirely self-replacing flock for wool production.

Labour

The enterprise employs 1 full time labour unit of the owner, husband. There is also casual assistance from children for cropping and crutching. Shearing and half of the crutching labour is contracted.

Production Goals

The whole farm goals are to reduce debt, make a profit and meet family needs. In terms of the sheep enterprise the aims are to maintain numbers during drought, increase production after drought, decrease labour inputs and to achieve a 9.6 DSE stocking rate on 275mm of annual rainfall.

Sheep Production

The sheep enterprise has a high stocking rate strategy. Cattle are used to increase whole farm stocking rates and meat production without impacting greatly on costs and labour inputs. The enterprise had been simplified over time with the removal of cross breeding for prime lambs and the introduction of cattle.
Sheep are genetically selected for fine wool, low coefficient of variance for wool, long staple length and high reproductive capacity. Selections are made by visual inspection.

Non Sheep Enterprise

The non sheep enterprise consists of cattle and crops. The cattle are integral to the sheep enterprise but are managed separately. Cattle can be stocked at high rates with little effect on reproduction, which has approximately 90-100% calving rate. However cattle are more expensive to feed in dry years.
The majority of crops are wheat with intermittent crops of clover.

NRM

There are no natural resource management activities at present. However, 26% of the property is uncleared. Fencing uncleared land is considered as expensive and undesirable as the bush land is integral to the livestock enterprise. Waterways are naturally preserved as they are too wet to crop in most years.

Sources of Information

Management utilises a variety of sources, including the internet, peers, radio and press such as 'Ground Cover' and 'Beyond the Bale'.

Importance of Lamb and Weaner Survival

The enterprise regards abortive losses as having no priority as there is little that can be done to prevent deaths. Lamb losses are given low priority as ewes are quiet and good mothers, while weaner losses are high priority where feed is increased immediately to prevent further loss. These priorities have not changed over time and are not likely to change in the future, unless the profitability of sheep increases resulting in an economic incentive to reduce losses.

Causes of Lamb and Weaner Loss and Management Interventions

The current conception rate is approximately 76-82% for sheep, but has got as high as 103% and as low as 66%. Abortion and birth losses are unknown. Losses between birth and marking are 5%, losses between marking and weaning are 5% and losses between weaning and hoggets are 10%. These estimated rates vary greatly depending on season and are based on general observations, counting at marking and weaning, and general assumptions based on experience. Abortive losses go unobserved but are believed to be minimal, from natural causes. Lamb losses can be caused by mother rejections; however, mothers are trained to be calm to reduce mismothering. Season would be the major cause of lamb and weaner losses.

Observations on Reproduction Cycle

Pre-joining

- Rams are selected using EBVs and visually assessed for large testicles without faults
- Rams are fed lupins for 1-2 months prior to joining
- Ewes are fed lupins in dry years
- Ewe condition is monitored through observation in paddocks and condition scored at shearing, scanning, drenching and weaning
- Ewes are vaccinated (Vaccinated for what?)

Joining

- Join for July lambing
- Joining occurs for approximately 6 weeks
- 1 ½% rams to ewes
- Ewes are 2-7 years old, and rams are 2-4 years old
- Maiden ewes are 18 months old when first joined

Pre-lambing

- Ewe condition is monitored by observation and are fed according to condition
- Maiden ewes are put into best paddocks

- Ewes are fed (fed what normally?)
- Pregnancy scans class twins, singles and dry ewes
- Dry ewes are sold depending on the season, this year they will be kept to boost numbers after 2 years of drought
- Dry maiden ewes are given a second chance
- Twin bearing ewes are fed double plus lupins

Lambing

- Ewes are monitored visually
- Often ewes require extra feeding
- Ewes are put into sheltered paddocks, especially twin bearing ewes
- Ewe udders are assessed at jetting, after shearing
- Predators are not controlled but fox numbers are high
- Poor mothering ewes are not identified

Marking

- Lambs are vaccinated (vaccinated for what?)
- Poor condition lambs are not actively culled
- Lambs are mulesed
- Ewes are managed to maximise mothering up by having reduced intervention during lambing and training to be calm around vehicles
- Survival data is collected through observation and counting

Weaning to First Shearing

- Weaning occurs when lambs are 11 weeks old
- Weight of lambs at weaning is estimated to be around 20kg
- Weaners are put onto clean paddocks, where no lambing has occurred
- Weaners are fed if needed
- Weaners are visually monitored regularly
- Weaners are vaccinated with vitamins E, A, D and K
- Weaner deaths are monitored
- Dry ewes are identified and sold
- Current management practices are found to be moderately simple and easy but very laborious and little information on high stocking strategies.

Parasites Current and Historic problems

The species of worms found on the property include all major types including barbers pole, black scour and brown stomach worms. The worms have a resistance to benzimidazole and levamisole drenches. This is known from regular monitoring of worms and drench resistance every 2-3 years, although they have not tested recently. Sheep losses are unknown. Production losses due to worm infections have been minimal.

Worm Management

Loss of animals and production due to worms is low priority, while drench resistance is high priority; however, family needs are of foremost priority. These levels of priority have not changed over time and will not change in the future. The managers are confident that their current drenching practices and management to reduce drench resistance are effective.

Practice Change and the Future

Genetically resistant sheep and management systems that reduce the number of sheep that need to be drenched are the likely future solutions of worm management. New biological controls and strategies to reduce the number of drenches given are also possible. Genetically resistant sheep would be the preferred solution for the enterprise, and anything that reduces labour inputs.

Management Practices Currently used to Manage Parasite Infection

Worm monitoring has not occurred in recent years due to drought conditions and the belief that through past testing they now have a rough idea of what worms occur on the property and current management practices are adequate to control worms and drench resistance.

Historical monitoring involved faecal collections and analysis by the local veterinarian. Drench resistance tests were then carried out when advised to do so by the veterinarian. Samples were normally collected between autumn and winter when burdens were highest. The main benefit of testing was increased knowledge of worm burden profiles. Monitoring is considered a low labour activity worth the financial investment.

All animals are drenched in summer with ivomec (broad spectrum, short acting) and rametin (mid spectrum short acting) drench types as a combination to reduce drench resistance. Drenching occurs when the children are home from school to help, and is completed in time to go on holidays. This is an important management decision that satisfies farm and family needs. Heavily used paddocks are also spelled when possible to reduce worm burdens.

Current management practices are believed to be simple and easy with a good amount of information available, but laborious. These management practices have not changed over time and will not change in the future unless a major event occurs.

Future Management of Parasites – Drenching 30%

The manager is interested in the proposed management system and believes that its implementation on their property would be worth a small loss to production, but not losses to profit. It is believed that if the system is effective, costs incurred should not affect overall profit. Current drench resistance tests are criticised for not accounting for worm burdens and resistance in individuals.

The manager is confident that their current management practices are adequate in controlling worm burdens and drench resistance and are submissive to increasing costs.

The manager believes labour is a major issue and will influence all future management decisions.

CASE STUDY CRC VIC RW 01

Enterprise Profile

This business operates an effective area of approximately 820 hectares across two properties located approximately 15 km east of Colac, Victoria. The properties are managed as separate enterprises due to being divided by a major highway. The properties receive a long term average annual rainfall of approximately 600 mm and the landscape is typified by mostly undulating land, with clay loam basalt soils. Approximately 35% of the effective area is dedicated to prime lamb production, 25% to medium wool self-replacing Merino flock, 25% to a vealer operation, and the remaining 15 percent used to produce perennial ryegrass certified seed. The whole farm is sown to perennial species.

Production Goal

The business has four enterprises to spread the risk of being involved in any one enterprise. Sheep production is the main interest for this producer, where he breeds his own first cross ewes from his Merino flock and his small Border Leicester stud and uses terminal sires with EBVs for fertility and fast growth, to produce lambs to trade and export specifications.
The goals are to make a good living, keep improving the farming systems and be sustainable.

NRM

To this end, creeks have been fenced off and trees planted throughout the property. The producer's perspective is that lamb survival is a key to a profitable business, and that going around the sheep during lambing pays.

Labour

The enterprise employs 3 permanent labor units including the two owners, husband and wife. The enterprise mix and labor input has remained relatively constant over the years, with exception that the cropping operations have become focused on certified seed production.
The sheep enterprises require approximately 50% of the labor on this property. Twenty-five percent of time is spent on general farm work and natural resource management such as fencing and tree planting. Cattle work utilizes approximately 15% of the whole farm labor and the remainder of time is spent on the certified seed production.

Sources of information

This producer sources information from the rural press, consultants (drench resistance plan, agronomy and fertiliser), and acknowledges the BeefCheque program helped him learn the principles for pasture and livestock management. The farmer does not view his scanner as a credible source of information.

Sheep production

Current Flock Structure

The wool enterprise is currently comprised of a comeback flock with 1500 Merino ewes and 300 Merino ewe weaners managed across 5 mobs (classified by age group). Half of the Merino ewes are joined to Border Leicester rams, and the wethers are sold as prime lambs.
The prime lamb enterprise is currently comprised of 1500 Border Leicester-Merino ewes and 300 First-cross ewe weaners managed across 5 mobs (classified by age group).
The weaner ewes and half of the rest of the ewes are pregnancy scanned. Not all ewes are scanned each year, as the greatest benefit of scanning occurs in the first couple of years to identify infertile ewes (and assist in identifying ewes that do not raise a lamb), also the ewes in the Comeback flock generally only have singles, so it is not so important to separate these ewes into single and twin bearing management groups.
The average stocking rate is 16 DSE per hectare with the land area including tree plantings and ryegrass seed crop which is less productive than the perennial ryegrass pastures. The operation uses an ad-hoc grazing strategy where approximately one quarter of the paddocks are rested at any one time, except for during lambing (June to November) when the ewes are split into smaller lambing mobs, with a mob placed on every paddock. Paddocks are autumn-saved (not grazed between the opening rains and lambing) to build a 3000 kg dry matter feed wedge for lambing. The twinning ewes are placed on the best pastures.

Selection Practices

The breeding objectives of the wool enterprise have been to develop big sheep with the ability to produce lambs that can be sold as prime lambs. The wool is medium micron and is of less concern to the producer.
The breeding objectives of the first-cross ewes are high fertility, growth and ‘easy care’ with no dags or flies and good survival.
The breeding objectives of the prime lambs are for growth to produce lambs to trade and export specifications. EBVs are used for all ream purchases, except for a small proportion of rams purchased from well-reputed stud that does not provide EBVs.

Importance of Lamb and Weaner Survival to the Enterprise

This family business places managing ewe reproduction ahead of all other farm management issues with managing parasites and pastures to provide adequate feed falling a close second. This is reflected in their marking percentages of 100% for Merinos and 135% for first-cross ewes (1-2 year old ewes excluded from this count).
Making a good living (earning a before tax income of $100 000) and doing the right thing by the livestock and environment is important to this family.

Sheep Enterprise Reproductive Performance

Ewes are maintained in good fat score of 3 to 4 as a safety margin incase the farmer fails to notice their condition falling. Fat score is visually assessed unless the ewes are in the yards for other management procedures. Ewes receive a capsule close to lambing, as part of a drench plan developed for the property by a highly regarded consultant.
Ewes are scanned and separated into twin and single management groups, and run in small mobs of 50 to 200 ewes/paddock. Smaller mobs for the twins. Twin management groups are placed onto the best pastures (often 3000 kg dry matter) with the most shelter at half the stocking rate of the single bearing ewes as they become due for lambing in June, July, August and September.

Lambing starts in June for the Merinos and July for the cross-breds to enable the lambs to reach 30 kg by the end of November. This ensures negligible lamb losses post marking, and to get lambs to approximately 45 kg for joining in autumn. Silage and pellets are fed through summer.

Table 1. Breakdown of scanning, marking and post weaning percentages for Merino and First cross flocks.

	At scanning %	Single – Marking %	Twin – Marking %	Average – Marking %	Post weaning %
Merino 1-2 yo	100			80	
Merino 1-2 yo					Neg losses
Merino 3-6 yo	115			100	Neg losses
1st X 1-2 yo	110-120			60-70 (many not in lamb as they are joined at 9 months of age)	Neg losses
1st X 3-6 yo	155-165	Close to 100	175	135-140	Neg losses

Other management interventions include checking the ewes daily and assisting where necessary and baiting and shooting foxes in the lead up to lambing, as many as 50 foxes per year are killed. The creeks and trees provide habitat for the foxes and Wedge-tailed Eagles are observed in the area.

Lamb losses are relatively constant on this property, at about 25%. There are negligible losses in single bearing ewes. The producer attributes the deaths in twin bearing ewes to mismothering where a lamb strays to a dam that has twins and the smallest lamb dies of malnutrition, and fox predation.

The weather is not considered to be a major factor given shelter in the paddocks and that lambing is spread over 5 weeks. The producer would like to reduce lamb mortality but cannot find a practical way to reduce mortalities.

Abortive losses may be a factor in the twin bearing ewes, but not the single bearing ewes as virtually every ewe has a lamb. Pregnancy scanner error may account for some of the losses. The producer indicated that he does not think abortive losses are an issue, and perhaps does not know enough about it.

The producer identified some actions that he could take to increase lamb survival such as scanning ewes to the day to tighten up management practices specifically for their stage of pregnancy/lambing, feeding corn to twin bearing ewes to liquefy the colostrum, weigh sheep more often to have a better handle on sheep condition, and feed up ewe lambs to get more lambs. The producer commented that it would cost so much more to produce those last 100 lambs. If prices were better and we had more time, we could do more.

If lamb mortality becomes an issue to society, this producer would move the lamb pile to a less visible area and plant more shelter.

Observations on reproduction

Pre-joining

Prior to joining ewe are managed to try and keep them in a visually assessed fat score 3 to 4. Ewes in poorer condition are differentially managed and placed on supplementary grain. Ewe udders are not assessed. Ewes are also given a 5-in-1 vaccination prior to joining.

Joining

Rams are managed to a visually assessed fat score 4 and tested for faults prior to joining. A joining percentage of 1½% is used. The rams are in with the ewes from February up until scanning at 80 - 90 days. Maiden first-cross ewes are joined in autumn at 9+ months of age. Maiden Merino ewes are joined in January at 1½ years of age.

Pre-lambing

All weaners and half the ewes are scanned each year (refer to Table 1), because the cost benefit of scanning each year is not worth it. Ewes are separated into single-bearing and twin-bearing mobs and priority fed. The condition of all ewes is monitored throughout pregnancy with supplementary feed provided if any look like falling below fat score 3.

Ewes are capsuled and vaccinated with 5-in-1 prior to lambing.

Culling practice, no maidens (Merino or Xbred) are culled, adult ewes that are dry are culled (about 3% of mob each year).

Lambing

It is understood that most losses between lambing and marking occur between birth and a couple of days life as a result of mismothering and fox predation in the case of twins.

The ewes are monitored daily, and assistance is provided.

Fox control, baits and shooting, is conducted prior to lambing.

Marking

Marking is conducted in the lambing paddock to minimize travel, disturbance by moving location and reduced risk of disease transmission. Losses at marking are minimal.

Lambs are vaccinated with a 5-in-1 and Merino lambs are mulesed.

Weaning to First Shearing

There are negligible losses between weaning and shearing as lambs are sold as suckers or weaned and finished. Merino ewe lambs and first-cross ewe lamb for retention achieve approximately 30 kg by weaning and are supplementary feed to achieve joining weight of 45 kg in autumn.

At weaning, lambs are given a booster vaccination.

CASE STUDY CRC VIC RW 02

Enterprise Profile

Prime lamb is the sole enterprise in this business. This business operates an effective area of approximately 225 hectares (16 ha leased) located on the Bellarine Peninsular, east of Geelong, Victoria. The properties receive a long term average annual rainfall of approximately 575 mm. The topography is gently undulating land, with sandy loam basalt soils. Pastures are permanent perennial ryegrass-sub clover pastures.

Labour

The enterprise employs 0.5 permanent labor units and a dog. Contract labor is used for crutching, marking and shearing.

Production Goals

The farmer's goals are to do things better each year, as measured by marking percentage and financial return, and to enjoy farming and social life.
The way the enterprise is run, the enterprise mix and labor input has remained constant over the years.

The Sheep Enterprise

Current Flock Structure

The prime lamb enterprise is currently comprised of 1960 first-cross ewes. The ewes are set stocked in 13 mobs at 15 DSE/ha (3 ½ ewes/acre). The rams go in with the ewes on Australia day and are removed at crutching. Lambing starts in late June immediately prior to the flush of pasture growth to make the most of late winter and spring pasture. On average, two-thirds of lambs are sold as suckers, and one-third of lambs are shorn before Christmas and finished on a neighbor's crop stubble for sale in late summer-autumn.

Selection Practices

First-cross ewes are purchased at store sheep sales based on looks and price. Rams are purchased from a variety of studs on the basis of wanting growth to produce suckers at trade specifications. The rams have to look good and sometimes the Lambplan Index is used.

Importance of Lamb and Weaner Survival to the Enterprise

This farmer places managing ewe reproduction second only to flystrike and ahead of all other farm management issues.
During lambing ewes are checked twice daily, and ewes having difficulties are revisited. Any ewes that leave their lambs are taken to the shed and confined with her lamb(s) to a corner in the shed for 24 hours to ensure they bond.
Each paddock has protection from wind by a combination of fencing to topography and trees plantations.
The producer indicated that if he was trying to scrimp on every cost he might count losses and do a lot of the possible management interventions to improve lamb conception and marking percentage. But at this stage he is 'just passing time until I die'.

When asked if a future event, such as action by PETA, would alter the way this producer operated, he indicated that if it was legislated he would improve his practices.
This producer identified that he could try to increase marking percentages by using Super Borders. He commented that it would be difficult to make up the extra money spent on increasing lamb survival.

Sheep Enterprise Reproductive Performance

Marking percentage averages 122%, last year got 118%, have got 130% in the past. There are generally few dry ewes. Pregnancy scanning is not used.
The major cause of lamb mortalities on this farm is foxes. The producer identified rain as a significant cause of lamb deaths, and mentioned that plantations do not protect the sheep from rain.
Weaner losses are negligible and only occur if flystrike is missed. The producer vaccinates against pulpy kidney.
Dead lambs are moved into the plantations. He acknowledged 'you expect to lose a few lambs'.
Ewes are maintained in good fat score of 3 all year around, and paddocks have at least 800 kg DM/ha of high quality pasture at lambing.
Fecal egg counts are monitored regularly and drenching is conducted if necessary. Drenching has not been required since June 2006.
Abortive losses are not detected as ewes are not scanned.

Sources of Information

This producer sources information from his veterinarian, and an agronomist occasionally.

NRM

Tree plantations have been planted in every paddock for stock shelter and there are no plans to plant more trees as it will inhibit the view.

Causes of Lamb and Weaner Loss and Management Interventions

Observations of reproduction

Pre-joining
Ewe are managed to keep them in a visually assessed fat score 3 to 4 all year around. The producer does not physically assess fat score as he says it sticks out a mile when a good quality first cross ewe is down to fat score 2, and same for fat score 4 and 5. My bank balance tells me I get it pretty right by assessing fat score visually.
Ewe udders are not assessed.
Ewes are also given a 5-in-1 vaccination prior to lambing.

Joining
Rams are managed to a visually assessed for faults, and feed lupins for 4-6 weeks prior to joining. A joining percentage of 1.1 % is used. The rams are in with the ewes from Australia day up until crutching.

Pre-lambing
Ewes are crutched and vaccinated with 5-in-1 prior to lambing.

Supplementary feed is provided if fat score drops below 3 and it doesn't look like the pasture will maintain the condition of the ewes. Barley or other cost-effective grain is purchased in. A full ration has been provided in some years 1.5 kg /head per day, but more often a supplement of 500 g/head/day suffices. The fat score at lambing is recognized as key to lamb and ewe survival and lamb performance through to processing.

Lambing

Most lamb losses occur within 24 hours of birth as a result of fox predation. Losses due to mismothering are minimized by confining dam and lamb in the shed for 24 hours.

The ewes are monitored twice daily, and assistance is provided.

Fox control, baits and shooting, is conducted prior to lambing.

Marking

Losses at marking are minimal.

Lambs are vaccinated with a 5-in-1.

Weaning to First Shearing

There are negligible losses at weaning as two thirds of lambs are sold as suckers. Of the retained lambs, frequent monitoring is required to minimize flystrike.

At weaning, lambs are given a booster vaccination.

CASE STUDY CRC VIC RW 03

Enterprise Profile

This business operates an effective area of approximately 500 hectares located approximately 30 km west of Lake Bolac, Victoria. The property receives a long term average annual rainfall of approximately 610 mm and the landscape is typified by mostly undulating land, with heavy grey clays and red clay loam basalt soils. Approximately 80% of the effective area is dedicated to wool and prime lamb production, 15% to self-replacing spring calving and opportunistic steer fattening, and 5% to a high value agroforestry plantation. The enterprise employs 1 permanent labor unit, a casual employee approximately 1 day/month and shearing is done by contractors. The manager of the farm participated in the interview.

Production Goals

The sheep enterprise undergone a transformation from fine wool Merino to composite and Dohne Merino over the 6 years that the manager has been at the property. The change from Merino to prime lamb was made since prices for mutton and wool, combined with a low wool cut meant that prime lamb was a more profitable option. The production goals are to produce 18-22 kg prime lambs for the supermarkets. Lambing is timed to coincide with spring flush and the goal of selling lambs by April. The stocking rate for the sheep portion of the farm is 18 DSE/ha averaged over the year. Fine wool is no longer a priority in this business, although the wool is still very important in terms of income.

The cattle component has been a constant on the farm, although the Herefords have been bred out to Black Baldy and Angus. For the cattle, the goal is to produce 400 kg steers at 15 months of age, destined for a feedlot. Calving is in spring to better match feed supply and demand to reduce supplementary feeding.

While the farm has traditionally been sown to perennial ryegrass, the plan is to renovate 10% of the pasture each year since a severe case of ryegrass staggers in 2002. Tall fescue will be sown to approximately a third of the farm and lucerne is being trialed. Summer crops of turnips and millet are part of the pasture renovation program, provide feed to finish lambs. This is followed by a season of annual ryegrass and clover to make hay or silage and opportunistic grazing depending on the season.

The sheep and cattle are run together in a simple opportunistic rotation, except when calving and lambing to avoid territorial issues. The stocking rate average over the year is 18 DSE/ha for the sheep and 1½ cow and calf units/ha. The sheep are regularly physically assessed and maintained at condition score 3 to maximize ewe and lamb performance. The farmer values physical assessment because of the benefits he has seen with his involved in Life Time Ewe Management. The comment was it is easier to manage to condition score 3 than trying to achieve specific growth rates to achieve condition score 3 at particular times eg. joining and mating.

Whole-of-Enterprise Performance

The sheep enterprises require approximately 50% of the labor on this property. Twenty-five percent of time is spent on general farm work such as repairs and maintenance and natural resource management such as erosion control, fencing and tree planting. Cattle work utilizes

approximately 10% of the whole farm labor and 15% of time is spent on maintenance of the high-value agroforestry plantation. The farm is in a change over period, but as an example last year 38% of income came from prime lamb, 43% from wool and 19% from cattle. All females were retained to build up prime lamb dam numbers.

Natural Resource Management

The manager is working with the CMA on salinity control of approximately 20 hectares using tall wheat grass, lucerne and plantations on the recharge areas. Also the manager is direct seeding indigenous trees and shrubs and has conservation areas for biodiversity. He has also done some erosion control works.

Sources of Information

This producer sources information from the 'Department of Agriculture', Bestwool/Bestlamb, his vet (drenching and resistance plan), the internet and rural press, consultants.

The Sheep Enterprise

Current Flock Structure

Of the 3600 ewes on the property, the 1000 Merino ewes were joined to Dohne, 300 Merino ewes were joined to White Suffolk (these are a separate mob being managed for footrot), 1000 Borderdales joined to composites (Border Leicester×East Friesian), 700 Dohne Merino cross ewes were purchased this year from Wagga Wagga and Walgatt areas and joined to Dohne, 300 second cross Dohne ewe lambs joined to Dohne and 300 composite ewe lambs joined to composites. Progressively the Merino is being bred out the ewes. Prior to the change to prime lamb, the property ran 4300 Merino ewes (45 kg mature weight). The rams for the 18 micron flock were exclusively from Rokeby for the past 12 years.

Selection Practices

Currently the breeding objective is to build up Dohne and composite ewe numbers. Good genetics are sourced by using reputable studs, for example Roseville Park for Dohnes, and using their index, all Dohnes purchased are AA. The Borderdale and East Friesans come from Starlings of Naracoorte on recommendation from the producer's agent. The producer commented that they are prepared to pay for good genetics. Specifically rams and the recent ewe purchases are selected for growth rate, wool quality (19 micron), wool cut, frame size (to achieve a 60 kg dual purpose ewe), fertility and maturity for joining at 8 months. The producer is less critical of genetics for the composites, but twin rams are selected. He is thinking of using Cashmore genetics in the future. MLA EBVs or indexes are not used.

Importance of Lamb and Weaner Survival to the Enterprise

This is of major importance to the business.

Sheep Enterprise Reproductive Performance

The Camphlobacter vaccination is being trialed this year to reduce abortive losses.

Scanning results for 2007 showed:

	Conception rate %	Proportion of ewes in lamb %	Marking rate %	Losses in weaning losses %

Merino ewes (joined to Merinos – this practice finished now)	115	86	65	10
Cross bred maidens (joined at 7 mo)	100% (1/3 single, 1/3 twin, 1/3 dry)			
Cross bred (composite)	150	94	110	<1
Dohne	Wet and dry only	94	80	<1

Scanning is conducted on all ewes, and Merino ewes not in lamb are culled. The Dohnes are only wet and dried as the farmer is building up stock numbers. Until this year is was impractical to split mobs as the mob size would be too small.

The producer acknowledged that the sheep were too light for lambing in previous years, hence the change to time of lambing and reduction of stock numbers. Given this flock structure is new, the producer is hoping that marking percentage is on the increase.

The lambing period is split so that the rams and sheltered paddocks can be used twice in the one year. The cross-breds and Dohnes lamb in July-August and the Merinos and ewe lamb in August-September.

Lamb losses were attributed to severe weather incidents, for example of one day duration. The producer commented that he would like to lamb in spring to avoid the coldest weather, but in practice he needs to get the lambs up to weaning weights before the season dries off in December.

Having the ewes in good condition (CS3) is highest priority to get more lambs on the ground. The second priority issue is to maintain a high stocking rate. This priority rating is primarily from the producer's involvement in Life Time Ewe Management. This priority rating is not likely to change as the producer plans out his activities 6-12 months in advance to ensure he can devote his attention to the sheep operation when it is required.

In response to the question, the producer indicated that he thought that management practices to improve pre-birth, lamb and weaner survival was complex and difficult, due to seasonal pressures on feed supply, and financial constraints. For example, barley would be the most appropriate feed now in a late break situation, but he is feeding hay as it is more affordable.

While ewes are scanned, it is not always feasible to separate into twin and single groups as there is insufficient sheltered lambing paddocks. Scanning is a priority for this farmer as he is trying to gain insight into why his marking percentages are lowest than he'd like. Lambing mobs are approximately 250-300 ewes per paddock. Other management interventions include checking the ewes daily and assisting where necessary.

Causes of Lamb and Weaner Loss and Management Interventions

Observations of reproduction

Pre-joining

Prior to joining ewe are managed to condition score 3. If a tail in the ewes is observed ie less than 2.8, these ewes are separated after shearing (2nd week of Jan) and placed on supplementary feed.

Separating reduces overall supplementary feed. The producer is trialing Ovastin to increase ewe ovulation. The results showed an increase in ovulation rate from 169% to 179% (total flock size 525 ewes, good drafting protocol, all run as one mob, wide range of condition scores). There were a similar proportion of dry and single-bearing ewes, and the difference was due to an increase in the proportion of triplets and corresponding decrease in twin-bearing ewes.

Joining
Rams are managed to a visually assessed condition score 4 and tested for faults prior to joining. A joining percentage of 1 % is used. Length of joining is 5 weeks, so that the rams can be used for the second round of mating with ewe lambs and Merinos. Maiden first-cross ewes are joined at 8 months of age, they scanned 100% (1/3 single, 1/3 twin, 1/3 dry). Five percent of ewes are 6 years old.

Pre-lambing
There is differential management of ewe flocks (Merino and composite) and maiden ewe so that priority feeding to ensure all stock are close to condition score 3. Testing the strategy of shearing 6 weeks prior to lambing to see if there are any benefits such as ewes seeking shelter.

Lambing
The ewes are monitored daily, and assistance is provided. A cradle will be used for crutching and if non functioning udders are noticed the ewes will be culled. Fox baiting and shooting, is conducted prior to lambing. There is no culling of poor mothering ewes at the moment so as to build up the size of the flock. The poor mothering ability of Merinos was a reason for getting out of them. Culling is based on these criteria, cull for age at 5 years and dry at scanning, where maidens get a second opportunity the next year.

Marking
Lambs are vaccinated with a 5-in-1 and all but the terminal lambs are mulesed. The Dohnes are tail stripped just in case they might have problems. Marking percentage is number of lambs and number of ewes in the paddock.

Weaning to First Shearing
Ewe lambs are weaned at about 12 weeks of age, and the terminals at 14-15 weeks with a view to selling some as suckers. Merino weaners are split into groups of <17 kg, 17-20 kg and 20+kg, and this has substantially improved lamb survival. The Dohne-cross lambs are about 30 kg at weaning, and don't tend to need splitting into management groups. The terminal lambs are frequently weighed for drafting to sell to the supermarkets. Weaners in sub-optimal condition are sold rather than trying to get them going. The producer does not identify dry ewes at weaning, as he feels that you need big lines of sheep to make that worthwhile. At weaning, lambs are given a booster vaccination and trace elements. A first summer drench is given in November-December. The cause of weaner deaths is generally associated with low feed and poor condition, worms and Yersinia in the Merinos. If there is a tail in the ewes, the producer drafts them off after shearing (2nd weeks of Jan) when it is easy to condition score for differential feeding.

Parasites Current and Historic Problems

There hasn't been any stock death directly due to worm burdens, however, stock losses have occurred when combined with low feed situations, low condition score and Yersinia with the Merinos. It is a bit early to comment on the Dohnes, and whether there have been any losses associated with worms. Production losses included tender wool and poor weaners. Regarding the priority of managing worms in the whole business, worm management only become a priority when there are other issues such as lack of feed and shelter. Worm management has always had this level of priority.

The producer commented that his management would change if his flock becomes resistant to MLs. Capsules are not used. The producer rates the complexity of the managing worm infection and drench resistance as fairly complex. He tried to keep his management system simple, based on checking if a 1st and 2nd summer drench and winter drench is needed.

The producer manages worms by doing a drench resistance test every 4 years, and gets fecal samples analysed and advice from a vet immediately prior to an anticipated drench. This is routine practice to reduce dags, use of drenches and to have healthier stock. The need to drenching is checked in early summer (coincides with weaning), late summer and early-mid winter. The '2nd summer drench' can often be missed. Other strategies include managing FOO to maintain adequate condition score. Labor input is minimal, about 1 hour per month. Cost is $25 per sample, which 2 samples submitted, 3 times per year. Cost of drench is usually less than $1/head/year, plus labor which would be a couple of weeks (more in a bad year).

The producer feels that the future of worm management will be strategies to reduce the number of drenches per year and managing FOO. The producer is not anticipating new drenches or biological control methods.

Future Management of Parasites – Drenching 30%

The producer would not be keen to implement the drenching 30% program. The practice would create work, and sounds like it would increase drench resistance. Any savings in the cost of drench would be outweighed by additional labor. To implement this system effectively, the sheep would need an electronic tag so that you could assess the effectiveness of the drenching program. The producer would be willing to sacrifice up to 5% sheep production in order to manage drench resistance. Management to avoid drench resistance includes changing shearing time for the weaners from Jan-Feb (tipping lambs at 4 months of age) to shearing with the rest of the flock in June (lambs 12 months old). With this strategy, the weaners appear better able to cope with the cold.

CASE STUDY CRC VIC RW 04

Enterprise Profile

This business operates an effective area of approximately 1200 hectares located approximately 15 km south of Coleraine, Victoria. The property receives a long term average annual rainfall of approximately 650 mm and the landscape includes tablelands, slopes and river flats, with light-brown sandy loams, medium brown and red clay loams, and heavy black clay flats. The business currently runs a 2700 ewe Merino flock, a 3300 Coopworth flock, and black baldy. All stock classes are self-replacing and spring-drop. They breed their own Merino rams and Dorset rams. This year all the Merinos are joined to Coopworths or Dorsets. The aim is to have 6000 Coopworth Merino ewes, which will become all Coopworth. 2000 will be joined to maternal sires for a self-replacing flock, 4000 will be joined to terminals for lamb production.

Production Goals

The goal is to produce 14 lambs/ha ie 10 Coopworth ewes/ha and 1 steer/ha, that is 1 cow and calf and last year's calf (6-14 month old weaner). The cattle enterprise started at a Hereford mob, then went to Simmental, then Angus before settling on black baldy. Producing 400-500 kg steers to the feedlot.

Labour

The labour input on the farm is approximately 2 FTE, shared between 3 people; 1 fulltime owner, 1 part-time owner, 1 part-time employee. Contractors are used for crutching, dagging, shearing, marking, and some fencing, hay and pasture sowing.
Of the labor resources, approximately, 70% is devoted to sheep and 30% to beef.

Sources of information

The main farmer (son) sources information from his Dad's experience, vet David Rendell AgImpetus, livestock consultant, Holmes and Sackett, LambCheque/BeefCheque, Farm 500 and LTEM. He allows 1 week a year for training.

N R M

Profits are invested in plantations, planting out creeks, recharge areas and land-type fencing of hills and tablelands.

The Sheep Enterprise

Traditionally this farm has been set-stock, but now set stocking occurs from 4-6 weeks prior to lambing through to weaning. The rotation strategy depends on the season, prior to the break the strategy is to clean up paddocks, after the break they use a 30-day rotation.
They make hay, and use to supplement stock.

Current Flock Structure

Two-thirds of the Coopworths are joined to terminal sires (Dorset, White Suffolk, Texel).

Selection Practices

Rams in the top 10% of the Coopworth Index are purchased from the Coopworth Society. Key traits are lambs born/weaned and growth. They buy top 10% Angus genetics too.

Importance of Lamb and Weaner Survival to the Enterprise

Sheep are the highest priority in this business. Every other activity is geared around the sheep. Lamb survival is a key profit driver in this business.

Sheep Enterprise Reproductive Performance

Coopworth maidens (using a terminal sire) have a marking percentage of 115%. The adult Coopworth ewes have a marking percentage of 140-145%. However in 2 out of 3 years they have had spontaneous abortions in 1 mob reducing overall marking percentage to 120-125%. About 30% of lambs at joining do not survive birth. Losses vary year to year with seasonal conditions, weather events can be an issue, but if the ewes are in good condition then they go well. Ewes in lighter condition are preferentially feed.

The spontaneous abortion was probably always there in the Merinos, but is new to the Coopworths. The first year the lambs were very small when it occurred, the second time the ewes were close to term. They considered vaccinating, but now thing the ewes are immune.

The Merino maidens were scanned 2-years ago, conception was 65% and marking percentage was 60%. The overall marking percentage was 70-95% including maidens, they expect 80-85% out of adult Merinos.

The producer feels there is no point scanning as they have such high lambing percentages, as it is. He doesn't want to cull maidens as they may be good.

Coopworth ewe mortality is generally less than 2%, but has been as high as 7% due to added pressure having twins. Merino ewe mortality is less than 1%.

Weaner losses on average are in the order of 10% for Merinos with the seasons in last 3 years. They just seem to disappear between marking and shearing. The weaners are located on a block 35 km from the main farm. He monitors worms regularly – the tail of the lambs (lighter in body weight) tend to die from worms.

In response to the question is management of pre-birth, lamb and weaner survival simple or complex, the producer commented the theory is simple, but it can be challenging financially. If you are open-minded it is easy.

Causes of Lamb and Weaner Loss and Management Intervention

Pre-joining

Use artificial insemination

Use physical condition scoring (have done LTEM)

Feedbudget to ensure ewes have adequate condition for joining.

Using high fecundity breeds and EBVs, breed own maternal and terminal sires.

Vaccinate with 6 in 1.

Joining

Aim to get rams in good condition from joining.

Rams are tested for faults. Ram percentage is 1% plus 1.

6 weeks joining period.

As they are building up their Coopworth flock, some ewes are up to 10 years old. The goal is to sell at 5 years of age.

Maidens are joined at 19 months of age, that is they are 2 years old when they first lamb.
Teaser rams are not used.
Lambing starts on 20 July for all sheep. They brought it forward so that they can get rid of the wethers. They used to lamb on 20 August.
The ewes are run in large mobs of 1500-1600.

Pre-lambing

Maiden ewes are run in separate flocks. The Merinos and Coopworths are run in separate flocks but are managed similarly.
Feed budget to ensure ewes have adequate condition for lambing.
At this stage ewes aren't culled or scanned, so not differential management of twins, singles, dries.

Lambing

Monitor ewe condition and feed budget.
Ewes are checked once per day in the main onslaught and 1-2/week as things slow down.
No all paddocks provide shelter (plantation or topography) – this is a goal.
Fox shooting teams are encouraged.
Ewe udders are not assessed; there is no culling of mismothering ewes.

Marking

FEC samples are taken prior to marking.
Lambs are monitored and rarely drenched.
6-in-1 and scabby mouth vaccinations given.
Ewe lambs and all Merinos are mulesed.
Have tested for trace element deficiencies, but there is none.
The marking process is managed to maximize mothering up of ewes and lambs.
Lamb survival data is recorded, to check that they are meeting their benchmarks (145% marking).

Weaning to First Shearing

Weaning date is dependant on the kind of season. Fro prime lambs, they are left on so they can be sold as suckers (18-22 kg CW). The maternals are weaned earlier. The goal is to get Merinos to 20 kg for weaning.
Weaners are feed 3 times/week with high quality hay, and lupins for the smallest. They are feed to achieve the required growth rate.
Shearing is in early January

Parasites Current and Historic Problems

Worm management has a high priority along with other management to ensure sheep productivity. This family follows their vet's program to manage worms including regular feceal sampling prior to potential drench and a drench resistance test every 3 years. This procedure started in 1986.
Management of worms involves making sure stock are well feed, monitoring FEC and condition score. The stock are visually assessed everytime the producer sees them.
The producer feels that management practices to control worm infection and drench resistance are simple.
The future of worm management, for this producer, will involve genetic progress towards resistance in his Coopworth flock. He acknowledged that all of the suggestions could have a role, and that new drenches would be nice, but he is resolved to coping with worms without new drenches.

Monitoring worms involves about 2 days work per month, all year around. The stock always get a first summer drench in about January under the guidance of vet (David Rendell). Samples are taken when mobs are shifted. It costs $20 per sample, which equates to about $2000 per year. Drenches used include BZ Levamisole-Rametin, followed by BZ Levamisole-Mactin ie Trition. The producer tries to minimize the use of Trition, and does not use capsules.
Annual drench cost can be considerable, on average $10 000, but sometimes much more. Labour spent on drenching is about 8 days per drench ie 1000 head per day.

Observations of reproduction

In response to the Drenching 30% management proposal, this producer commented that he already does something similar to this with the guidance of his vet. His father acknowledged that's how we used to drench in the olden days.
With respect to the level of production losses they'd be prepared to accept, the producer commented that they already have a production loss associated with their current strategy and would not be prepared to take a high level of loss.

CASE STUDY CRC VIC RW 05

Enterprise Profile

This business operates an effective area of 2200 hectares located in the district of Aspley, Victoria, east of Naracoorte. The average annual rainfall over the last 9 years has been 550 mm. The landscape is flat, with sandy loam over clay which is suitable for cropping in these drier years. The current enterprise mix, in terms of land area, is 75% pasture and 25% dryland-crop, depending on the season. Wool production is the primary enterprise, complemented with a Merino nucleus flock, first cross ewe production, and opportunistic trading and agisting of steers. Crops include cereals, canola and small seeds such as sub clover, Balansa and Persian. They have a centre-pivot irrigator and grow lucerne seed and hay. The manager (interviewee) has been on the property for 9 years, in that time cropping is up by 100 ha to 500 ha, and he is still tweaking the system.

When the manager started on the property, the pastures were run down. He went into a 4-year cropping phase to clean up the weeds and incorporate lime. Now the soil fertility is up, the goal is to sow phalaris and sub clover, and lucerne on the lighter country.

The area is not traditionally cropping country as it can get fairly wet as the land is part of a transient lake system; south of the Wimmera is regarded as grazing country. They have a 20 cm topsoil.

There is 3 permanent staff including the manager. Contract labour is used for shearing, harvesting, and some casual labour for other jobs like crutching and marking.

The labour spent on sheep is 10 000 DSE/labour unit, and 1 labour unit on 500 ha of cropping.

Production Goals

Stocking rate and wool/ha are key profit drivers. The stocking rate is 13 DSE/ha. Shearing is in February, yielding 100 000kg of 19.2 micron wool (523 bales), that is 60 kg wool/ha. Time of lambing is in August-September as this give a decent FOO for lactation. He hosted a LTEM farm trial on time of lambing.

The goals are to make a good living, make a profit for the owner, and manage the property in a sustainable way.

If the drier seasonal conditions are a longterm trend, then cropping would become more viable. This would determine the balance of cropping and sheep. There are a lot of large (120 ha) paddocks on the property. So there is scope to split paddocks into 2 or 3.

The grazing strategy is mostly set stocking. The sheep are moved around in summer based on the watering system – it is not set up yet so prevents use of all paddocks. Mob size is 500 to 1000; sometime he puts 2000 together for example the weaners during winter to rotate them on the lucerne.

NRM

The producer wants the land to be in a better state when he leaves. It is important to him that production is sustainable, no salt, good worm count, creeks are fenced off, trees have been direct drilled, red gums pop up if you disturb the country.

Sources of Information

The producer has done Farm 500, is part of a farmer network, attends meetings with guest speakers (for example Grain & Graze), is involved in LTEM, in the past has subscribed to Kondinin and Holmes and Sackett, done Triple P with Peter Schroder, risk management and other RIST courses, and sometimes gets advice from Robbie Herman and Graeme Lean (feed budgets).

The Sheep Enterprise

Current Flock Structure

The producer runs 15 000 head Merino flock, and breeds first cross ewes. Of the 8000 Merino ewes, 5500 are joined to Merino rams, 500 are joined to Dorsets, and 2000 are joined to Border Leicesters. The rest are weaners and wethers.

Selection Practices

The producer has a Merino nucleus flock of 200-230 ewes which he purchased from a stud dispersal 7 years ago. He AIs these ewes to the best sires in the country based on sire evaluation, wether trials, and some other rams he has been following.

Already, the producer has reduced micron from 22.5 to 19.2, and plans to take it to 18 in the next 5 years. Concurrently he has increased liveweight from 45 to 60 kg, and may even take it out to 75 kg. This strategy has been to increase fertility, and produce ewes for sale at 14 months ahead of the majority who sell at 18 months. Therefore they have to be big to look like 18 month ewes. The Poll Dorset and Border Leicester rams are bought from a local stud, he gets second pick, high Index twin-born rams.

Importance of Lamb and Weaner Survival to the Enterprise

Wool is a focus for this producer, he has decided this is the enterprise for him. If the price of wool goes much lower the management team would really need to consider staying in it. All 1 year-old ewes are laser scanned by Sue Jarvis. They are categorized for obvious faults (structure, rot, wool cut) approx 25%, the 12 % index approx 75%, the top 5% are used in the stud. The bottom 10% are joined to Border Leicesters. The stud ewes are reclassed every year, and are getting 7-8 kg of 15-16 micron, the worst would be 4 kg at 23 micron.

Sheep Enterprise Reproductive Performance

This producer doesn't scan. He acknowledges that if there is a late break there is good argument to scan, but he is aiming to have enough feed so that he doesn't have to worry about it. There is not much value in scanning, as it is too late to rejoin and not possible to sell the ewes. Since shearing is in February, the ewes have 6 months wool on them and they are run as dry sheep. The producer indicated that if he put pressure on fertility ie culling, he wouldn't have any sheep left.

Weaning percentage has been a big disappointment for this producer. It is usually 60-70%, early on when the pastures were dominated by onion grass the weaning percentage was 10-20%. In recent times, one year it was 85%, then fell to 75% the following year. They looked for all kinds of things including Brucellosis. Now having completed a year of LTEM, the ewes are in better condition at joining and the producer is hoping for 90-100%.

In drier years, when the sheep were in ordinary condition all winter, there were a lot of dead lambs. Now with LTEM, the ewes are in better condition and he is not having snow storms of

dead lambs. He puts the lamb losses down to bad management not the weather or predators ie high stocking rates and the stock doing it too tough.
The producer has noticed some cases of abortion. Ewe mortality is not known, and he cannot give an accurate indication of weaner losses. He acknowledges that things are getting better as a result of LTEM, and combined with his efforts to establish a lot of lucerne for summer feed.
In response to the question on whether it is simple or complex to manage lamb and weaner survival, the producer said reasonably simple if it rains. Late breaks are a problem as you need the finance to spend on feed. He commented if it was a late break followed by flood/water logging it would be a disaster.

Causes of Lamb and Weaner Loss and Management Interventions

Observations of reproduction

Pre-joining
Ideally the ewes are run at condition score 3. In autumn, for joining they tend to be in condition score 2.7-2.8. The ewes are condition scored at weaning in about Nov-Dec, with the goal to have the ewes in condition score 3. In 2007 about ¾ were in condition score 3. The ewes in lower condition are given the better paddocks, start on supplementary feed or get more supplementary feed. Sometime the strategy is just to hold their condition, as it is too costly to do any more.

Because of the long summer, the stock need to be supplemented to maintain weight during summer. Prior to LTEM, the start of feeding was left too late. A little bit early on is much better. If condition score is 3 in Feb-March, it is ok to run them down to 2.8, as by 1 June there is about 1300 kg FOO and the sheep do really well.

Ewes are condition scored at shearing in February. The producer works on getting tail into condition score 2.8 for joining (Apr).

Joining
Ram percentage is 1½%. Joining is 5-6 weeks as a short lambing is important to get the ewes back into condition before the season cuts out.
The ewes are up to 6 years old.
Maidens are joined at 18 months of age.

Pre-lambing
Ewes are not culled.

Lambing
The ewes are left alone at lambing, labour is an issues and it is not cost-effective to check them. The philosophy is to get them in the right order rather than propping them up. Natural selection for hardiness.
Some paddocks have shelter. Lambing mobs are 200 head. Mob size is determined by paddock size and the number of stock that can be treated in a day, in the order of 500 to 800 head.

Marking
Lambs are mulsed at marking.

Weaning to First Shearing

Weaning is at 12-13 weeks. At weaning, the lambs are drafted into a light and heavy group (visually; scales are on the wish list) with the lights put on the lupin stubble, the heavier ones are also feed. The lambs get 2 vaccinations and guidair.

Parasites Current and Historic Problems

The producer cannot say if he has ever lost sheep to worm infection. He has used vet, David Rendell, for the last 4 years. All stock are frequently monitored now. The weaners are FEC tested every 4-6 weeks over the summer and 6 weeks after the break. In the past harvesting took priority over worms, but now they are more on to it. Weaner rams are most susceptible. The older sheep are now maintained in condition score 3 and only need 1 drench per year thanks to LTEM.

The future of worm management for this producer is breeding FEC into the flock via the ram genetics. He selects rams/semen base on lower than breed average. It is a slow process, need to be patient. Other management strategies include keeping the stock in condition score 3 so that they do not need a drench (lucerne important), and partial drenching of mobs.

The property has a drench resistance problem, he was flogged Cydectin in the past which caused the problem and wont fall for that again. The producer is now rotating with 3 drenches in the mix. They have regained some Ivermectin efficacy. The cost of the drenching program is not documented.

Labour requirement for FEC testing is minimal; 1 person can do the testing in a morning.

Future Management of Parasites – Drenching 30%

The producer said the drenching 30% program sounds similar to what he is already doing. The son of the owner of the property trained in it and is very supportive. Regarding sacrificing production, the producer is aiming to have stock as healthy as possible and drench as little as possible – he would not be keen on forgoing any production.

CASE STUDY CRC VIC RW 06

Enterprise Profile

This business operates an effective area of 400 hectares located approximately 15 km east of Hamilton, Victoria. The properties receive an average annual rainfall of 630 mm (based on the last 15 years). The landscape is gently undulating land, with clay loam basalt soils including some gil gai country and volcanic ash, as well as sand dune. Fine wool is the focus of this farm with a commercial flock and small stud. Approximately, 90% of income is from wool and 10% from grain. The owner works full time on the property and uses contractors for fertilizer spreading, crutching (if available), shearing and harvesting grain.

Production Goals

Fine wool production is the main interest for this producer. His breeding program is based on the 12% index. The producer is currently averaging 65 kg greasy wool/ha. The wool is tested, and EBVs are calculated by Sue Jarvis, after 7 years it is possible to see the genetic gain from this work. He grows cereal crops predominantly to feed back to stock and as part of pasture improvement.

The goals are to make a good living and be sustainable. The producer sees that he will crop a bit more as part of pasture improvement and to ensure adequate feed for stock. While the enterprise mix and labor input has remained relatively constant over the years, genetic gain and improvements to managing the nutrition of the flock have resulted in finer wool and increased wool cut and fewer sheep losses. The farm is sown to perennials including phalaris, fescue, lucerne and chicory. Perennial ryegrass does not survive on this country, not even Banquet.

Sources of Information

This producer sources information from his network of farmer friends, including Darren Gordon, and contact with the Department of Primary Industries. This producer is on the advisory committee for the Hamilton Evergraze project and hosts a supporting site. He is involved in LTEM, Bestwool/Bestlamb and SFS Hamilton Branch, and gains information from Holmes and Sackett and Grain and Graze.

The Sheep Enterprise

Current Flock Structure

The wool enterprise is currently comprised of 2200 Merino ewes including a nucleus flock of 230 ewes, 1500 Merino mixed sex weaners and 1100 wethers (half recently sold to the boat trade). He currently only has rising 2 and rising 3 year old wethers as he sold the rest to cope with last season. The lighter than usual stocking rate has allowed him to do more pasture renovation this year. They are managed in two mobs, as the younger ones tend to have a higher worm burden. The ewes are ran in two mobs, 3 years plus and up to two years, the latter a given more grain to achieve a satisfactory mature liveweight. The weaners are run in three mobs, two of about 600, and a tails group, which are drafted off by visual assessment.

All adult ewes are joined to Merinos. After recent experience with LTEM, the ewes were managed ‘too well’ and produced too many lambs to get through the summer. Based on the

improved budgeting skills from LTEM and Holmes and Sackett analysis, the producer is now aiming for a weaning percentage of 85% across the mature ewes. This will allow him to reduce the pressure on his maiden ewes so they can be joined as rising 3 year olds. Efficiency of weaning percentage is very important to the business, to reduce feed costs. It means that the maidens can be run as dry stock.
The stud consists of 230 ewes, 100 rams lambs, 100 ewe lambs and 100 rams. There is a low rate of twining, so scanning and differential management of twin and single bearing ewes are not used.
The average stocking rate is 16-16.5 DSE per hectare including grazing of crop stubbles and swamps. The operation uses a strategic rotation to spell pastures and match feed to mob requirements as per Lifetime Ewe Management principles.

Selection Practices

Fine wool production is the main interest for this producer. His breeding program is based on the 12% index where he selects rams according to their EBVs to ensure they are better than the index. The key traits are micron, wool cut, staple length, tensile strength, body weight and FEC/WEC. Additionally the producer chooses rams with superior style, well-crimped, nice looking wool, because it always sells better, so you might as well have it. Other considerations are to reduce fleece rot and select for good attributes such as fibre alignment. The producer is currently averaging 65 kg greasy wool/ha. The wool is tested, and EBVs are calculated by Sue Jarvis, after 7 years it is possible to see the genetic gain from this work.
Ewes are culled if they have below average EBVs or any faults.

Importance of Lamb and Weaner Survival to the Enterprise

Efficiency of weaning percentage is very important to the business, to reduce feed costs and to push selection of better stock. Of the stud flock, all ewes are joined, but little assistance is given to survival as a goal of the stud is to select for thriftiness and lamb vigor.

Sheep Enterprise Reproductive Performance

The ewes are managed according to LTEM principles (see later). Ewes are not scanned or separated for singles and twins.
Rotational grazing is used until 2 weeks before lambing, when the pregnant ewes are allocated to lambing paddocks. Lamb losses following birth are up to 20%, with an average of 15%. The dead lambs are left in the paddock for predators. Lambing losses are attributed to the amount of shelter in the paddock and coinciding with bad weather, where the water sits on the ground. Lamb losses between marking and weaning are in the order of 1-2%, although one year it was 3-4% due to Yersinia. Yersinia and Coccidiosis is a big problem in the area (south of the Glenelg Hwy). Despite low worm counts and the stock being well fed, a proportion of the flock will get it. The producer cannot understand the cycle, it usually comes in winter, but once happened in summer. On occasion there has been a response to antibiotics. The producer gives a sulfur drench at one year old.
Shearing for adults is in May as it fits better with sheep management, the producer commented that August would be best for cleaner wool and wool quality. This probably reduces winter stocking rate. Weaners are shorn in June; selection for staple length makes this feasible. The lambs are tipped in May.
The stud ewes are joined every year despite the weather conditions with a goal of selecting for thriftiness and lamb vigour.

Johnes disease accounts for 4-5% ewe losses. A particularly bad fly wave this year struck ewes when lying on a stock camp.
In response to the question is it simple or complex to improve pre-birth, lamb and weaner survival, this producer says simple, especially if you have a budget to keep the sheep in good order. If you have the finance, you can make good decisions based on benchmarks. To save another 10% of lambs, the costs don't work out especially when grain prices are so high.

Causes of Lamb and Weaner Loss and Management Interventions

Pre-joining
The ewes are condition scored when they are brought in for other management procedures. Managing the tail (lower condition score ewes) is most important to managing overall fertility. The average condition score is 2.7-2.8, and the producer ensures that there are not many at condition score 2.5.
Rams managed to a condition score 3 for joining. They are tested for faults and feed a high protein diet.

Joining
The ewes are managed to be in condition score 3 at joining, there wouldn't be many below 2.7. A feed budget is used to ensure that they are in the right condition to avoid too much handling. The ram percentage at joining is 1% plus 1 for adults and 2% plus 1 for maidens.
The joining period is 3 ½ weeks to ensure that ewes can get the weight back on before the season cuts out and for weaner survival. The strategy for joining maidens is under review, in the past the maidens were joined at 1 ½ years of age and had an extra 6 days for joining. The producer is now thinking of only joining maidens that are 40 kg and condition score 3, ie merely 10% of maidens, or not joining until rising 3 year olds.

Pre-lambing
Ewes are set stocked during lambing in mobs of 150-300/paddock at a stocking rate 14 ewes/ha. The ewes are checked for functional udders prior to lambing.

Lambing
Lambing starts on 27 August.
Ewes are culled at 5 years of age.
The producer has a fox shooting program, but does not bait as there are too many neighbors. He finds that the crows are more of a problem especially with cast ewes. The number of crows is increasing with the amount of cropping in the area.

Marking
The ewes are wet and dried at marking. Any 4-year olds that are dry are culled, as well as anything with structural faults. If they are a first or second time lamber and are dry, they get a second chance. Lambs are mulesed.

Weaning to First Shearing
The weaners are run in three mobs, two of about 600, and a tails group, which are drafted off by visual assessment.

Parasites Current and Historic Problems

Worm infection has been factor involved in sheep deaths. The worms give the stock a set back and then a Yersinia/Coccidiosis takes over. Losses due to worms has only been in individuals and never been widespread.

When asked whether managing worms and resistance is simple or complex, the producer said that it is not simple. It is difficult to get efficacy back up. For example, the producer has not used white or clear drench since 1991, and still cannot use it.
The producer regularly does drench resistance testing, as drench resistance is an issue. He commented summer drenching has created the problem.
This producer monitors fecal worm counts to avoid over drenching and focuses on keeping the sheep in good condition and manages the immune response. Less drenching sets up the immune system and then the lambs are pretty good ever after.
The producer does not drench the best looking 20% of each adult flock. He drenches the tail, and will spot drench a mob while skipping other mobs. He hasn't done a prelambing drench for years. At marking the twin bearing ewes and/or lower condition score ewes are drenched, and the lambs are drenched at 1 ½ years of age. The producer can cope with higher worm counts since working with his vet and developing his understanding in this area. Also he now feeds the stock better.
The producer would not use capsules as you loose your immunity. He uses a white, clear and rametin mix.
The future of worm management for this producer includes continued guidance by his vet, don't try and save money by buying drenches in advance. Smart grazing will not be a priority for this producer for two reasons: firstly there is evidence that smart grazing acts like drenching to concentrate the resistant worms, and secondly he puts his mobs where the feed is best based on paddock and mob size.

Future Management of Parasites – Drenching 30%

The producer said the drenching 30% program sounds good, but thinks that you wouldn't loose any production with it; you'd be more likely to gain.

CASE STUDY CRC NSW CS 01

Enterprise Profile

This is a sheep and cattle enterprise and sheep are 75% of the business. It also runs a Merino Sheep stud. The farm sells 250 rams annually. The property is 20k Nth of Walcha and is 1000 hectares. It has a 750mm annual rainfall. It has been in the family since 1968 and the current owner manager has been there since 1998. He has a Bachelor degree in Graphic design and has previously worked in advertising. Oats are sown for pasture since they introduced cattle into the system 5 years ago. Cattle were introduced into the system due to the variable seasons and allow the cattle to be sold as a drought management practice. Weathers are also used as a drought management practice in that they can be sold for cash while maintaining ewe flock.
The owner has been trough a stage of improved then not improved pastures – currently there is regeneration of old pastures but now the cost of fertilizer is prohibitive to continuing this. However it is still cheaper to improve pasture than it is to buy additional land.

Labour

There is 1 fulltime staff and one casual; contract labour is used for seasonal work

Production Goals

Personal goal is to have a productive property – however his son is not coming back to the farm but it is possible that his daughter may. With that in mind he expects that he will be on the farm for another 10 years - making him 60 when he leaves. He will keep the sheep stud while he is passionate however it is getting harder and he is increasing cattle activity because of the ease of management. However he can't make cattle more profitable than sheep and his infrastructure is set–up for sheep The farmer's goals are to do things better each year, as measured by marking percentage and financial return, and to enjoy farming and social life.
He has a enterprise mix of 10.5 DSE per hectare over winter 13 per hectare over winter. He has decreased the number of ewes because of the cost of feed during the drought and it because increases the flexibility for drought management.
His goal is to increase fleece weight over time and he has decreased fiber diameter of the flock from 20um to 18um since the late 80s without loss of fleece weight. His major selection trait for rams is now WEC because clients are asking for it. In his stud he uses Aust sheep breeding values in response to client's requests. In future he will be looking to include staple strength as selection criteria because it is 300c/kg in price.

Non Sheep Enterprise

Cattle are produced.

NRM

This respondent is part of the Landcare Group and a local fox baiting program- he also monitors pasture species content.

Sources of Information

This producer sources information from word of mouth i.e. if other producers will talk to you. Attends CSIRO and projects such as cicerone project (project by farmers at CSIRO – funded by AWI). He is on the CRC Nucleus Flock Advisory Panel and he likes to be involved in following the results of current experimental work. He believes that producers get into a rut of production practices and believes that repetition of idea presentation is necessary to break that. He pays for private consultants within his business.

Sheep Production

Current Flock Structure - Selection Practices

This is a self replacing merino flock with the only introductions as ram semen for the stud.
He has 3200 ewes, down from 4000, 3 years ago and he reduced numbers because he could not achieve weight increases on his weaners and he needed more control over internal parasites - thus more cattle less sheep. He believes an all ewe flock is the biggest profit driver but has less management flexibility. He has recently changed his grazing system and now grazes all adult ewes in a rotation grazing system instead of a set stocking system. He now scans for pregnancy for singles and twins and he separates the singes into early singles and late singles as well as separating off the twins to increase lamb survival and to give better management within seasonal variation on pasture performance - he believes this is helping with survival of lambs. The ewes are joined at 18 months of age.

Importance of Lamb and Weaner Survival

Places very little ahead of lamb losses and could not identify anything more important. He believes that there must be a way to improve survival and short term solutions related to heritability – this needs explanation Col and perhaps clarification.

Causes of Lamb and Weaner Loss and Management Interventions.

Management practices taken include feeding grain and efficient feeding systems. There were no other suggestions in terms of management practices
Improving survival should be improved by improving post-weaning nutrition as autumns are very dry. He has not changed his management from this recently as autumns continue to be dry.
Has switched to early and late singles because more of the ewes bearing later singles become cast – this needs explanation Col

Sheep Enterprise Reproductive Performance

Marking percentage averages 95 % across adult ewes and maidens. His long term average is 87%.

Observations on Reproduction Cycle

Scanning

90% of animals joined are pregnant conception rate of 110% (fetus per 100 ewes joined)
Believes that 0 lamb losses prior to birth but has 200 missing by marking /2600ewes. He loses another 100 from marking to weaning and another 130 from weaning to 12 months.
He has no idea why these losses occur

Weaning to First Shearing

The Rams receive a physical check and a vet health check and they are fed lupins 5 weeks prior to joining. Following the drought he has started to condition score ewes and feed them if necessary. They are scanned for pregnancy and ewes are separated into twins and early and late lambing singles. Last few years he has been supplementary feed prior to lambing and they receive either lupins or corn for 5 weeks. He wet and drys the maidens at marking and marks the ear if dry and if two ear marks they are culled into the weathers as non breeders
The proportion of lamb losses at birth has not been determined but they possibly abort because of low nutrition or worms. They are lambed in sheltered paddocks that do not get worst weather – he believes losses are not due to exposure.
He does not do post-mortems on any age group of sheep.

Parasites Current and Historic problems

Importance of internal parasites to the Enterprise

Rates this as a very high financial concern. Believes that young sheep with a bad worm infection have a carry over effect in that they are more susceptible at later ages.

Practice Change and the Future

Concern for internal parasites is a critical driver of management and has been a major reason for changing to rotational grazing – the introduction of cattle which he grazes ahead of the sheep and the changing of lambing paddock annually. His main parasite is Barber's Poll and he does routine egg counts but it is 6 years since he did a drench test. He doesn't believe he has drench resistance but if he discovered he did he would make management changes to solve the problem.

Management Practices Currently used to Manage Parasite Infection

Current drench routine – ewes WEC prior to lambing – may or may not receive a drench pre-lambing and the same procedure at weaning but they are drenched at the start of autumn and a WEC and drench if necessary at the end of winter.

Future Management of Parasites – Drenching 30%

His change to management has been to increase cattle and lower sheep. He would not leave a portion of the mob undrenched in order to slow the rate of resistance because if it does not work it might increase farm parasite load - but has in place mob management that is designed to manage worm resistance.
He believes we need to understand sheep resilience to the effects of worms rather than sheep resistance to worm infection. He has already reduced the number of sheep run because of concerns over internal parasites.

Other Issues

Fly strike

Not rated very highly as a management concern and over recent years has only been problem this year with 20/3000 and it is 15 years since they have done a chemical jetting program. He muleses some ewes depending on the amount of skin fold and he doesn't mules wethers; they are mulesed

at marking which is done 2 weeks after lambing finishes. Ewes and lambs receive *click* at marking and the ewes are crutched pre-joining and pre-shearing. He uses this program because he has found it covers him right thought the year. This year side and shoulder strike were apparent. His trigger to treat a whole mob would be a lot of body strike, say 50 lambs in one go. He believes he is getting less strike as sheep are plainer (less wrinkle). Doesn't believe *clips* are an alternative to mulesing but may be suitable for tail skin fold.

Control instead of mulesing

Select for bare breach animals and doc tails shorter. Believes *disulphin* spray (at mulesing) reduces losses after marking because mothering-up is better.

CASE STUDY CRC NSW CS 02

Enterprise Profile

This farm business is a mixed enterprise self-replacing Merino flock with portion of the ewes joined to terminal sires for prime lamb production. The wool sheep produce 45% of total income, prime lambs 10% and cattle45% for the business. The 1660 hectare property is 60k West of Guyra with 850mm annual rainfall. It has been in the family since 1963 and the current owner/manager has been there since 1998. He has completed the Higher School Certificate and has a TAFE Certificate in Wool Classing.

Oats are sown for grazing and most of the arable area (75%) of the property has been sown over time. Cattle have always been about 30% of the system but have increased to 45% over the last few years as part of a change to improve profitability. Merino ewes joined to Merino rams have been reduced from 2000 to 1600 and replaced with 400 ewes joined to terminal sires. 700 wethers are also grazed as a drought management practice in that they can be sold for cash while maintaining ewe flock – as well as producing wool. The cattle enterprise includes a self-replacing cow-calf operation. Bulls are purchased but cows are not in order to reduce the chances of introducing any diseases – not specified. The herd has been changed from Hereford breed cattle to Angus breed in order to catch premium prices – but doesn't think that has happened. Heifer calves are sold at weaning while the steer calves are retained and grown through to 'feedlot' weight: 400 – 450 kg LWT at 18 months. The cows are pregnancy tested and culled on pregnancy status plus other considerations.

The owner has been through various stages of improved pastures but is disappointed that sown pastures do not persist and the current cost of fertilizer is prohibitive to plan new pastures. Oats are sown to supply winter feed as the results are better – "well, more obvious".

Non Sheep Enterprise

Cattle have always been about 30% of the system but have increased to 45% over the past few years as part of a change to improve profitability labour.

Labour

There is 1 fulltime staff and occasional casual staff as required; contract labour is used for seasonal work.

Production Goals

Personal goal is to generate sufficient cash flow to see Australia. The owners have two daughters both of who do not wish to return to the farm at present (one is studying Science – Agriculture) so the option of leasing the property for the next 5 years is being considered. The final decision regarding selling will be made then.

This respondent has been a board member of the NSW Farmers Association and other rural/farmer organisations.

The farmer's goals are to do things better each year, as measured by marking percentage and financial return, and to enjoy farming and social life.

The mixed enterprise has an average stocking rate of 4.3 DSE per hectare. The changes in enterprise mix and stock numbers have been made to increase profitability.
The goals with the sheep enterprise are to improve management to decrease the amount of work required (cattle help) and to decrease the number of deaths among young sheep. The cattle production could be changed to vealer (~8 – 12 mth) production if more green feed could be grown. To this end he may improve some paddocks with variable technologies including grazing systems, and pasture plants such as legumes, native species and short-term ryegrasses while at the same time reducing the area sown to crops for grazing (and harvested for seed). Grazing programs may be changed to include rotational grazing and spelling as he believes 'spelling' will improve the pastures. The sheep enterprise has a gross income of $114,000 and the cattle operation $62,000. Total profitability is not fully recognised.

NRM

The property has about 25% tree cover and the owner has "locked-up" 100 acres to allow native grass regeneration. The property has an annual fox baiting program.

Sources of Information

This producer sources information from peers (word of mouth) and attends relevant seminars & forums and obtains information from the DPI. He likes to be involved in following the results of current experimental work but is doubtful of the benefits of most research – not adaptable to his property. He obtains information from retail and company representatives, vets, agronomists and stud breeders. He is unsure if he would pay for private consultants for his livestock enterprises but would for cropping.

Sheep Production

This is a self replacing merino flock with the only introductions as rams from studs.
He has 1600 ewes joined to Merino rams, down from 2000, 3 years ago plus 400 joined to terminal sires. The change was made to increase whole farm profitability.
Sheep selection is made with a visual assessment of the physical appearance of the animal and the visual quality of its wool. "Clean" fleece weight is the only objective measurement used in selecting 'select' ewes for breeding own rams. Maiden ewes are joined at 18 months of age. Ewes are shorn in August and the wethers shorn in November.

Importance of Lamb and Weaner Survival

Lamb losses are less important than health and family, worm and fly control and cropping decisions related to weather. Labour requirements are also a high priority.
Lamb losses are more important than the cropping enterprise itself.

Lamb survival/losses have become more important with the increasing loss of useful drenches for Barber Pole worm has occurred and worm and drench resistance are becoming a driver of management.
The owner would reassess the value of lamb losses with huge increases in wool / meat prices or profits from grain.
The owner believes that management practice recommendations are getting too complex and he is of an age that says "oh s—t". He also believes there are no real answers 'out there' yet and no

'package' that makes sense at a profitable cost. Current information is too general and is hit & miss.
The owner does not know of any different management techniques and other farmers are not forthcoming as they don't want to make a fool of themselves. Need more GRDC [Grains Research & Development Council].
Sheep Enterprise Reproductive Performance - Marking percentage averages 84 % across adult ewes. The maiden ewes marked 72% however one mob marked 18 / 60 &30%) and the owner believes this was due to a "dud' ram.

Causes of Lamb and Weaner Loss and Management Interventions

The ewes are not [ultrasonically] scanned for pregnancy.
The ewes are not wet / dried at any time.
The owner believes the factors that cause lamb losses at all stages are recognisable by observation and sometimes wonder if crows clean up the 'missing' lambs or they are "too far gone' to find.
He does not have post-mortems done on any sheep at any stage of the reproductive cycle.
He believes that once the lambs are 2 days old that the dam is conferring protection on the lamb and places losses before lambing as less important that perinatal and post weaning losses which he rates as equal.

Observations on Reproduction Cycle

Pre- joining
The owner does not physically check the rams nor have a veterinary check prior to joining. The ewes are not condition scored prior to joining and they lamb in the same paddocks each year because they are the better sheltered paddocks.
Joining
Joining commences on the 25th April and continues for 6 weeks with 2% rams used in the flock ewes.
This owner believes there must be at least 90+% ewes pregnant, does not know the conception rate and does believe there are occasional abortions prior to lambing.
Pre-lambing
The owner believes pre-lambing losses are due to stress and to pregnancy toxaemia. The ewes are not scanned for pregnancy but all ewes receive supplementary feed during winter (mid – late pregnancy) when it is cold and to avoid *pregnancy toxaemia* in late pregnancy. They are also fed supplementary feed after shearing which is prior to lambing to provide body heat.
Foxes are shot on the property but Foxoff® [1080 poison] is not used as he believes baiting programs are not successful.
Lambing
This owner believes that 2-3% of Merino and 6-10% of XB lamb losses occur prior to birth due to a combination of fox predation and dystocia (especially in the XB ewes). He bases this number on the amount of lambs found dead and believes the number is constant from year to year but for different reasons but did not know of any other reasons.
In a repeat question the owner said he believes 5-6% of Merino lambs and 10+% of XB lambs are lost at birth – 2 days with few deaths between this period and marking.
Marking

From marking to weaning he has a ‘shocker’ with 7-8% of lambs lost. He believes losses are mainly due to internal parasites, and poor-doers / ill-thrifty lambs. The owner drenches more often as a precaution and then they still die.

Weaning to First Shearing

2.2% of weaned lambs are lost before their first drench following weaning and a further 15% losses occur from weaning to autumn (March).

Understanding reproductive terminology

The owner understands the following reproductive terms as:

Pregnancy rate: No ewes pregnant in the joined mob [☑]
Conception rate: the same
Lambing rate: the no lambs on the ground from all ewes joined [☑]
Marking rate: the no of lambs in the ewes present at marking
Weaning rate: lambs alive from lambs marked.

Parasites Current and Historic problems

The effect of internal parasites

IPs have a drastic effect upon the management directions and the profits due to increasing deaths coupled with failing drenches. There is such a short time between noticing an initial problem and then deaths.

The problem leads to extreme depression when the IP control program fails. The ‘WormKill’ program was great then: bang – it failed. IP are a very high priority and are managed more than the whole cattle enterprise.

Practice Change and the Future

IP control program

The ewes are drenched pre-joining (April), drenched again at shearing (August / pre-lambing), again at lamb marking (Nov) and the young sheep are then WEC to follow worm development. Drench Resistance is a major problem and advice is sought from retailers, company representatives and fro Veterinary Health Research [test lab].

Have / would you reduce the number of sheep because of internal parasite problems? Have already made changes by increasing the cattle enterprise.

Management Practices Currently used to Manage Parasite Infection

Understanding of management practices – are they simple or too complex - Programs are too complex and too difficult. WEC takes ½ day each week. Would follow a clear plan and has followed ‘DrenchPlan’ but did not use any paddock / grazing management at the same time.

He did a FECRT [drench resistance test] in 2007 and now has worms with resistance to Ivomec®.

Future Management of Parasites – Drenching 30%

Would need peer reviewed proof that the system worked and did not break down and lead to greater infection.

The problem is getting conflicting information without peer proof.

Other Issues

Fly Strike

Describe the effect blowflies have on management, production and profits

No a big deal compared with lice or worms. A combination of shearing, crutching and chemicals is used and gives good control. This control is effective in non-mulesed sheep and all body strikes occur in the XB sheep.

Mules v Flystrike

The ewes and wethers are struck <1%, the lambs & weaners about 4% and the rams are only struck on the horns,

The Merino ewes are mulesed but the wethers and XB ewes are not.

The ewe weaners are mulesed in winter at 6 months of age and no 'fly' chemicals are used at mulesing.

The sheep are dipped and receive 2 jettings to manage flies but he tries not to jet the ewes.

Current Fly control program

Clik® on the tail of adult ewes at marking as there will be a fly disaster without it.

The lambs are treated at marking with Vetrazin® and Diazinon™ around the rings for tail and scrotal/teste removal, [Elastrator rings cause strangulation of tissue & blood vessels].

The lambs are jetted at weaning.

The trigger to jet a mob is when increasing numbers of sheep are seen with breech flystrike. They would be crutched and jetted. This year (2008) crutching was done early as the wet summer lead to more flystrike.

Comments on future fly management

Cips are useless according to people that have tried them. Too many negative tales / tails will loose markets if the no mulesing promise is broken. The intra-dermal injection may be useful – no knowledge of its use. Mulesing plus the *Tri-sulfon*™ anaesthetic spray is not acceptable but genetics may be if too much wool is not lost.

Don't like the 'hot-knife' [a gas fired blunt scissor that sears off the tail and cauterises blood vessels] as it leads to fly strike on the tip of the tail.

CASE STUDY CRC NSW CS 03

Enterprise Profile

This farm business is a mixed enterprise with a self-replacing Merino flock and with opportunity cattle trading and agistment in seasons with sufficient pasture production.
The 1250 hectare property is 16km West of Uralla, NSW with a 800mm annual rainfall. It is a long-held property being in the family for 128 years. The present owner has been the manager for 34 years: he has completed a wool classing course at Technical College.
The property stocking rate is nominally 7000 DSE (5.6 DSE/ha) decreasing to 6000 DSE in drought periods.
Trade steers and females are grazed as part of the operations. The owners comments are that he doesn't know why as when he has excess feed there is not value in the market and when the (sale) market is high he has no feed.

Sheep Production

The sheep flock now has 1500 adult ewes, 686 mixed sex hoggets, 1000 lambs (2007 drop) and 1400 mixed age wethers. Joining commences ~30 April and lasts for 6 weeks giving a 15th September-30th October lambing. Rams are joined at 2%. The lambs are marked in November-December and are weaned in March.
The maiden ewes are joined at 2½ years of age, lambing at 3 yr and he is still grazing 12 yr ewes that are only culled for broken mouth [lost all front teeth]. Rams are both purchased and bred on the property
Grazing management has changed from set-stocking to one of the first RCS 'rotational' systems but has now reverted to feed-on-demand.
The sheep are shorn in late August _ September with Staple strengths of 48 – 50 NKtex and 80% of PoB as a base break [80% of wool staples (bundles) rupture near their base].

Production Goals

The owner's personal goal is to continue as current; no great plans.
Being a long held property, there have been many changes made over the years especially with the sheep flock. The aim now is to breed a sheep producing wool with a fibre diameter (FD) less than 17 microns.
The sheep flock from 1962-94 was based on Havilah stud lines (Mudgee) until Wilson's Creek rams were purchased in 1992. The flock was producing 3.9 kg GFW of 18.5 um FD. In 1994 a goal of 3.5 kg GFW, 16.8 um FD and 80% lambs marked was set. In 1997 the flock was producing 2.6 kg GFW at 17.2 um FD when a change was made to Soft Rolling Skin (SRS©) type sheep.
The sheep are selected on staple structure and the genetic progress of the ewes on the ram-source Stud and the breeding goal of the Stud. The owner believes that some figures are required but that ASBVs are not appropriate.
Sources of information are very limited as the owner has been at it long enough to "know-it-all" and can't find any better as it takes too long to source it through. If there is a problem he may look for information.

Non Sheep Enterprise

Trade Steers are produced.

Sources of Information

The owner has sourced information from private sources – 35 years ago with holistic management and advanced grazing with Executive Link. He is willing to pay for information on the basis that what you pay for is regarded as more valuable; he consults veterinarians on a question basis. He may attend a seminar if he can't find any other source of information he is looking for but will only adopt it if it is appropriate and useful.

Importance of Lamb and Weaner Survival

Low lamb survival is regarded as an ever present and sever problem. The owner stated that it has gone on for so long that he has almost "chucked the towel in". When I try something new there is a different set of problems each year.
The highest lamb marking percentage is 72% with many years average 61%. Better feed + selenium is given to the maiden (2.5yo) ewes. The very low average lamb survival is effecting management as he is unable to select sheep for genetic progress and ewes have to be kept until they are 12yo in order to maintain sufficient breeding ewes. I have to buy sheep to maintain numbers even when I keep sheep to an old age (12yo).
The owner believes there is no one answer and what is known cannot be reduced to a single answer: we are dealing with 'chaos'. For example, in one year heavy rain washed the ewe's smell off the lamb and the maiden ewes abandoned the lambs.
Sheep Reproductive performance - The owner has commenced scanning ewes for pregnancy status (wet / dry) and the current pregnancy rate is 95+% of ewes are pregnant at scanning. He believes there are few losses before lambing based on the known results from the 'stud' ewes. The current lamb marking rate is 72% with a long term average in the low 60s.
In 2006 he joined two mobs of ~750 ewes. Scanning showed 95+% pregnant. Many lambs were killed with heavy rain and 45% lambs were marked. In 2007 he joined 13500 ewes, 980 were marked (73%), 860 were weaned (64%) and 600 were shorn (44% of initial joining). This is a loss of 40% of lambs originally marked. He has had to purchase ewes to maintain breeding numbers.

Causes of Lamb and Weaner Loss and Management Interventions

The ewes are [ultrasonically] scanned for pregnancy but not for single/twin.
The rams are not physically nor veterinary inspected prior to joining. The rams were tested for Brucellosis 4 years ago.
The ewes are not condition scored neither before joining nor after weaning but they are wet / dry inspected at weaning.
Supplementary feeding is based on necessity but ewes have not been supplementary fed.
The ewes may get pregnancy toxaemia in September. He does not have post-mortems carried out on any class of sheep.
The owner has attempted to supplementary feed prior to lambing with 1 bag of corn / 1000 ewes fed twice weekly, (160gm/head/week), he believes this may have increased lamb survival.
All ewes must have a selenium bullet, given as a maiden.

Observations on Reproduction Cycle

Pre-joining

The owner does not physically check the rams nor have a veterinary check prior to joining. The ewes are not condition scored prior to joining. The ewes lamb in paddocks that are flat and have sufficient feed.

Joining

Joining commences on the 30th April and continues for 6 weeks with 2% rams used in the flock ewes.

This owner knows there are at least 95+% ewes pregnant as they are scanned but does not know the conception rate.

He has joined the ewes in mobs of over 900 and the results were not good. In 1994 he joined 1100 ewes as a single mob and marked only 830 lambs (75%). He has been informed (Bob Marchant) that sheep have an upper social limit of 650 animals; the problem he has is finding sufficient paddock to be able to have mobs smaller than 750 ewes.

Pre-lambing

The owner does not know how many lambs are lost prior to lambing and has no reason of why any such losses should occur.

Lambing

The main losses are because of mismothering and cannot be avoided and to foxes of both the four and two legged varieties. Poison is sometimes laid for foxes.

Marking

There are no significant losses associated with marking.

Weaning to First Shearing

The main losses following weaning are because of ill-defined ill-thrift and post-weaning shock.

The owner believes the major causes of loss are to do with management at weaning. His best success has been with shepherding the full mob of weaners in smaller paddocks for 2 weeks following weaning. Crops are not planted to feed lambs as he can't make money from it.

Understanding reproductive terminology

The owner understands the following reproductive terms as:

Pregnancy rate: No ewes pregnant in the joined mob [☑]
Conception rate: % of foetuses in ewes joined ☑
Lambing rate: the no lambs (live & dead) on the ground from all ewes joined [☑]
Marking rate: the no of lambs in the ewes present at marking
Weaning rate: no lambs weaned for total no ewes joined. ☑

Future Management of Parasites – Drenching 30%

The effect of internal parasites.

Internal parasites are not an uncontrollable problem.

Management Practices Currently used to Manage Parasite Infection

IP control program.

Ewes are shorn in September and are given a Ewegard. At tailing in November/December the ewes are given a Suponover® plus Levamisole which may be rotated to a Benzimidazole in some years.

The lambs, born 15th September-30th October, are given a Weanergard® in January/February or may be given a Suponover® in alternate years. At weaning in March the lambs are given the lambs are given Valbazen® plus selenium.
Note: this was the first interview and was completed before the internal parasite and Fly questions were added.

CASE STUDY CRC NSW CS 04

Enterprise Profile

This farm business is a mixed enterprise self-replacing SRS©, Merino flock with portion of the ewes joined to terminal sires for prime lamb production. The sheep produce 60% of income and cattle 40% for the business. The 640 hectare property is 7km west of Walcha with 800mm annual rainfall. It has been in the family for six generations and the current owner/manager has been there since 1990. He has completed Agricultural College at Yanco and has a TAFE Certificate in Wool Classing.

Sheep production was based on Gromark sheep until 1995 when a change to the SRS© Merino was made. During the 1970s the property had a Dorset sheep stud and during the 1980s had a Merino stud. Currently 20% - 30% of ewes are retained for breeding. Prices received and the costs of supplementary feed have been the drivers of these changes.

Non Sheep Enterprise

Cattle have not always been part of the system but have increased to 40% over the last few years even though they are not as good as the sheep. The owner has chosen Shorthorn cattle as they finish better on his available feed.

Heifers are joined at 14 months as it is too costly to join at 26 months. All females are pregnancy tested with 95+% being PTIC [tested pregnant]. Trade steers and females are sometimes purchased/traded for cash flow if there is excess feed available.

Crops are not sown for grazing but pastures have been sown down but they tend to run out quickly.

The cattle enterprise - The owner breeds Shorthorn cattle but they tend to ‘fold’ during a drought. Cattle have been sold direct to the abattoir but are now being sold into the weaner market. The aim is to grow sale stock through to feedlot entry weights and scores. Heifers are joined at 14 months of age and all females are pregnancy tested.

Labour

There is 1 fulltime staff and the owner’s son is gradually taking over changing the pastures. The son has worked at the Cicerone Project and is not including rotational grazing on this property. The farm currently uses 1½ labour units with 80% to sheep and 20% to cattle and general farm activities.

Production Goals

Personal goal is to increase both production on the property and to increase the size of the property but it is tough as current land prices are prohibitive. The owner’s son wishes to return to the farm and works part time o the farm at the same time the owner wishes to ease out of the work.

They wish to grow more grass to increase the farm stocking rate from 6-8 DSE/ha up to 12 DSE/ha [DSE ≡ annual grass required for a 50 kg wether – about 500kg DM] and to increase the number of sheep at a profitable cost.

Sheep goals are constantly changing in chasing higher returns. The owners are now disillusioned with the SRS© sheep as there is now no reliable market for the 'Elite' type of wool [low FD wool but with a broad crimp] as the Italian market doesn't like it and China doesn't pay premiums for it

NRM

There are no natural resource management programs. The owner believes that rows of trees are overrated and just make people feel good but offer no true benefit. He believes NRM is important and has ceased ploughing paddocks and moved to direct drilling pastures. Poa Tussock [*Poa labillardieri*] has taken over much of the area but it gives protection for stock.

Sources of Information

This producer sources information from rural newspapers (The Land), from RCS and Cicerone Project field-days, journals, Rural Lands Protection Board (RLPB) staff and has done a Prograze course. He places little value on stock agents and representatives. He does not obtain information for stock or pasture from private advisers but would consider paying for advice if it was at the cutting-edge. The owners use the internet for research and for costs and have occasionally used the CRC and AWIL web sites but finds them of low benefit.

Sheep Production

Current Flock Structure - Selection Practices

This is a self replacing SRS© based Merino flock with the only introductions as rams from studs. There are 800 adult ewes, 300 ewe hoggets and currently 700 weaners on the property. There are 30 rams in the flock. There is usually 3000 sheep DSE over winter but numbers are changed on the basis no rein – no feed and have been through the very expensive problem of feeding for 12 months.

Sheep selection was based on the SRS© system but following disillusionment more traditional fine wool selection is used. Sheep/wool are selected visually for nourishment and a finer crimp. Increased density is used as an indicator and no 'fluffy' types are selected. No weights or FD measurements are made.

Importance of Lamb and Weaner Survival

Lamb losses are less important growing more grass and 'dermo' [lumpy wool - Dermatophilosis] but are more important than tractors.

The owner rates abortive and lamb losses more highly that weaner losses. He believes that 300 foetuses are lost and that the major cause of lamb losses are exposure - especially storms - , black leg and arthritis. Weaner losses are due to scouring (bacterial). He carries out his own post-mortems looking for worms in all classes of sheep. Weaner losses to first shearing may be 2%.

He gives the weaners selenium.

Sheep reproductive performance - Marking percentage, including maidens, averages 110% with 116%, 110%, 105% and 110% over the past 4 years with the best 10 year result being 140%. Scanning shows 95+% ewes are pregnant with 40% of ewes carrying twins – a 140% conception rate.

October, rather than September, lambing is much better feed and weather wise for lamb survival though there can be grass seed problems in the autumn.

The owner believes that selecting ewes for a plain draping neck and less face cover has increased reproduction rate.

Causes of Lamb and Weaner Loss and Management Interventions

The ewes are [ultrasonically] scanned for pregnancy: the maidens wet/dry and the adult ewes for single / twin.
The ewes are wet / dried at marking and dries are culled.

Observations on Reproduction Cycle

Pre-joining

The owner physically checks the rams and has a veterinary check when necessary – the flock is accredited free of Ovine Brucellosis. The rams are supplementary fed lupins for 2-3 months at the rate of 95 gm / hd/day. Rams are joined at % in Maidens ewes and 1% - 2% in older ewes.
Maiden rams are joined with older ewes.
The ewes are 'eye-balled' for condition score prior to joining and are in good condition. They are supplementary fed when required – which has been more often over recent years.

Joining

Joining commences on the 10th May and continues for 6 weeks with 1% -2% rams used in the flock ewes and 2% in maiden ewes. Ewes are joined in mobs of 400.
This owner scans at least 9+% ewes pregnant with a conception rate of 140%.
Maiden ewes are joined at 18 months of age.
Scanning has been used mainly to reduce supplementary feeding costs. The owner has costed the scan/feed relationship with grain delivered at $400/tonne. He believes that reducing feed to single bearing ewes has avoided 'blowing-up' the single lambs.

Pre-lambing

Scanned mobs are differentially fed as required. This information came from the Cicerone Project.

Lambing

Ewes are lambed down in protected paddocks. Fox baiting with liver and Foxoff (not much good) is carried out before lambing. Ewes are not supplementary fed during lambing.
The owner believes 30% of lambs die/go missing at lambing – 2 days; he doesn't know where they go but knows this occurs from scanning information.
The ewes are not inspected during lambing.

Marking

The ewes are wet/dry checked at marking with dry ewes culled. However with scanning this may not be continued.

Weaning to First Shearing

The ewes are not condition scored at weaning – gets a general idea but no split management. The lambs are drenched at weaning. Now drenching with Rametin® and drenching 4 times per year.
Salt blocks are provided for the weaners.

Understanding reproductive terminology.

The owner understands the following reproductive terms as:

Pregnancy rate: No ewes pregnant in the joined mob [☑]
Conception rate: No foetuses per all ewes joined ☑
Lambing rate: the no lambs on the ground from all ewes joined [☑]
Marking rate: the no of lambs per al ewes joined ☑

Future Management changes - Management changes for the future may be to reduce mob size at lambing, grow more grass and keep twins in even smaller mobs. Grazing like the Serengeti may be useful. He also believes that at lambing the twins should be moved back with the single bearing ewes to avoid mismothering. Building multiple hides in lambing paddocks to provide shelter is a possibility.

Parasites Current and Historic problems

The effect of internal parasites.

IPs have a huge drain upon management and costs of drench and labour especially if full drench resistance occurs. Changing drenches is a problem.

The priority of IPs is increasing a resistance occurs and less sensitive drenches are available to use.

The main parasite is Barbers Pole and sheep are drenched 4-5 times each per year.

Drench resistance is present in the worm population on the farm and this effects management because of less protection, more deaths and more changes of drench.

Management Practices Currently used to Manage Parasite Infection

IP control program.

The owner does not use WEC as a management tool Post mortems are done when there appears to be a problem. A formal FECRT is not used but sheep are drenched then a post mortem is carried out to see if all worms have been killed.

The ewes are drenched at shearing in September before lambing in October and again at lamb weaning.

Rametin® is used in combination with Levamisole:

Understanding of management practices – are they simple or too complex.

Initially complicated but there is wisdom there. Cattle are run with the weaners from Feb-March and this seems to work.

Future Management of Parasites – Drenching 30%

Would you consider a worm control program that advised leaving some sheep undrenched?

Not much of an idea. Try to keep population and pasture contamination to a minimum. 400 epg is too high.

Practice Change and the Future

Have / would you reduce the number of sheep because of internal parasite problems?

Have already made changes by increasing the cattle enterprise.

Other Issues

Fly Strike - Describe the effect blowflies have on management, production and profits?

Always present, always a problem. The use of chemicals is a concern and should be replaced with better selection to give less body strike preferably zero.

Body strike in ewes is not a problem due to the increasing nourishment and increasingly white wool.

Mules v flystrike.

Merino ewes are mulesed when they are 8 months old, wethers are not mulesed. There is an association of increased flystrike with the presence of a hairy coat at marking.

In 2002 the sheep were not mulesed leading to a large number of back and body strikes with serious losses. Crutching and chemicals gave a good result in control.

Current fly control program.

The sheep are shorn in September and crutched in February-March with a small bung-hole and wig. [Bung-hole: remove only a small amount of wool in breech area without removing significant wool above the tail, Wig: removing wool on face].

The ewes are jetted with Vetrazin® on the tail/perineal region at marking – lambing scab can run flies over the ewe.

The lambs are jetted all over with Vetrazin® at marking and are treated with Clik® in January.

At marking, the lambs as a penned group are sprayed all over with the Vetrazin – it appears to work. Dermo in young sheep can lead to flystrike.

A couple of years ago a mob of lambs were treated with Kleendoc® at marking and the whole mob had to be jetted with Vetrazin® to control a flystrike outbreak.

This program is continued because the results are successful.

Comments on future fly management.

Now have plainer body sheep with less skin folds. Crutching and chemical give good control so fly control should be ok.

AWIL: confrontation with PETA was no way to go as PETA etc cannot be satisfied. The division with Oppenhiemer's group and AWI was disgusting as the wool industry need a single message. Marketing direction is a back-flip but we need some.

CASE STUDY CRC NSW CS 05

Enterprise Profile

This farm business is a mixed enterprise with a self-replacing Merino flock and a larger flock of crossbred (XB) ewes joined to terminal sires for prime lamb production. The wool sheep constitute 20% of the sheep operation and the prime lambs 80% but produce about 90% of total farm income. The cattle require about 15% of management time.
The long-held 1350 hectare property is 40km east of Walcha with an 850mm annual rainfall. It has been in the family for three generations and the current owner has been manager for 5 years. Cattle are both bred on the property and bought in stock are traded either as steers or pregnant cows/heifers.
The manager has a wool classing certificate and is now in the final year of a B. Comm. (UNE). Cereal crops are not traditionally sown for grazing and most of the arable area (75%) of the property has been sown to pasture over time. Pasture renovation is an ongoing program and pastures consist of Fescues, Cocksfoot, Phalaris and sub/clovers. Summer growing fodder plants such as plantain and chicory are included in some paddocks. This year (2008) crop of triticale has been sown for silage and for feeding lambs.
There are no clear production or management goals.

Labour

There is 1 fulltime staff and ½ unit occasional casual staff as required; contract labour is used for seasonal work.

Production Goals

The owner's personal goal is to generate sufficient cash flow to make a profit. The owner and his wife have two small daughters and both parents have professional qualifications and are unsure whether to take their skills off farm. They have not had a holiday for two years and the property has not made a profit over the last 3 years on a total capital value of over six million dollars.
The owner, after 20 years on the property wishes to enjoy a better lifestyle with more free time.
The mixed enterprise has an average stocking rate of 8 DSE/ha. The changes in enterprise mix and stock numbers have been made to increase profitability.
The goals with the sheep enterprise are to improve production to produce a 25kg DLWT lamb [carcass]. There are no goals or development programs for the Merino flock. The cattle production goal is to turn off 600kg steers but there are no breeding plans to change production.
Pasture goals are to produce sustaining highly productive pastures. The owner has two major concerns, firstly, that previous pastures have had poor persistence and are now dominated with Poa Tussock and secondly, the cost of inputs to establish new pastures is very high and the increasing length of the pay-back period of at least 8-10 years.
He does not apply fertiliser regularly as he has insufficient funds but he would like to. He has no plans to further increase stock numbers.
The grazing aims are to increase the amount of mob grazing with cattle and with dry sheep. To do this the owner plans to do more fencing as some of the infrastructure is starting to fall apart through long term lack of maintenance.

Whole of enterprise performance - The property has a total capital land value of over six million dollars and a gross income of $450,000. The owner is now making management changes after attending a Wool 4 Wealth course and a land inheritance from an uncle.

NRM

The property has about 15% tree cover and there are no plans to adopt any natural resource management programs. The property has an annual fox baiting program.

Sources of Information

This producer sources information from peers (word of mouth), radio and attends relevant field days. The owner points out that he "would like to try that" but never does as ongoing enthusiasm is not there. He does not seek information from private advisors but would be comfortable to pay for advice if it was seen to be beneficial. To this end he has paid a financial advice and found it to be of no benefit.

He does attend training programs but believes that a 'filter' of all the available advice is required especially where the 'filter' has genuine experience in what actually works and is beneficial. There is usually too much information delivered at a single session and time is required to put it in place.

The owners use the internet for market and product information. He has visited the Sheep CRC and the AWIL websites and did not get much benefit from them.

Non Sheep Enterprise

The Cattle enterprise - The cattle are run traditionally but the owner has now started mob/rotationally grazing to improve both beef production and the quality of pastures. The heifers are first joined at 24 months of age, all females ate pregnancy and there is 95% PTIC. Pasture is allocated where available with the cattle having first access to the better feed. The owner is not sure about this as the prime lambs make more money.

Sheep Production

The sheep operation is 80% prime lamb production. All maiden ewes are first joined at 18 months of age. There are 1400 XB ewes in the enterprise and all rams are purchased. The stocking rate is uncertain as the owner has only recently started to measure and calculate production.

The ewes are wet/dry checked at marking: dry Merino ewes go into the wether flock.

Prime lambs are run traditionally and sold as export lambs as soon as they are heavy enough to produce a 25 kg carcase. The owner believes this is inefficient and would like to sell lambs as suckers but he believes his pastures are not good enough.

Current Flock Structure – Selection Practices - There are now clear breeding programs for the Merino flock. Sheep are visually selected on frame size and wool quality. No measurements are used and rams are purchased.

Importance of Lamb and Weaner Survival

Lamb losses are less important pasture quantity and quality and the need to increase gross income.

Lamb losses are more important than lice which are not seen as a major problem –"maybe I should, sheep are starting to rub now". Sheep are treated for lice with Magnum®.
The owner believes there has been no reason to change the priority level of lamb survival.
He believes that he would change lamb survival priority, and the willingness to do more about it, if there were more consistent wool prices and better methods available provided they did not cost too much.
The owner does not know of any simple recommendations to increase lamb survival but would like to be more conscious of condition score and of supplementary feed needs in dry times.
The owner does not know of any different management techniques and other farmers are not forthcoming as they don't want to make a fool of themselves. Need more GRDC [Grains Research & Development Council].
Sheep Enterprise Reproductive Performance - Marking percentage in the XB flock ranges from 80% to 1125% while the Merino flock averages 60% with the best ten year result being 75%
The major losses occur from birth to 2 days with few losses from birth to marking and marking to weaning. There are few losses following weaning.

Causes of Lamb and Weaner Loss and Management Interventions

The ewes are not [ultrasonically] scanned for pregnancy.
The ewes are not wet / dried at any time.
The owner believes there are no abortive losses but lamb losses pre-weaning are due to poor condition of the ewe, predators especially eagles, foxes are baited with Foxoff® in July, and to weather changes. Losses in weaners are few and are due to infection. He bases these opinions on what he sees or doesn't see. No post mortems are done in relation to reproduction but occasional p/ms may be done for barbers Pole worm and kidneys in pulpy kidney.

Observations on Reproduction Cycle

Pre-joining - The owner does not physically check the rams as he believes there is no reason – he may check the testicles in an old ram.
The rams are not veterinary inspected - no need but he would for a high value animal. The ewes are not condition scored but he would like to try it. The ewes are they given supplementary feed but he did try supplementary feeding with lupins; it was a benefit but it was a pain.
Joining - The XB ewes are joined from the start of March and the Merinos in May. Joining lasts for 6 weeks. Rams are joined at 2% with adult ewe mobs of 250 while all the maiden ewes are joined as a single mob.
Pre-lambing - The owner does not know how many animals are pregnant or what the conception rate is. He has not scanned because the XB ewes usually have high marking percentage and the Merino flock are not considered important. He does not know how many lambs are lost before lambing and no idea what would be causing any losses.
Lambing - Lambing occurs in August – September in the XBs. Ewes are lambed down in paddocks protected by tree windbreaks and paddocks with Poa Tussock tufts. The owner has no idea how many die in the peri natal period or for what reason. Lambing ewes are not supplementary fed but he would like to
Marking - No noticeable losses occur related to marking. The ewes are now wet/dry checked at marking and while he would like to condition score at weaning he did 'put his hand on them' especially in previous year as it was so tough. He would like to be taught how to condition score.

Weaning to First Shearing - The lambs are weaned in January at 5 mth of age. Few, not sure how any, losses occur after weaning. He has planted fodder crops of rye grass, short-term ryegrass and turnips but not sure if it is profitable.

Understanding reproductive terminology.

The owner understands the following reproductive terms as:

Pregnancy rate: No foetuses that go full gestation
Conception rate: the no eggs fertilised per all ewes joined [☑❁
Lambing rate:
Marking rate: the no of lambs in the ewes present at marking

Parasites Current and Historic problems

The effect of internal parasites:- Internal parasites are highly important to management and the owner would delay other practices in order to drench sheep. He rates IPs at the top of the economic and management drivers because of losses rather than the costs associated with control.

Management Practices Currently used to Manage Parasite Infection

The main parasite on the property is Barbers Pole worm and most sheep receive 4-5 drenches per year. He has not done a FECRT and does not know if he has drench resistant worms in his sheep but he says that resistance is highly important in worm management decisions.
Ewes are given Cydectin® off shears and prior to lambing and lambs may get an Ivomec® at weaning. He has used Napthalophos (Rametin®), Levamisole, Suponover® and rarely a combination drench. He has no quarantine program for introduced sheep.

"What I do know helps to control pretty well though occasionally get caught." Rotational mob grazing and cattle are beneficial.

Future Management of Parasites – Drenching 30%

Would you consider a worm control program that advised leaving some sheep un-drenched:- Would not like it as part of the idea is to use drench to kill larvae – don't want any infected sheep or increased infection on the paddock.

Practice Change and the Future

Have / would you reduce the number of sheep because of internal parasite problems?
No

Other Issues

Fly Strike –

Describe the effect blowflies have on management, production and profits?

Hardly any problems now – western wethers were a problem probably due to fleece rot. Clik® makes life easy. The owner believes fly strike concerns do not determine management decisions because strikes are not that severe. However, this year has been the worst for a while – probably because of the wet summer – but it was still pretty good. If an outbreak occurred he would crutch a few bums.. but hasn't had to.

Mules V fly strike

3% of the Merino ewes have been struck, 4% of Merino wethers are struck on the pizzle and body and 2% of XB ewes are struck. 1% of rams are struck and are culled.

The Merino ewes, rams and wethers are mulesed but the XB ewes are not. The sheep do get foot lesions and fly strike may originate from these sites.

Current fly control program:-

Lambs and ewes receive Clik® at marking in November and lambs receive Vetrazin® on the back at weaning in January.

The ewes are treated with a high concentration of Vetrazin by applying it with a back pack along the backline and not as a full jetting because it is easier than setting up the jetting equipment.

The owner would use organic chemicals for control if they worked as they are clean and green.

Comments on future fly management –

The owner is not aware of control methods other than crutching and chemicals and worm control. The aim of this is to keep the perineum area clean. It is not necessary to get too complicated. The timing of crutching is important – Easter week – and a trigger to treat a mob would be 10% animals struck.

The owner believes the withdrawal of mulesing will have no great effect on fly management. Breeding a plainer body sheep without heavy wrinkle and culling fleece rot will allow business as usual.

CASE STUDY NSW RB 01

Enterprise Profile

This enterprise operates an effective area of approximately 1850 hectares across four properties distributed over a 28 km radius and located approximately 40 km southeast of Wagga Wagga. The properties are managed as separate enterprises due to slightly different disease profiles across the four properties – three properties are infected with OJD and all four properties have different resistance levels to internal parasites. The properties receives a long term average annual rainfall of approximately 800mm and the landscape is typified by mostly undulating and some steep granite hills which have acid soils at depth. Approximately 90 percent of the effective area is dedicated to fine wool self-replacing merino flock, with the remaining 10 percent used to support a cattle agistment enterprise.

Labour

The enterprise employs 1.8 permanent labour units besides the owners and engages contractors for all ancillary services such as shearing and crutching.

Non Sheep Enterprise

10 percent of farm production = cattle agistment enterprise.

Production Goals

The operation is focused on fine wool production, albeit the returns during the last two years of drought from the cattle agistment enterprise are disproportionately high compared to the fine wool enterprise. A major focus of the enterprise over the past 20 years has been to increase stocking rate in order to improve profitability. While attempts have been made to improve labour efficiency, it has not been possible to move beyond approximately 6,000 DSE per labour unit.

NRM

From a NRM perspective the enterprise has been conducting a tree planting program for some time and has 80 percent of the pasture limed and sown to perennial species.

Whole-of-Enterprise Performance

Over the past 10 years the enterprise has achieved an average return on assets of 3.8 percent and range of (3.5%) to 7.7 percent.

Table 1 below demonstrates the per DSE gross margin generated by the two enterprises.

	2004-05	2005-06	2006-07
Fine Wool Enterprise	$14.62	$19.48	$0.89
Cattle Agistment Enterprise	NA	$13.46	$25.36

Table 1 – Gross Margin Per DSE – Fine Wool Enterprise and Cattle Agistment Enterprise

Table 2 below demonstrates the gross profit and net profit per hectare of the two enterprises

	2004-05	2005-06	2006-07

	Gross Margin	Net Profit	Gross Margin	Net Profit	Gross Margin	Net Profit
Fine Wool Enterprise	210	49	300	(120)	NA	NA
Cattle Agistment Enterprise	NA	NA	207	60	349	180

Table 2 – Gross Margin and Net Profit per Hectare – Fine Wool Enterprise and Agistment Enterprise

Sheep Production

Current Flock Structure

The wool enterprise is currently comprised of 10,000 merino ewes, 3,500 merino ewe weaners and 400 rams managed across 40 mobs. In normal seasonal conditions the number of ewes is approximately the same with 7,000 ewe and wether weaners and 3,000 wethers. The mobs are managed according to age group wherever possible. All mobs are drafted on condition score though the summer and autumn to give preferential feed to those with the highest feed requirements. Ewes are mostly culled for age at six years.

The current average stocking rate is 12 DSE per hectare and in a normal season, 15 DSE per hectare. The operation uses an ad-hoc grazing strategy whereby the properties are set stocked for most of the year and rotated to manage for worms and pasture availability.

Selection Practices

The breeding objectives of the enterprise have been to decrease fibre diameter, maintain fleece weight and increase staple strength. An index using a 20 percent micron premium plus staple strength has been used in selection decisions. Reproductive traits have not been a selection criteria because of the trade-off between reproductive traits and production traits.

Importance of Lamb and Weaner Survival

Lamb and weaner losses have been significant historical problems for the enterprise. This has been exacerbated by five years of no autumn breaks and two severe droughts.

Causes of Lamb and Weaner Loss and Management Interventions

It is management's philosophy that genetics is the priority management issue for the sheep enterprise followed by weaner survival. While lamb losses can be high, there is limited practical and economic management intervention that can be conducted. Most lamb losses occur around birth due to birthing problems, mismothering and adverse weather conditions. None of these problems is easy to influence by management. Whereas, while weaner survival can be so easy to get wrong, specific interventions are clearer.

The possibility of action from PETA similar to that taken over mulesing is an adequate threat to address the issue. However, it is an industry-wide issue as the industry cannot get caught fighting a 'rear-guard' action as it has in the case of the mulesing issue. Another example of the influence of animal welfare on livestock practices is the live sheep export, where animal rights activists were saying that 1 percent death rates on boats were too high. The normal death rate of sheep on most farms would exceed this. As such, addressing lamb and weaner mortalities on this property is a high priority management issue.

The biggest limitation to lamb and weaner survival management on this property is the extensive acidic soils at depth. This places significant limitation on the ability of the farms to grow fodder

crops (only 14 hectares is suitable to be planted to Lucerne). Other acid tolerant, summer growing, deep rooted perennial species are needed. It is easy to draft-off the low live weight lambs at weaning; however, if there is no high quality feed to place them on then supplementary feeding is necessary. The low live weight lambs are always the most difficult to get to eat supplementary feed, even when they have been imprint fed on their mothers.
The only area where management can have an effect is at the farm level therefore that is where effort is concentrated. This management team cannot change an industry.

Sheep Enterprise Reproductive Performance

This enterprise does not scan and as such conception data is not maintained. It is estimated that losses between conception and lambing would not exceed 5 percent and that such a rate is natural. Table 1 below demonstrates the reproductive performance of this enterprise for the period 2000 to 2007.

	Ewes			Lambs					
	Joined	Vaccinating	Lambing	Marking	%	Weaning	%	First Shearing	%
2000	4050					3615	89%		
2001	7119			6542	92%	6276	88%		
2002	5901			5337	90%	5224	89%	4468	76%
2003	10837			6131	57%	5966	55%	4828	45%
2004	10554	10398	10215	7090	67%	6783	64%	5569	53%
2005	9999	9912	9889	6480	65%	6305	63%	5769	58%
2006	10329	10335	10161	7096	69%	6781	66%	5675	55%
2007	9736	9838	9266	3702	38%	3668	38%		

Table 3 – Reproductive Performance of the Fine Wool Enterprise – 2000 to 2007

Prior to 2002, marking rates of approximately 90 percent were commonplace and it is believed that nutritional issues associated with the poor seasons in 2003, 2004, 2005 and 2006 have been the major cause of the significant decline in marking rate and the significant losses between weaning and first shearing. Additionally in 2004 a cold-snap resulted in the loss of 400 wooly lambs.

Observations on Reproduction Cycle

Pre-joining

Prior to joining ewe are managed to try and keep them in a visually assessed condition score 2.5 to 3. Ewes in poorer condition are differentially managed and placed on supplementary feed. Ewe udders are not assessed.
Ewes are also given a 5-in-1 vaccination prior to joining.

Joining

Rams are managed to a visually assessed condition score 4 and tested for faults prior to joining, although visually assessed condition score 2.5 to 3 is more common in current season conditions. Rams are supplementary fed lupins if they are less than condition score 3. The joining percentage

used in 1 percent to 1.25 percent plus 1 depending on the season. The ewes are joined for a period of four to five weeks timed for a spring lambing. Maiden ewes are joined at 18 months of age.

Pre-lambing

Ewes are not scanned, so conception data is not available. However conception rates are believed to be approximately 90 percent. The enterprise tried scanning in one year but determined the practice to be sub-economic because dry ewes are not routinely culled and due to an absence of alternative feed supplies, there is limited capacity to differentially manage twins and singles.

Maiden ewes are differentially managed to the extent that they are placed on the better available pastures. The condition of all ewes is monitored throughout pregnancy with supplementary feed provided when necessary.

Ewes are vaccinated with 5-in-1 immediately prior to lambing.

Lambing

It is understood that most losses between lambing and marking occur between birth and the first seven days of life as a result of:

- The birth process being difficult
- Exposure, particularly in the case of twins

Paddocks with the best feed and available shelter are used for lambing, albeit that wind is not a big issue for this property. Fox baits are laid prior to lambing and the lambing process is not monitored.

Marking

It is understood that losses at marking are minimal.

Marking is conducted very close to the completing of lambing and as such lambs aren't drenched as some are only one day old. Lambs are vaccinated with a 5-in-1 and against OJD. CLICK is also applied to the lambs.

It is believed that the loss in bodyweight that results from mulesing is a major cause of post-marking mortality. Due to a failed spring in 2007, all wether lambs were euthenased. To maximize survival, the remaining ewe lambs were not mulesed at marking to avoid anything which may slow their growth rate.

CLICK is applied to the mulesed area of lambs. The worm status of flocks is checked at marking.

No interventions are undertaken to optimize mothering-up after marking as this is logistically impractical with mobs comprised of 500 ewes. In particularly bad seasons dry ewes are drafted from wet ewes at marking so that the older ewes to be culled can be sold early.

Marking is conducted in yards which are centrally located to allow for a short journey back to lambing paddocks.

Weaning to First Shearing

It is understood that the main causes of loss from weaning to the first shearing are:

- Internal parasites
- Inadequate green feed which is particularly problematic for weaners that are in poorer condition
- Weaners that are less inclined to eat supplementary feed even when imprint fed on their mothers
- Grass seeds that cause eye infections
- Bacterial scours

Lambs are weaned at 12 weeks from the start of lambing. Lambs are weaned onto a spelled paddock, with weaners in poorer condition drafted onto better pastures if available and tagged

according to visually assessed condition. The enterprise owns a set of walk-on-self-weighing scales but they have not been used extensively to date. The scales will be used this year to measure the average weight of flocks and standard deviation.
Lambs are imprint fed four to five times prior to weaning.
At weaning, lambs are given a booster vaccination. When bacterial scours occur a three day sulfur drenching regime is implemented. Flies have been historical problem, but this has been resolved by the use of CLICK at weaning.

CASE STUDY CRC NSW RB 02

Enterprise Profile

This enterprise operates an effective area of approximately 2,250 hectares located approximately 60 kilometers west-south-west of Wagga Wagga. The property receives a long term average annual rainfall of approximately 500 mm and the landscape is typified by gently rolling hills of red-brown soil type. The effective area is allocated approximately 60 percent to a cropping enterprise comprised of approximately one-third canola and two-thirds wheat with a very small amount of barley and pulses and 40 percent to a self-replacing merino flock.

Labour

The enterprise employs 2.5 permanent labour units and engages contractors for all ancillary services such as shearing and crutching.

Production Goals

This enterprise has an approximately equal resource allocation between the cropping and wool enterprise, albeit the cropping enterprise usually receives more management attention as it is typically the more profitable in any given year.
The goal of the wool enterprise is to reduce micron and increase the volume of wool produced per hectare. When wool prices were lower, the enterprise trialed joining cross bred ewes equivalent to half of the flock to White Suffolks for prime lamb production. However, this seemed to require increased management input and the culled merinos were marking at a similar rate to the cross-bred ewes in any case.
The enterprise recently changed classing systems. Previously, the enterprise was using a traditional classer who deployed visual methods of classing. The enterprise then engaged a classer who classed on subjective and objective measures of micron and bodyweight. In September 07, the classer then scaled back subjective assessment to 5 percent, measured fleece weight, calculated an index and selected on the basis of the index.

NRM

The enterprise has a strong NRM focus, with an established tree planting program, fenced-off gullies and creek lines and drought lots to keep sheep of the country in drought years.

Non Sheep Enterprise

Cropping

Sheep Production

Current Flock Structure

The enterprise runs a self-replacing merino flock comprised of approximately 4,000 sheep run across four mobs including two lamb mobs of 1,000 lambs each, a mob of 700 maiden ewes and a mixed age mob of 1300 ewes.

The mid-winter average stocking rate for the sheep enterprise is 8 DSE per hectare and the enterprise deploys a rotational grazing strategy on the Lucerne based pastures and a set stocking strategy in late winter.

Selection Practices

Rams are acquired from a stud that does not use ASBVs. The primary breeding objective is to reduce micron and maintain wool per head, while increasing wool per hectare. The secondary breeding objective is to select animals with a sound frame.

Importance of Lamb and Weaner Survival

Lamb and weaner survival is a key management focus within the sheep enterprise because it is desirable to have more sheep in order to increase selection pressure. Additionally, the sale of surplus sheep is becoming an increasingly important source of revenue However, the cropping enterprise takes priority over the sheep enterprise and as such, from a whole-of-farm point of view, lamb and weaner survival is a mid-level priority.

The management of this enterprise previously operated a scanning service business and currently scans the entire flock. Conception rates average between 150 and 160 percent. While actual lambing data is not collected, management believe anecdotally that losses are between zero and three percent prior to birthing.

On average the enterprise achieves 90 percent marking with singles and 120 to 130 percent marking in the case of twins. This suggests that the losses between birth and marking are approximately 30 percent with approximately one twin in every two sets of twins dying during this period. Management is of the view that most of this loss occurs during or immediately after birthing. A further zero to five percent of lambs are lost between marking and weaning.

Observations on Reproductive Cycle

Pre-joining

Ewe condition is monitored visually and ewes tend to get to an acceptable condition (no specific condition target) without supplementary feeding as they come off good pastures from spring and then go onto stubbles in January/February. Because management is satisfied with the current rates of conception, interventions prior to joining have never been a major concern.

Worms are monitored regularly and there has not been a need to drench adult sheep for three years.

Joining

Rams are checked for faults and conditions in winter and if they are not in satisfactory condition they will be grazed on a pulse for a month prior to joining.

Ewes are joined to time lambing for a late July/early August. Maiden ewes are joined at 18 months of age at joining percentage of 1.5 to 2 percent and older ewes are joined at a percentage of one percent plus one. Ewes are joined for six to eight weeks. A couple of years ago, management tried reducing the joining period to five weeks, however, this seemed to result in lower levels of conception.

Pre-lambing

It is understood that losses between conception and lambing are less than 3 percent and that this is a natural rate of abortive loss.

All ewes are scanned and twins are drafted onto paddocks with the best feed and provided additional supplementary feed via automatic feeders. Singles are drafted onto the next best paddocks and dry ewes onto the worst paddocks, which tend to have about the same quality of feed as the paddocks that the singles are drafted onto. Supplementary feed is only given to singles and dry ewes in particularly bad seasons. The scanner also checks ewes for udder faults.
If the number of dry ewes is less than five percent the usual practice is to cull the dry ewes. However, if the portion of dry ewes exceeds five percent a decision to keep them is usually made because there is a view that rates of misconception above five percent are probably the result of a management issue, rather than any natural deficiency associated with the animal and as such, a number of the dry ewes should conceive in the following season.
Ewes are visually monitored throughout pregnancy and management try to keep them in the best condition as is practical because it is too difficult to recover a pregnant ewe that is in poor condition.

Lambing

The most significant losses on this enterprise occur between birth and marking and the major causes of this loss are believed to be:

- Exposure, particularly in the case of twins
- Poor nutrition, particularly in the case of twins
- Mothering ability of maiden ewes, particularly in the case of twins, where maiden ewes seem to have a propensity to abandon one of the lambs

Twins are usually drafted into smaller mobs for lambing so that they can spread out. The lambing process is monitored only to a minor degree and every effort is made not to stress ewes during lambing. There is a preference to use sheltered paddocks. However, the paddocks with the best feed are used in priority for lambing over paddocks with shelter because it is understood that good nutrition is the key determinant to lamb survival. Fox baits are not laid by the enterprise. However, the district runs a fox baiting program.
Lambing paddocks are spelled as a matter of course, because sheep are grazed on stubbles prior to lambing.

Marking

It is understood that losses of up to five percent can occur between marking and weaning and that the main causes of these losses are:

- Shock from mulesing
- Infection from mulesing
- Mismothering

Lambs receive a 6-in-1 vaccination and are mulesed at marking. Marking is conducted in paddock with portable yards so that there is limited mustering and minimal infection risk. The ewes are treated with Gudair.

Weaning to First Shearing

Lambs are weaned at between ten and eleven weeks of age. Special weaning paddocks are not used because of limited paddock availability. However, the paddocks with the best available feed at that stage are usually used. Lambs receive a drench and booster vaccination at weaning

CASE STUDY CRC NSW RB 03

Enterprise Profile

This enterprise operates an effective area of approximately 3100 hectares across two properties, located approximately 220 km northeast of Wagga Wagga. It receives a long term average annual rainfall of approximately 650mm and the landscape is typified by a basin where granite and slate outcrops intersect resulting in relatively fertile soils. On one of the properties a dual purpose flock and wheat crop are operated on the other property a self-replacing merino flock is operated.

Labour

The enterprise employs 1.8 permanent labour units (averages 11500 DSE/labour unit) and engages contractors for all ancillary services such as shearing and crutching.

Production Goals

The operation works on a whole-of-farm philosophy, whereby the wool enterprise is the primary operation accounting for approximately 75 percent of income. The dual-purpose flock is operated primarily to supplement income and improve the productivity from sub-optimal ewes produced by the merino flock.

Non Sheep Enterprise

Cropping

NRM

The enterprise has a strong NRM focus including regular tree planting and native vegetation protection.

Sources of Information

The figures below are taken from our benchmarking data.
Whole-of-farm return on assets – 7% average for 2001 - 2005
Gross margin per hectare for the wheat versus merino versus dual purpose enterprises
Operating profit/ha – Merino for 2001-2005 average $87/ha and XBD 2005 only $157/ha
The wheat wasn't included in the benchmarking.
Gross margin or net profit per DSE
Operating profit/DSE – Merino average for 2001 –2005 $11.24/dse and XBD's 2005 only $21.40/dse
Cost components of the two sheep enterprises
Merino cost - $25.27/dse
XBD costs - $26.38/dse
….or however you measure it

Sheep Production

Current Flock Structure
The wool enterprise is currently running 6,000 merino ewes and the dual purpose enterprise is comprised of 3,000 culled merino ewes joined to Suffolk rams. This is subsequent to a significant cull of 2800 ewes in September 2007 that formed part of a strategy to preserve the better quality pastures for lambing and weaning heading into a poor season.
The ewes are managed in 18 mobs across both properties according to age groups.
The current stocking rate across both enterprises is 7 DSE per hectare. However in a normal season the stocking rate is usually approximately 9 DSE per hectare. The enterprise uses a combination of continuous grazing and set stocking on both enterprises depending on the nature of the particular season.
Selection Practices
Merino rams are selected using ASBVs for super-fine wool and above average fleece weight. Suffolk rams are selected visually for big long rams and on the recommendations of the stud which uses ASBVs in its selection practices. In the future, low WEC will also be a selection criteria.

Importance of Lamb and Weaner Survival to the Enterprise

Management does not believe that losses due to misconception or lamb losses are significant. However, weaner losses have historically been unacceptable and in terms of management priorities on the whole enterprise, managing for weaner loss is second only to managing parasites across the flock.

We don’t want to see our animals suffer or die and from an economic point of view you have less animals to sell or cull at the other end because your replacement numbers are less.
This enterprise does not scan and as such, does not collect or maintain conception data. The reason scanning is not conducted is that given the relatively high conception rate when compared to weaner losses, the additional data does not justify the investment or additional labour input required. On average the enterprise achieves a marking rate 90 to 95 percent and weaning rate of 85 to 90 percent. Historically, the enterprise regularly suffered further losses of approximately 10 percent between weaning and first shearing.
Pattianne and Tony, are the issues different for the merino and dual purpose flock? Also, do you have actual marking, weaning and first shearing numbers for the past several years that I could include?

Causes of Lamb and Weaner Loss and Management Interventions

Basically there are no issues with the xbds as marking doesn’t knock them around and they are mostly sold straight off their mothers so no weaner management problems.
As a comparison see below:
2002/2003 – We marked 4500 Merino lambs in September 2002 and there were only 4040 shorn in June 2003. A loss of 500 odd. Most of the losses occurred from weaning.
2004/2005 – We marked 3547 Merino lambs and only 2990 were shorn 9 months the following June. A loss of nearly 600.
2006/2007 – We marked 3560 and 3410 were shorn. A loss of 150. We put this reduction down to using Trisolphen, better worm management and the addition of lime and salt to their diet

through the late summer and autumn. These were the best weaners we had taken through to their first shearing.
2007 – We marked 4700 lambs and weaned the same amount. They are absolutely the best weaners we have produced at this time of the year when usually they are struggling by now. This has been helped by worm management the trisophen treatment and the fortunate falls of rain in late spring which meant we had green feed to wean them on to. Prior to that it has been one of the toughest years we have had.

Observations on Reproduction Cycle

Pre-joining

Prior to joining management attempt to maintain ewe condition at a visually assessed condition score of 2.5 to 3 and WEC are conducted frequently due to a high prevalence of H. contortus in the area. However, supplementary feeding is not undertaken for economic reasons. Management has previously placed ewes on a lupin based nutritional regime. However, because this did not result in any apparent improvement, they ceased the practice.

Joining

Rams are routinely placed on a lupin diet for six weeks prior to joining as it seems to result in the rams being more active during joining. Rams are also checked for faults prior to joining, with particular focus on maiden rams.
Maiden ewes are joined at 18 months of age and all ewes are joined for a period of five to six weeks. The merino and cross-bred flocks are managed the same, with the merino flocks joined in January and the cross-bred flocks joined in February.
Tony and Pattianne, what raming percentage do you use? Is this different for the merino versus the dual purpose flock or different for maiden ewes?
Ram percentage is about the same for both flocks. 1% plus one for the adult ewes and 1.5% for maidens. They only have a 5 week joining.
Pre-lambing
Maiden ewes are managed differentially to the extent that they are usually placed on paddocks with better quality feed. However the cross bred and merino flocks are managed the same. Ewes are not scanned and consequently, there is no differential management of twins and singles.
Ewe condition is monitored visually, with supplementary feed applied where required.
Because this property is characterized by a number of steep sloping paddocks, ewes are shorn in May which reduces there weight and limits ‘slipping accidents’ leading up to lambing and during the lambing process.
The May shearing was introduced to avoid shearing lambs with only 3 months wool on them – effectively turning the finest wool produced into low value short wool. Also the May shearing is timed to be closer to our major break in the wool point.(Ring me if you need further explanation)
The side benefit is that ewes are lambing with less wool on them and therefore less chance for them getting ‘down’.
Lambing
It is understood that the main causes of loss between lambing and marking on this enterprise are:
Exposure
Predation (foxes)
Loss of twins in the merino flock
The property is such that most paddocks have some shelter and those paddocks with the better shelter are used for lambing where whole-of-farm logistics allows. Lambing paddocks are not

spelled before lambing. There is limited monitoring of the lambing process with older ewes to avoid ewe stress. However, maiden ewes are lambed in smaller paddocks close to the house where they can be monitored from a distance more easily.

Marking

It is understood that losses at marking are minimal. Only since 2006.

At marking lambs are drenched and vaccinated using a 6-in-1 vaccine. They are also inoculated for scabby-mouth. Lambs that are unlikely to survive are destroyed.

Lambs are mulesed using tri-sulfane and an antibiotic. This has resulted in a significant reduction in post-marking losses.

Marking is conducted in the sheep yards. However, the yards have large laneway and the ewes and lambs are left in the laneway overnight to give them a chance to mother-up before they are released to the paddocks.

Lambs are not tested for worms at marking.

Weaning to First Shearing

Lambs are weaned at 12 to 14 weeks of age. Weaning paddocks are spelled or paddocks are only used where dry sheep have been grazing. Because the weaning paddocks are usually dry pasture some supplementary feed is provided. Weaners in poorer condition are drafted off and placed on the better paddocks with additional supplementary feeding.

Prior to weaning lambs are imprint fed for a short period.

At weaning, lambs are given a booster vaccination, fly treatment and selenium.

In more recent years management has placed tyres filled with salt and lime in the weaning paddocks, which seems to have substantially improved weaner survival rates.

CASE STUDY CRC NSW RB 04

Enterprise Profile

This enterprise operates an effective area of approximately 3,500 hectares, located 80 km northeast of Wagga Wagga. It receives a long term average annual rainfall of approximately 680mm and the landscape is typified by 75% basalt and 25% granite soil which is gently undulating and with some rocky outcrops in the granite area. The enterprise currently has 55 percent of the effective area allocated to wheat and canola production, 28 percent to a merino flock and 17 percent to a dual purpose flock.

Labour

The enterprise employs three permanent labour units and engages contractors for all ancillary services such as shearing and crutching.

Non Sheep Enterprise

The enterprise currently has 55 percent of the effective area allocated to wheat and canola production,

Production Goals

The operation works on a whole-of-farm philosophy and currently the main operational focus is on cropping, as it is the most profitable enterprise. For example, activities such as building up the nitrogen profile of soils and controlling rye grass tend to take priority over livestock management issues. Management resources focused on the sheep enterprise tend to be directed at activities that yield significant results as practices that yield incremental results may carry too significant an opportunity cost.

Traditionally, the sheep enterprise has been focused on fine wool production, with an objective of achieving the finest wool possible given the agronomic and climatic conditions. In order to achieve this, genetics have historically been sourced from the New England region to reduce the average micron of the flock. While micron reduction was achieved, variability in climatic conditions and vastly differing feed types and quality associated with the location of the enterprise resulted in too much variability in tensile strength and as a result, the wool product from the enterprise was not achieving adequate premiums in the marketplace.

In order to improve whole-of-enterprise profitability, a decision was made in late 2007 to transform the sheep enterprise into a pure dual purpose flock. Table 1 below demonstrates the plan to migrate the sheep enterprise to a pure dual purpose flock.

	2008		2009		2010		2011		2012		2013		2014	
Age	**Ewe Breed**	**No.**	**Ewe Breed**	**No.**	**Ewe Breed**	**No.**	**Ewe Breed**	**No.**	**Ewe Breed**	**No.**	**Ewe Breed**	**No.**	**Ewe Breed**	**No.**
0	1st X	800	1st X	1600	1&2 X	1400	1&2 X	2000	1&2 X	2000	2nd X	2000	2nd X	1500
1	Merino	1000	1st X	700	1st X	1500	1&2 X	1300	1&2 X	1800	1&2 X	1800	2nd X	1800
2	Merino	1500	Merino	900	1st X	600	1st X	1350	1&2 X	1200	1&2 X	1600	1&2 X	1600
3	Merino	1800	Merino	1400	Merino	800	1st X	550	1st X	1250	1&2 X	1100	1&2 X	1450
4	Merino	1780	Merino	1650	Merino	1300	Merino	720	1st X	500	1st X	1100	1&2 X	1000
5	Merino	1500	Merino	1700	Merino	1550	Merino	1200	Merino	650	1st X	450	1st X	1000
6	Merino	400	Merino	500	Merino	1350	Merino	1400	Merino	1100	Merino	450	1st X	200
Total		**8780**		**8450**		**8500**		**8520**		**8500**				**8550**

Table 4 – Future Plan for Sheep Enterprise

NRM

The enterprise has a strong OH&S and NRM focus. The enterprise was awarded a local Landcare award in 2006 and plans to have all non-arable land (being equivalent to 10 percent of the property) planted to trees within the next 10 years.

Whole-of-Enterprise Performance

The average return on assets for the years 1997-98 to 2005-06 is approximately 6.5 percent, with a high of 12.5 percent in the 2001-02 financial year and a low of 3.5 percent in the 2003-04 and 2004-05 financial years. The return on assets from this operation in the 2005-06 period was 4.7%. Figure 1 below demonstrates the net profit before interest and tax on a per hectare basis generated by each enterprise for the 2005-06 period.

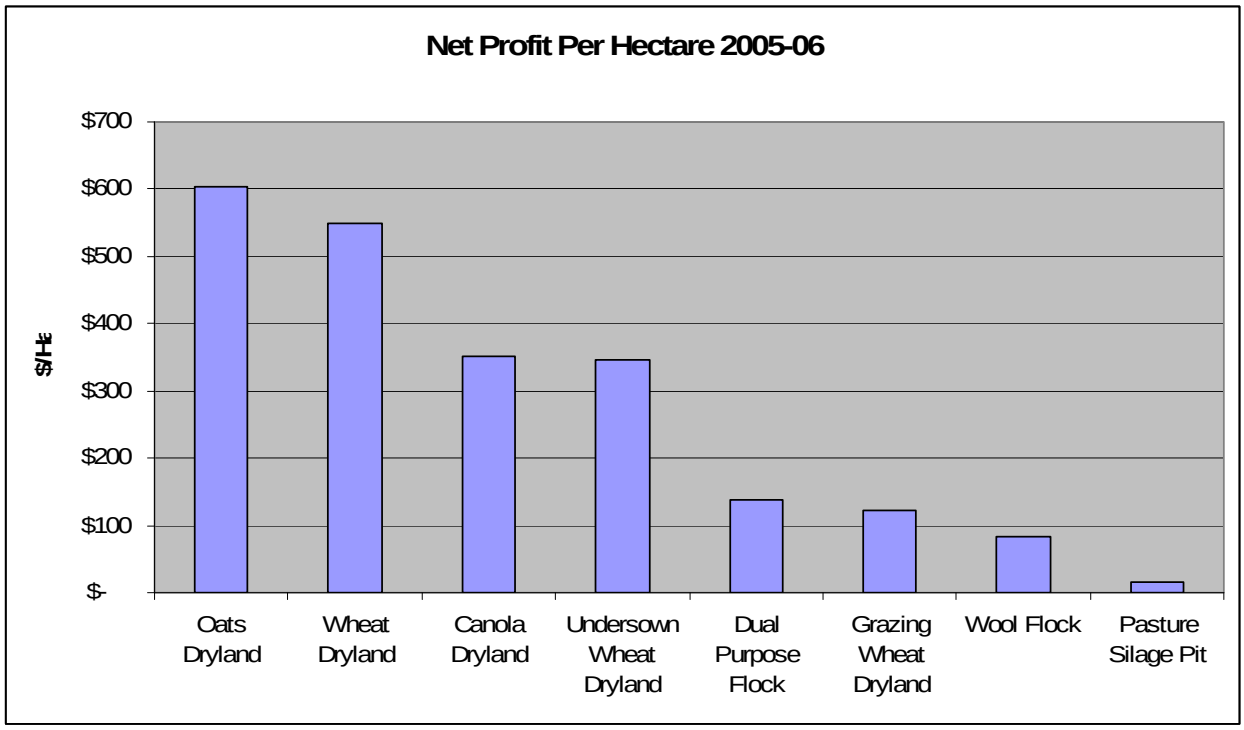


Figure 1 – Enterprise Net Profit per Hectare 2005-06

Figure 2 below demonstrates the contribution each enterprise makes to whole-of-enterprise gross margin.

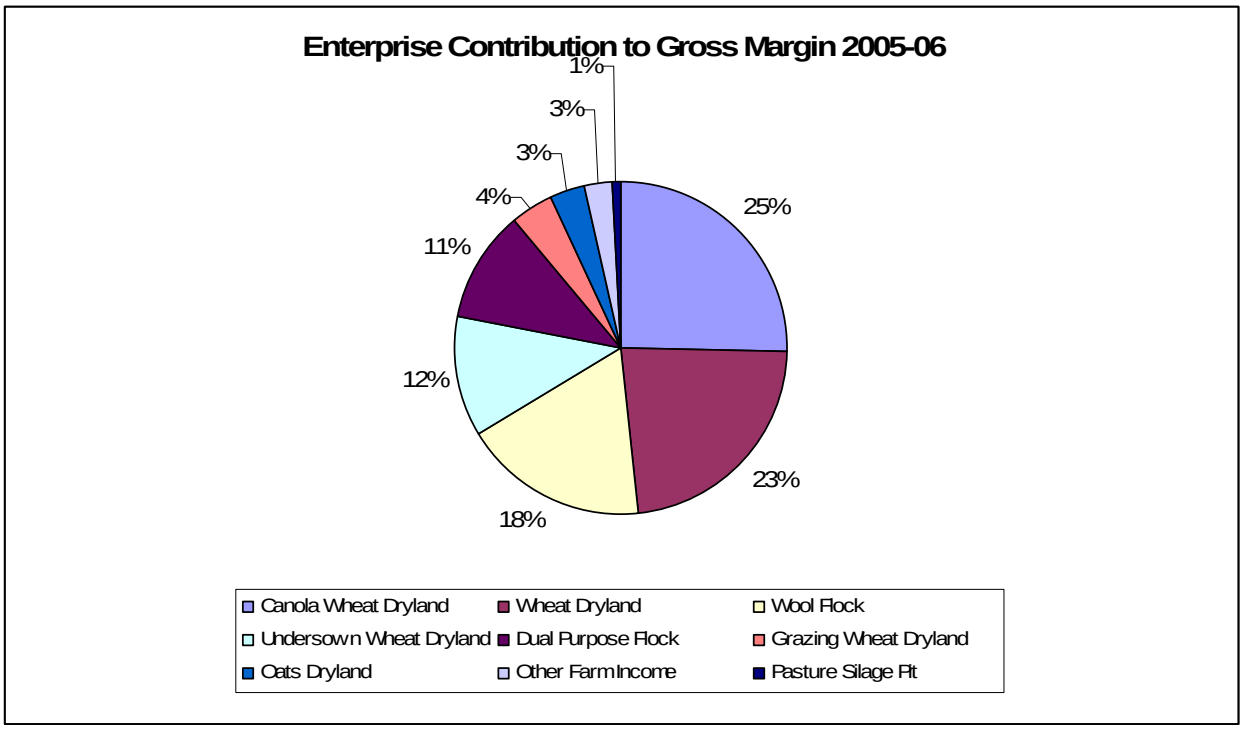


Figure 2 – Enterprise Contribution to Gross Margin 2005-06

In current conditions, the crop enterprises make a greater contribution to net profit per hectare than the sheep enterprises by order of magnitude and makes a more significant contribution to whole-of-enterprise gross margin than the sheep enterprises by a significant amount, with the wool enterprise making a smaller contribution than the dual purpose flock. Even in good seasons such as 2001-02, where the gross margin per DSE from the wool enterprise can be has much as 50 percent higher than current levels, the improvement in gross margin per hectare in the cropping enterprise that also usually occurs in a good season, significantly dilutes any opportunity cost case. While this is largely a function of price, the less optimistic outlook for wool prices when compared to grain prices, dictates the management focus.

Sheep Production

Current Flock Structure

As demonstrated in Table 2 overleaf, flocks in both the wool and dual purpose enterprise are structured according to age and in the case of the wool enterprise, micron.

Ewe Flocks	**Number of Sheep**	**Weaner Flocks**	**Number of Sheep**
1 Year Old Ewes	1900	5 Month Weaners	4600
2 Year Old Ewes	1100	4 Month Weaners	3450
2 Year Old Ewes	387	**Total Weaners**	**8050**
3 Year Old Ewes	962		
3 Year Old Ewes	817	**Ram Flocks**	
4 Year Old Ewes	912	2 and 3 Year Old Rams	60
4 Year Old Ewes	917	Mixed Age Rams	82
5 Year Old Ewes	660	**Total Rams**	**142**
5 Year Old Ewes	850		
6 Year Old Ewes	1468		

Total Ewes	**9973**		

Table 5 – Current Structure of Sheep Enterprises

Up until the last two years, the enterprise has also operated whether flocks. However, these animals were culled due to the poor seasons.

The average annual stocking rate of the wool and dual purpose enterprise is 14.2 DSE per hectare and the mid winter stocking rate is 16.2 DSE per hectare. Mobs are grazed on Lucerne based pastures on a block rotational grazing system, which is believed to be the most efficient method for this enterprise.

The Wool Enterprise

The gross margin per DSE generated by the wool enterprise has been as high as $31.14 in 2001-02 and as low as $16.29 in 2004-05. In 2005-06 the wool enterprise returned a gross margin of $19.41 per DSE. Figure 3 demonstrates the cost components of the wool enterprise per DSE gross margin in 2005-06.

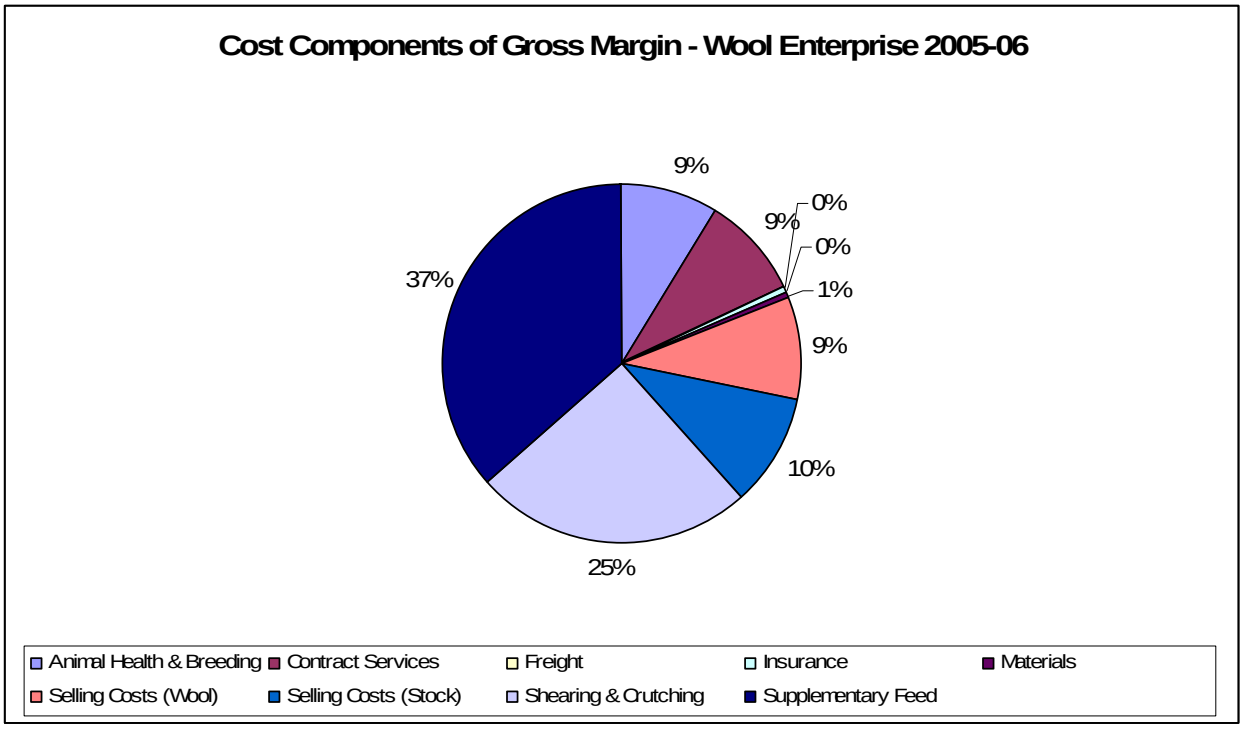


Figure 3 – Cost Components of Wool Enterprise Gross Margin 2005-06

Wages account for 20 percent of overhead expenses, with an additional 20 percent representing drawings from the proprietor.

The most significant change in the cost components of the wool enterprise has been the increase in cost of supplementary feed, which has been a function of poor seasons requiring additional feed combined with the relatively high prices of grain. This demonstrated in Figure 4 below.

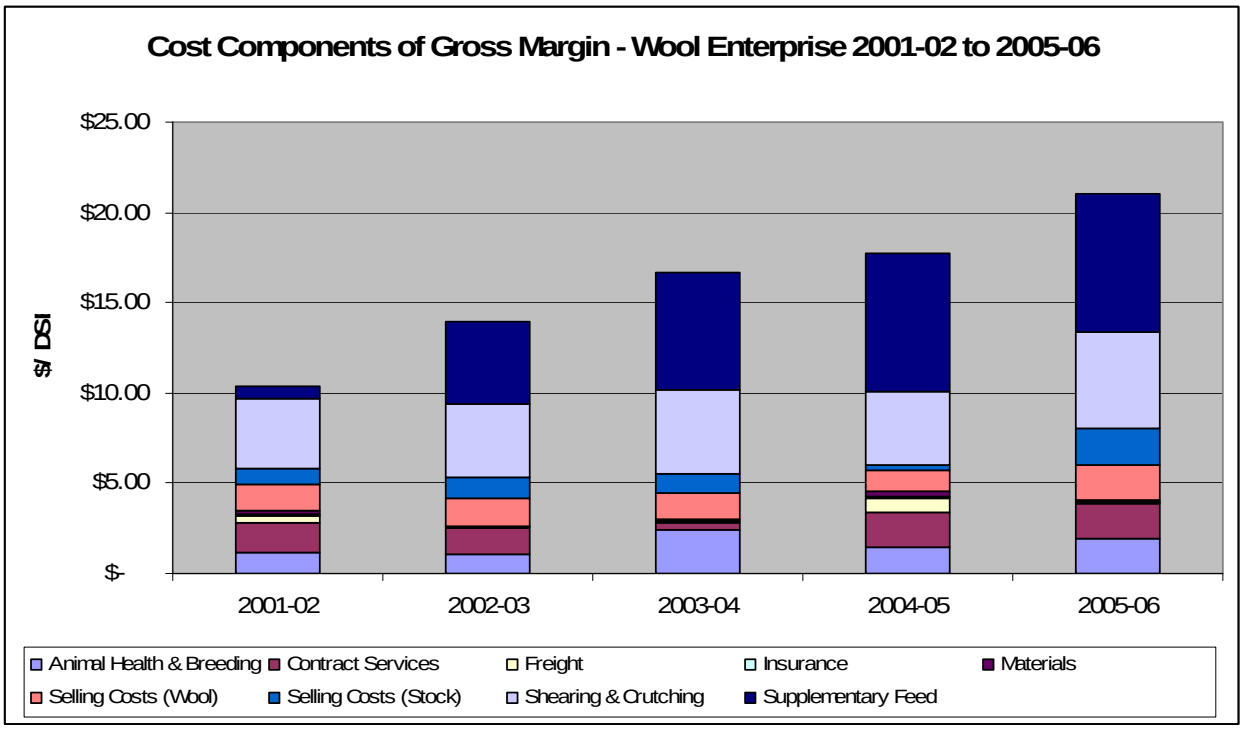


Figure 4 – Historical Costs Components of Gross Margin – Wool Enterprise

Overheads per DSE have increased by approximately 6 percent per annum over the period 2001-02 to 2005-06 driven mostly by increases in fertilizer costs which typically account for between 10 and 15 percent of total overheads and have increased by approximately 20 percent per annum and labour costs which typically account for between 30 and 35 percent of total overheads and have increased by approximately 17.5 percent per annum.

Dual Purpose Enterprise

In 2005-06 the dual purpose enterprise produced a Gross Margin per DSE of $20.11 compared to $22.04 in its first year of operation. Figure 5 demonstrates the cost components of the dual purpose enterprise per DSE gross margin in 2005-06.

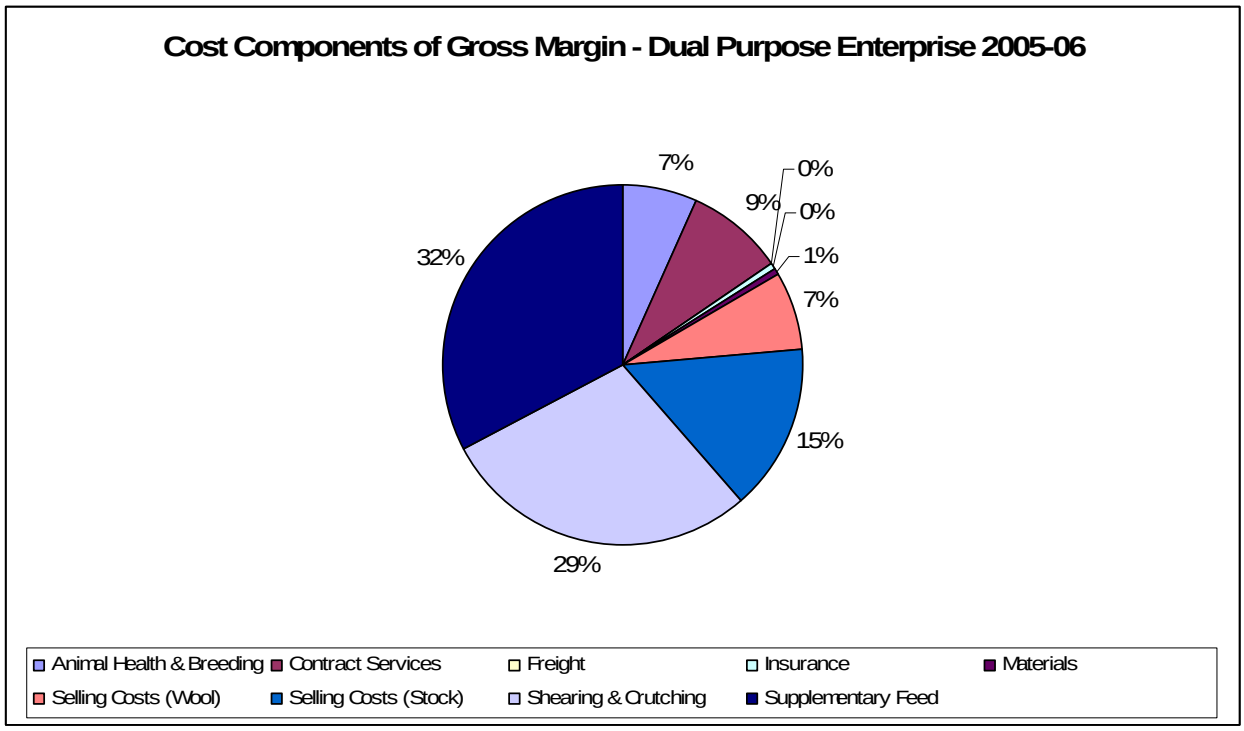


Figure 5 – Cost Component of Gross Margin – Dual Purpose Enterprise 2005-06

The most significant component of the gross margin for the short history of the dual purpose enterprise has been supplementary feed and increasing shearing and crutching costs. This is demonstrated in Figure 6 below.

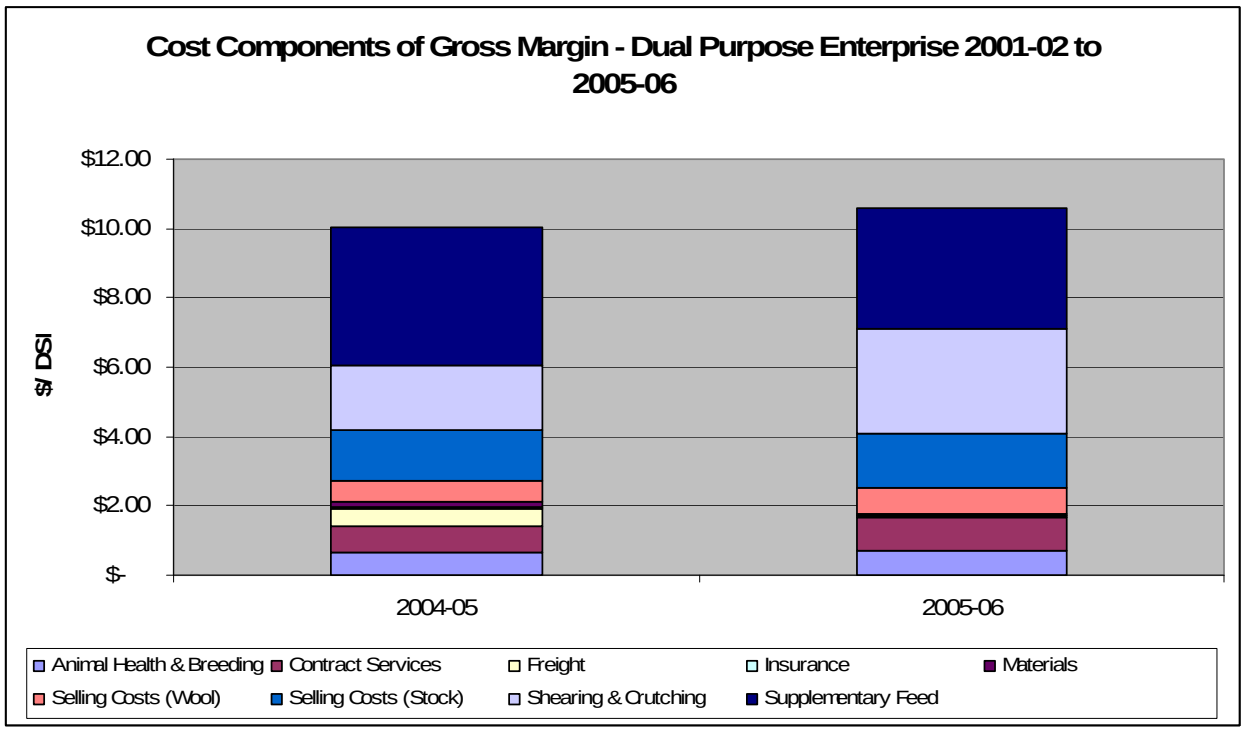


Figure 6 – Historical Cost Components of Gross Margin – Dual Purpose Enterprise

Overhead costs associated with the dual purpose enterprise have remained constant. However the labour component of the overheads associated with the dual purpose flock is lower than the labour component for the wool enterprise accounting for 9 percent and 12 percent of overheads in each year respectively.

Selection Practices

Historically, high index merino rams have been selected, with a strong emphasis on micron and stable fleece weight and body weight. With respect to the dual purpose enterprise, high index Poll Dorset rams have been selected with a focus on meat production.

It is intended that once the dual purpose enterprise is established, more emphasis will be given to reproductive traits. However, improvements in reproduction traits must be associated with profitability factors such as additional lambs being efficient feed converters. There are also some corollaries associated with selecting for reproduction. For example, while high birth weight improves lamb survival, it can cause dystocia, resulting in losses of lambs and ewes. If this is the case, lower birth weights would be preferable.

Importance of Lamb and Weaner Survival

Profit drivers are the main focus of management interventions on this enterprise.

The animal welfare case for lamb and weaner survival is certainly becoming a greater concern to management. However, the main profit driver in a merino enterprise is stocking rate rather than lambing percentage. The economic argument for managing for greater rates of survival is slightly stronger in a prime lamb enterprise and as such, is likely to become a more important issue for this enterprise as it migrates to a pure dual purpose flock.

High prices for supplementary feed adds significantly to the cost of livestock nutrition programs, particularly in poor seasons when additional supplementary feeding might be required. Furthermore, when grain prices are low, management tends to opt to store grain.

However, lamb and weaner losses appear to be less of a problem in dual purpose enterprises and as such, if lamb and weaner survival becomes a welfare issue, this will further justify the decision to migrate to a pure cross-bred flock.

Causes of Lamb and Weaner Loss and Management Interventions

This enterprise does not acquire or maintain conception data. For the period 2002-03 to 2006-07 the wool enterprise has achieved an average marking, weaning and survival to June the following year of 95 percent, 92 percent and 87.5 percent of ewes joined respectively. As demonstrated in Figure 7 below, in most years losses have been relatively proportional between joining and marking, marking and weaning and weaning and June the following year. The exceptions have been 2003-04 when there were negligible losses between marking and weaning and in 2005-06 where there were disproportionately higher percentage of losses between weaning and June the following year. 2005-06 was characterized by a particularly bad autumn and is expected that this would have contributed significantly to the higher losses.

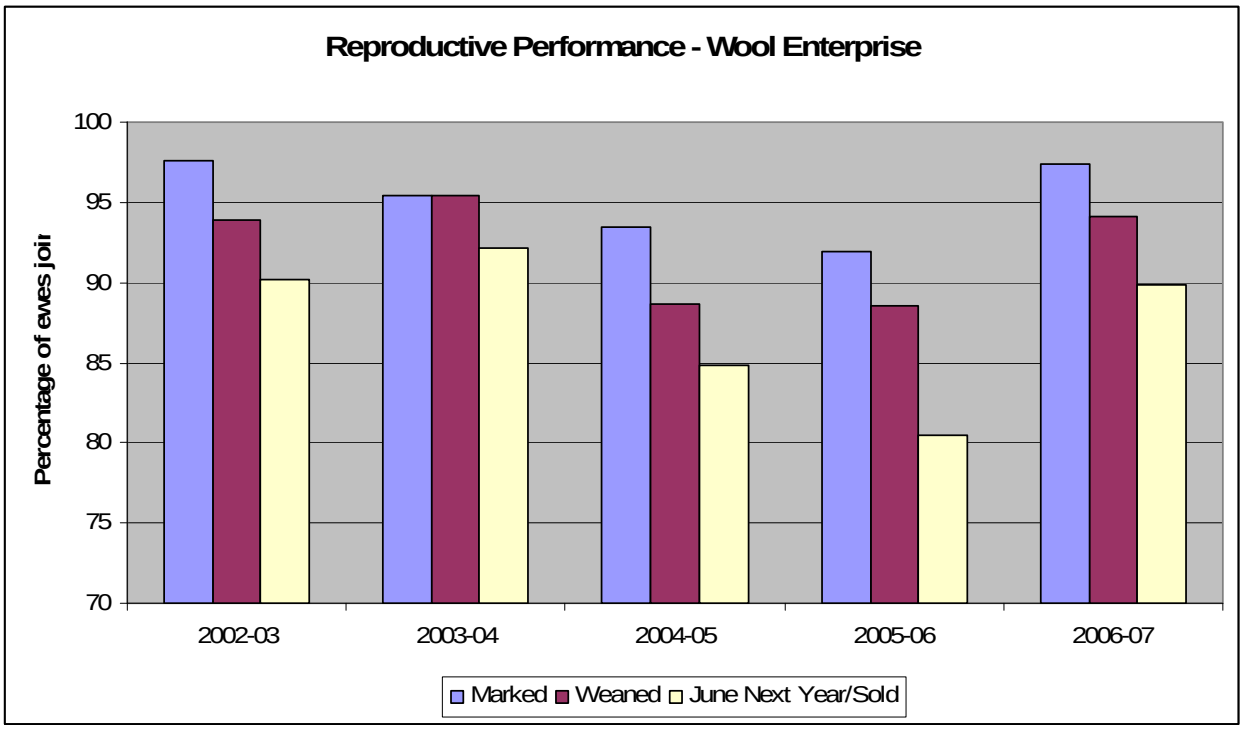


Figure 7 – Reproductive Performance – Wool Enterprise

Losses between marking and weaning are proportional between all age groups, with the poorer reproductive performance of maiden ewe flocks significantly impacting on the overall reproductive performance of the wool enterprise. This is demonstrated in Figure 8 below.

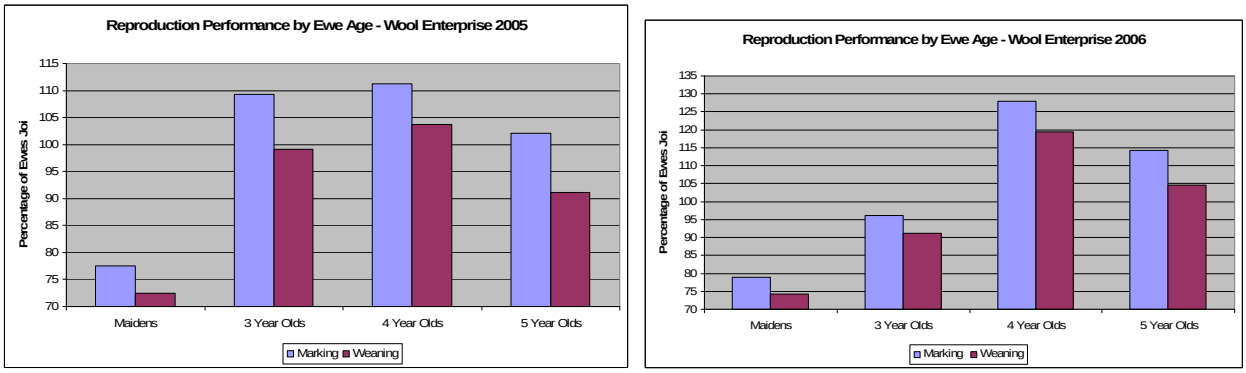


Figure 8 – Reproductive Performance of Age Groups – Wool Enterprise

Dual Purpose Enterprise

For the period 2004-05 to 2006-07 the dual purpose enterprise has achieved average marking, weaning and survival to June next year rates of 107 percent, 106 percent and 104 percent of ewes joined respectively, which is indicative of higher rates of twinning, a more robust lamb and better maternal traits that are typical of cross-bred ewes. As demonstrated in Figure 9 below, the losses at each stage have been relatively proportional.

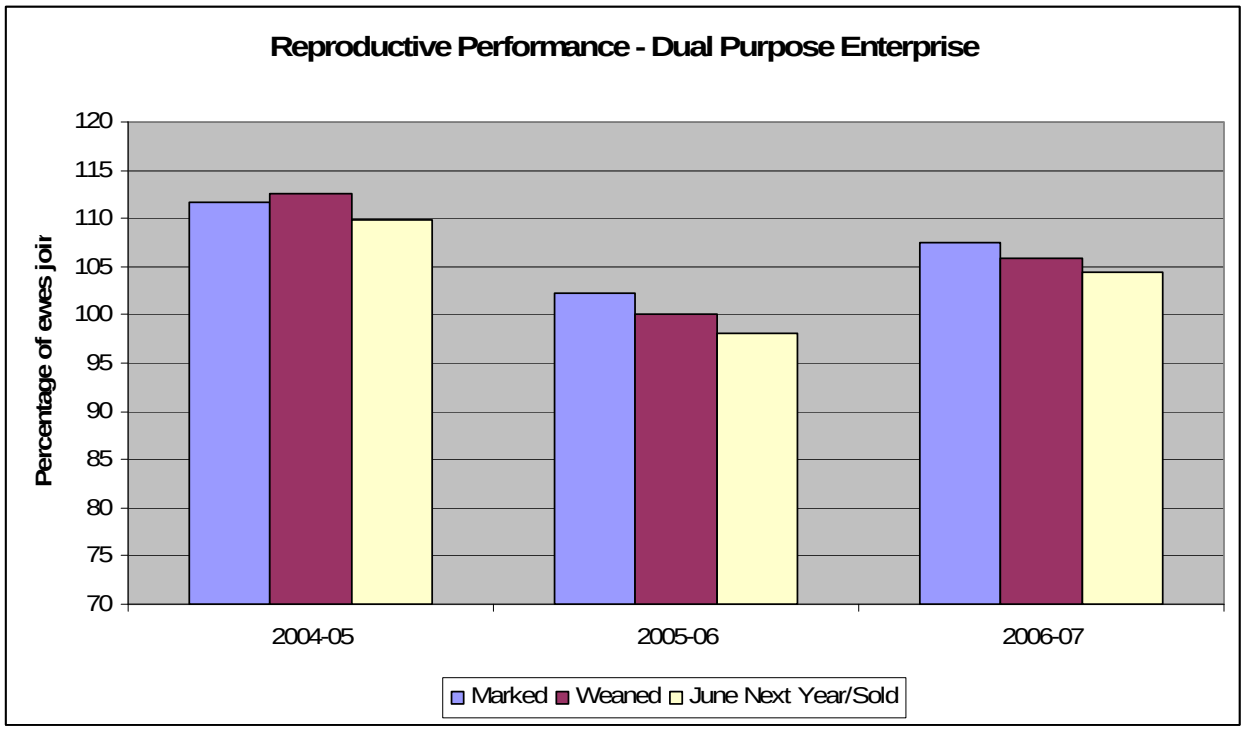


Figure 9 – Reproductive Performance – Dual Purpose Enterprise

Losses between marking and weaning are proportional between all age groups, with the poorer reproductive performance of maiden ewe flocks significantly impacting on the overall reproductive performance of the dual-purpose enterprise. This is demonstrated in Figure 8 below.

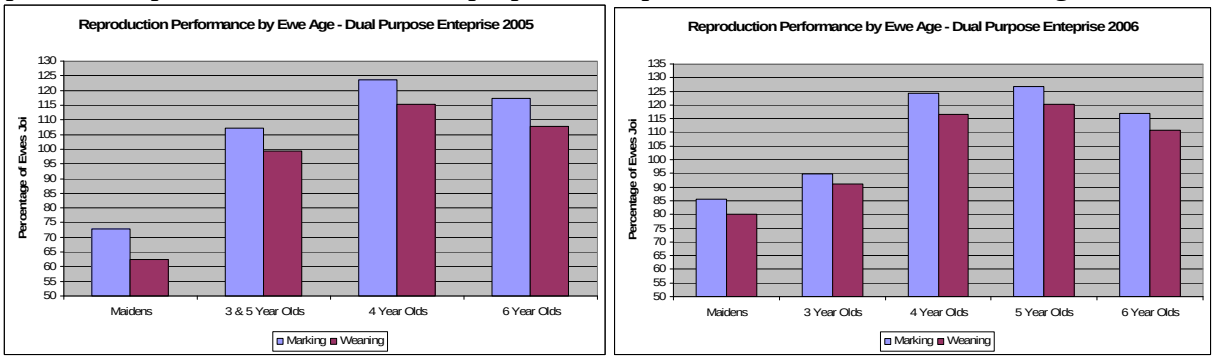


Figure 10 – Reproductive Performance of Age Groups – Dual Purpose Enterprise

Observations on Reproduction Cycle

Pre-joining

Enterprise management attempt to maintain ewes in reasonable condition throughout the year as it is difficult to recover a ewe that is in bad condition. The target for joining is condition score three or better and this assessed visually, as it is considered unnecessary to physically measure each ewe. Ewes are placed on a lupin based nutritional regime one week prior to joining.

Prior to joining ewes are classed according to micron. During this process, ewes with udders in poor condition are culled.

Management attempted weighing individual sheep some years ago. The data produced from this activity was useful, but did not justify the additional labour input required. The application of

electronic tagging system to overcome the labour issue was examined. However, it is believed there is currently not an adequate business case in terms of return on investment to justify the installation and use of such a system.

Joining

Rams are maintained in the best possible condition and fed lupins for a few weeks prior to joining. Rams are checked for faults during the weaning process.

A raming percentage of 2.0 percent is used on maiden ewes and 1.25 percent on older ewes. Ewes are joined for a period of five to six weeks without teasers and maiden ewes are joined at between 19 and 20 months of age.

Lambing is timed for early September for the merino flocks and mid August for the cross-bred flock.

Pre-lambing

While conception data is not gathered, management believes there are minimal losses between conception and lambing and have not had any evidence of abortive loss for a long time.

Ewes are not scanned in the merino flock because, unless lambing percentages are very low, it is sub-economic to do so. Maiden cross-bred ewes are scanned to ensure only high fertility ewes are being drafted into the prime lamb operation.

Ewe condition is continually monitored visually throughout pregnancy. Management has not been convinced that the increased accuracy that can be obtained from weighing or physically condition scoring justifies the additional investment or labour input required.

Dry ewes are not culled or classed prior to lambing. Historically, the operation has done quite a lot of work managing for ram and ewe fertility. However, it was found that the benefit that can be achieved from individual animal management that is above what can be achieved by the more fundamental management interventions is marginal at best. The same applies for practices such as separating twins and singles. However, it is acknowledged that this might change when the enterprise has three age groups of cross-bred ewes.

Ewes are drenched prior to lambing with a low cost drench that is not 100 percent efficacious but is adequate to get the animals through lambing. The ewes are then grazed on stubble, which is of course, a worm-free paddock. Faecal egg counts are conducted on a regular basis and the merino ewes are drenched twice per annum.

Lambing

It is understood that the main causes of loss between lambing and marking on this enterprise are:

- Starvation
- Exposure
- Dystocia

Lambing is targeted at early September for the merino flocks and mid August from the cross-bred flocks. Lambing paddocks are spelled and baited for fox baits three weeks prior to lambing. The baits are collected two days after lambing commences and approximately 300 to 400 baits are used annually. There is no local cooperative baiting program.

The better sheltered paddocks are used for lambing where possible. However, because of the block grazing strategy and the existence of large paddocks, it is difficult to provide shelter for 8,000 ewes and in any case, paddocks with the best feed is the priority selection criteria for lambing paddocks. To this effect, lambing is timed for the spring-break to give optimal chance for the best pasture growth. The target is to have 1200kg or dry-matter on ground in the lambing paddocks. However, in drought years this is difficult and supplementary feeding is required.

The lambing process is not monitored and every attempt is made to avoid causing the ewes stress.

Ewes without lambs are not culled at lambing.

Marking

It is understood that the major cause of loss at marking is injury that is incurred during the process of managing the sheep. This is particularly the case with the more ‘flighty’ merinos and can only be minimized by careful handling.

At marking lambs are vaccinated with a 6-in-1 and for OJD, as OJD is endemic in the area. Sick lambs that are unlikely to survive are destroyed and there are usually only approximately half a dozen such animals in a mob.

Lambs are mulesed at marking with tri-sulfane and clout applied to the wound. Marking is conducted in-paddock using portable yards which improves mothering and reduces infection risk associated with mulesing. Previously, some marking was conducted in the yards and as a result of infection, unacceptable losses occasionally occurred.

Weaning to First Shearing

Weaners are lost as a result of a range of causes:

- Ill thrift
- Red gut
- Worms
- Some rare cases of Coxidiosis

Lambs are weaned at approximately 13 weeks from the commencement of lambing and are administered a booster vaccination and drench. Prior to weaning, lambs are imprint fed.

While it is logistically challenging to get a worm free paddock at weaning, weaning paddocks are spelled prior to weaning. Weaners in both the cross-bred and merino flocks are drafted according to condition, as there is a strong ‘pecking-order’ in younger sheep.

CASE STUDY CRC NSW RB 05

Enterprise Profile

This enterprise operates an effective area of approximately 3,000 hectares located approximately 30 km east-northeast of Wagga Wagga. The property receives a long term average annual rainfall of approximately XXX mm and the landscape is typified by a mixture of granite hill country and alluvial river flats. The property is primarily a cattle property with supplementary wool, prime lamb and crop enterprises.

Labour

The enterprise employs 3 permanent labour units and engages contractors for all ancillary services such as shearing and crutching.

Production Goals

Historically, the enterprise has focused on wool production. Over the past 10 years the focus has shifted to cattle, a decision that has been driven by markets and the suitability of the property to cattle production from a sustainability perspective.

Eighty percent of enterprise income is derived from cattle breeding and trade. Approximately 10 percent of income is derived from wool, 3 percent from prime lamb, 3 percent from merino lambs, 2.5 percent from sheep sales and 1.5 percent from cropping. The sheep enterprise is operated primarily for the purposes of diversification and pasture management.

Non Sheep Enterprise

Currently 80% of farm income is derived from cattle and 1.5% from cropping.

NRM

The enterprise has a strong NRM focus, with an implemented tree planting program and fenced gullies. The enterprise also embraces economic innovation. Management has trialed bioclip, but found it too labour intensive as well as in-shed micron testing, but found this to be sub-economic without significant premiums for micron.
There is a plan to migrate the merino flock to Dohne merinos.

Whole-of-Enterprise Performance

During the period 2000 to 2005, the enterprise achieved an average gross margin per hectare of $231 for the merino enterprise, $251 for the cattle enterprise, $325 for the prime lamb enterprise and $121 for the cropping enterprise.

Sheep Production

Current Flock Structure

The sheep enterprise is comprised of approximately 3,500 ewes and 2,200 lambs run across five mobs. While maiden ewes are run in a separate mob, the other mobs are of mixed ages. 2,250 ewes are joined to Dohne rams and 1,250 ewes are joined to Dorset rams.

This compares to 2,900 head of cattle.
The average stocking rate for the sheep enterprise is 10 DSE per hectare. The operation uses an ad-hoc grazing strategy with partial rotation.

Selection Practices

Rams are selected using ASBVs, targeting wool traits only. The traits that are specifically targeted are micron and wool cut as these attributes are easier to control and have a far more direct impact on profitability than reproductive traits. When management changes totally to Dohnes, it is expected that there will be more focus on growth rates.

Importance of Lamb and Weaner Survival

Managing for optimal lamb and weaner survival is a relatively low priority management issue for this enterprise. There are two main reasons for this:

- The sheep enterprises account for less than 20 percent of whole-of-enterprise income and as such, generally receive less management resource. For example, managing for calf survival is a priority issue because the operation is primarily a cattle enterprise; and
- Managing for higher conception rates and lower losses at lambing is too difficult from the perspective of identifying the causes and implementing interventions and interventions at this stage yield at best, marginal economic results.

Managing for weaner survival receives a higher priority because losses can be significant at this stage, practical interventions alleviate the problem and more resource has been invested in the animal by this stage and it has a higher value.
Management is aware that lamb and weaner survival rates could be improved by increasing supplementary feeding, albeit that management questions whether this would have a significant effect on survival rate and subsequently on animal welfare. However, management decisions on this enterprise are driven by industry best-practice, particularly when it comes to animal welfare.

Causes of Lamb and Weaner Loss and Management Interventions

Sheep Enterprise Reproductive Performance

This enterprise only scans in particularly poor years when it is an imperative to cull dry ewes. In most seasons, dry ewes are maintained as they still produce wool income. As such, conception rates are not known. In years where the enterprise has scanned, misconception has been negligible. Marking rates have averaged between 70 and 100 percent and losses to first shearing have been between 1 and 5 percent lower than the marking rate. Lambs are not counted at weaning and as such, precise weaning rates are not known.
It has been observed that most weaner losses on the property are associated with parasite or fly strike issues.

Observations on Reproduction Cycle

Pre-joining

Rather than target a specific condition for ewes at joining, management attempt to keep ewes in a condition score of 2.5 or above generally. This is based on a visual assessment and in particularly bad seasons, ewes are drafted according to condition and differentially managed.
The event of compulsory electronic tags in the cattle industry has substantially increased the information available to management on individual animals and on mobs of cattle, which has been beneficial. While the same benefits would accrue for sheep with electronic tags, these benefits do not justify the investment.

Ewes are not vaccinated prior to joining.

Joining

Rams are tested for faults prior to joining. The joining percentage used for maiden ewes is 2 percent and in older ewes the joining percentage is between 1.25 and 1.5 percent. Ewes are joined for a period of six weeks. Joining is timed for a spring lamb drop.

Pre-lambing

The flock is only scanned in very poor seasons, when it is necessary to cull unproductive ewes. Even when scanning is undertaken, twins and singles are not differentially managed. Maiden ewes are visually monitored for condition and given preferential pastures and hand fed on an as needs basis. There is no differential management of merino and cross-bred ewes. Supplementary feed is given to all ewes on an as needed basis.

Six weeks prior to lambing, ewes are placed on better pastures because this supports superior follicle development.

Lambing

It is understood that most losses between lambing and marking occur as the result of exposure as the enterprise only ever observes significant lamb losses in particularly bad weather.

Paddocks with good feed and shelter are used where possible. However, calving will always take priority in paddock allocation. Baits are laid for foxes prior to lambing. The lambing process is monitored casually at a rate of between once a day and once every four days unless there is a problem, in which case monitoring is intensified.

Marking

Lambs are given a 5-in-1 vaccination and are not drenched or tested for worms. Lambs that are unlikely to survive are destroyed. Only self-replacing merinos are mulesed at marking. Marking is conducted in the paddock to minimize mothering-up problems.

Weaning to First Shearing

It is understood that the main causes of loss from weaning to the first shearing are:

- Poor nutrition
- Irritation and infection from grass seeds
- Parasites

Lambs are weaned between 12 and 14 weeks of age, depending on other priorities on the enterprise. Weaning paddocks are spelled and usually silage paddocks with some re-growth are used for weaning. Lambs are drenched at weaning and then monitored every four weeks until first shearing. Lambs are administered a booster vaccination at weaning and fly control if necessary.

Weaners in poorer condition are drafted and managed differentially until first shearing. Management has tried tri-sulfane during mulesing but found it had little impact.

CASE STUDY CRC NSW RB 06

Enterprise Profile

This enterprise operates an effective area of approximately 1400ha located approximately 50km south-southeast of Wagga Wagga. The property receives a long term annual rainfall of approximately 600mm.The topography ranges from light granite hills, gently undulated sandy loams sown to perennials down to heavier flat clay loams where the cropping is conducted. The effective area is allocated approximately 60% to livestock and 40% to crop, albeit approximately 60% of income is derived from the cropping operation.

Labour

The enterprise employs 1.75 permanent labour units & engages contractors for all ancillary services such as shearing & crutching.

Production Goals

Historically, this property has always had a self-replacing merino tradition and a smaller Angus cow enterprise. However, in 1998 when an adjacent 270 ha was purchased, a larger scale cropping program was introduced. The cropping enterprise commenced a Canola and wheat rotation with a small legume component. The cropping has facilitated a successful pasture program and the gross margins stacked up better than the livestock enterprises. To simplify management also sold the cow enterprise.
The goal of the sheep enterprise is to grow the self-replacing merino flock to 10,000 head. In recent years there has been much more focus on improving both the genetics of the flock as well as pastures. If these initiatives are both successful, the need to consider changing into a first-cross enterprise should not be necessary.

NRM

The enterprise has a strong natural resource management focus with fenced –off creeks, remnant vegeatation areas, tree planting & a drought-lot facility to be used when pastures get to approximately 70 % groundcover or require a spell to replenish carbohydrates.

Non Sheep Enterprise

Cropping – Canola and Wheat rotation.

Whole-of-Enterprise Performance

Over the past 10 years the enterprise has achieved an average return on investment of approximately 0.6 percent, with a range of 11 percent to (7.5 percent).
Figure 1 below demonstrates the gross and net profit per DSE associated with the wool enterprise for the period 1997-98 to 2006-07.

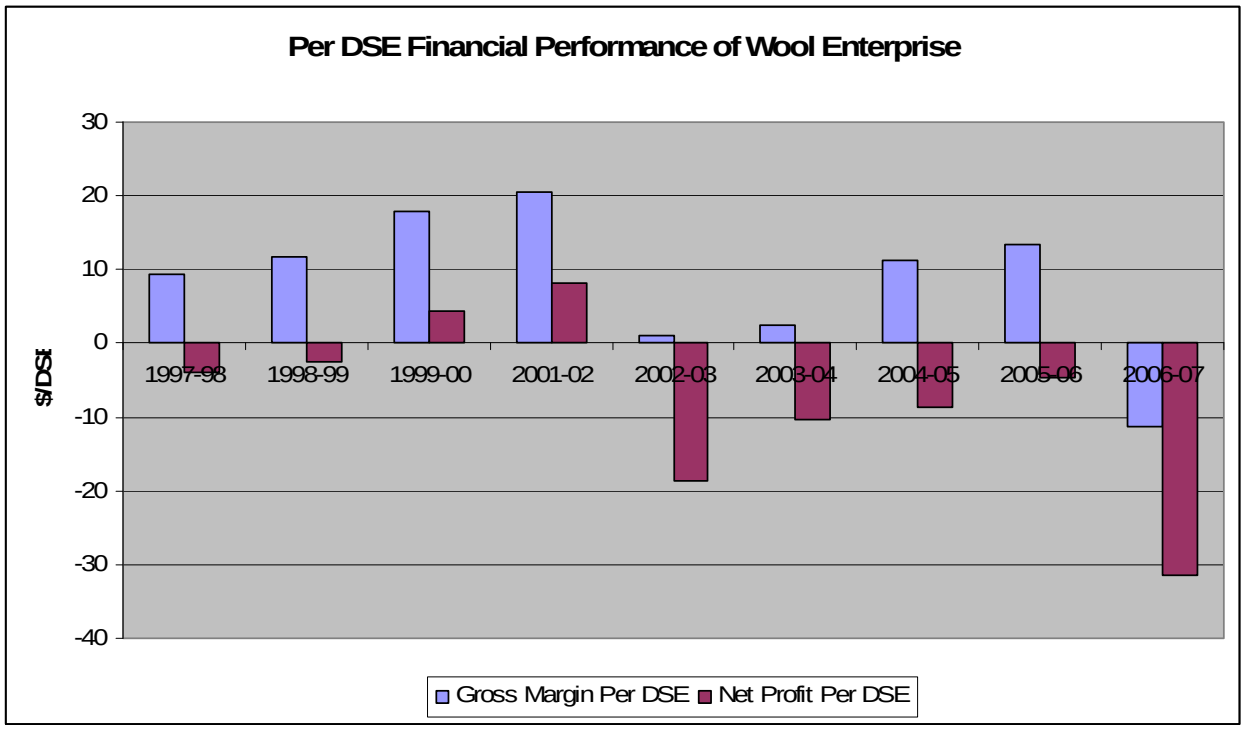


Figure 11 – Per DSE Financial Performance of the Wool Enterprise

Figure 2 below demonstrates the gross margin and net profit per hectare associated with the wool enterprise for the period 1997-98 to 2006-7.

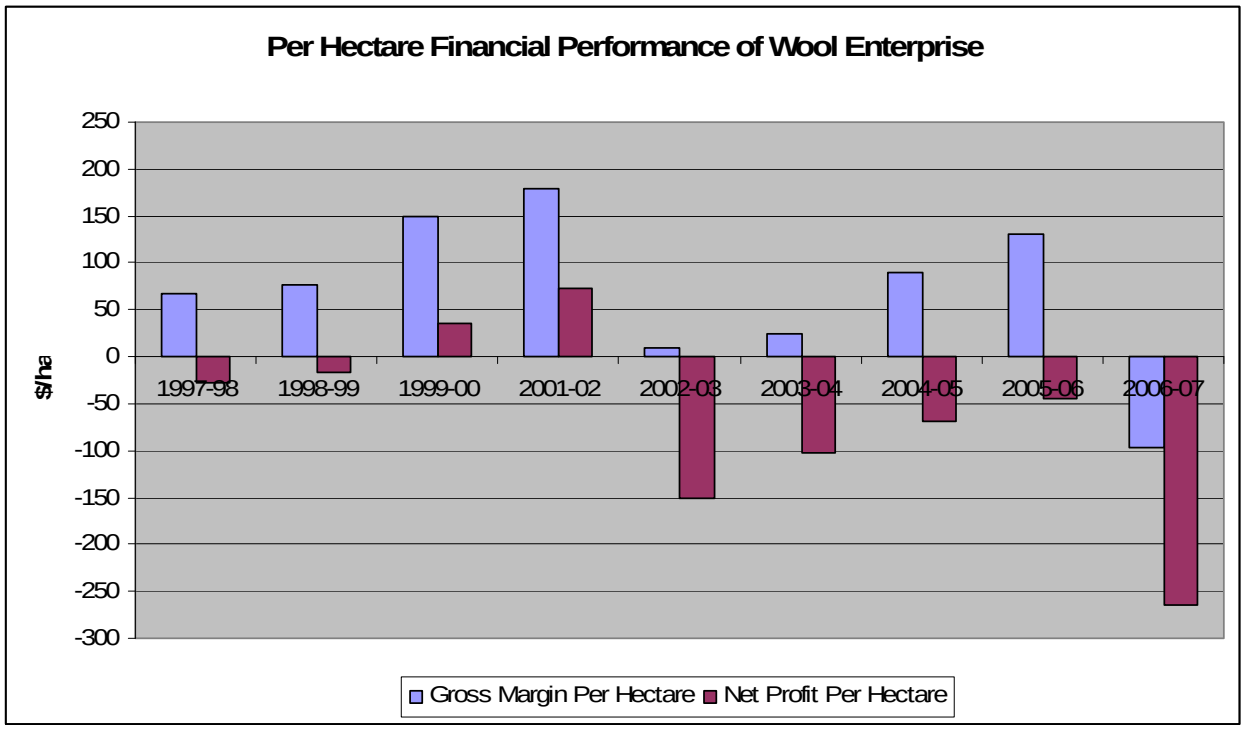


Figure 12 – Per Hectare Financial Performance of the Wool Enterprise

Table 1 below demonstrates the average gross margin and net profit per hectare for the cropping enterprises for the past five years.

Cropping Enterprise	Average Gross Margin Per Hectare	Average Net Profit Per Hectare
Canola	$237.82	$54.09
Wheat	$341.00	$180.00
Grazing Wheat	$347.55	$176.06
Triticale	$64.25	$(89.92)
Peas	$146.88	$(6.03)

Table 6 - Financial Performance of the Cropping Enterprise

Sheep Production

Current Flock Structure

The sheep enterprise is currently running 2,500 one to five year old ewes, 1000 maiden ewes and 2600 mixed sex weaners. In average or better seasons management will run 4,500 ewes, 4000 weaners (90% lambing), 1500 1year old wethers, totalling 10,000 head on 1000ha's plus stubbles and grazing crops in winter.

The enterprise operates at an average mid-winter stocking rate of 10DSE /ha with a set stocking strategy at lambing time only (mid August-end of October weaning). For the remainder of the year the enterprise runs large mobs (1000+) with a rotational grazing strategy.

Selection Practices

Current selection practices are aimed at maintaining fibre diameter at around 15-17 micron & using an index to increase clean fleece weight by 1 kilogram over next 5-10 years. Classing in the past has been based on ASVBs and will continue to be in conjunction with visual classing. The current stud ASVBs have the ability to achieve the production goals of 4 kg clean fleece weight and maintain micron. In the past management has concentrated too much on micron and inadvertently reduced fleece weight and frame size. Rams are measured every year and now classed visually in conjunction objective measurements.

Importance of Lamb and Weaner Survival

Managing for lamb and weaner survival is a high priority for the business because losses have been at an unacceptable level especially in failed spring years as bodyweights are too light going into their first summer as well as for the purposes of realising the economic impact on the enterprise from high losses due to less sales and less genetic improvement. The enterprise is currently managing for weaner losses and has set a goal of less than 5% in first 12 months as more resources have been invested in the animal by this time.

Causes of Lamb and Weaner Loss and Management Interventions

The enterprise has scanned for the past two years to identify twins and singles. Maiden ewes have been achieving conception rates of around 90% and older ewes have been achieving conception

rates of around 93-95 %. In the 2007 season, there were 10% losses between conception & lambing. About 10% of older ewes are scanned with twins and virtually no maidens.
In a average or better year the lamb marking rate is between 85 & 90% and in below average seasons lamb marking rates can be 70-75%. The lower rates usually occur after a failed spring the year prior to joining.
Losses between lamb marking and weaning are typically around 1.5%.However losses between weaning & first shearing (12 months) typically range 5-10%. Historical losses between weaning and first shearing are demonstrated in Table 1 below.

	Lambing Numbers	**1st Shearing Numbers**	**Losses**
2004	2228	2091	6.1%
2005	2401	2254	6.2%
2006	2900	2091	11.5%
2007	2267	NA	NA

Table 7 – Enterprise Sheep Losses Between Lambing and 1st Shearing

Observations on Reproduction Cycle

Pre-joining

Prior to joining, management try to get ewes to a visually assessed condition score 3. This should allow maximum single conception rates with a small percentage of twins and empties. Visual assessment is feasible because ewes are shorn after weaning, facilitating adequate accuracy. This is achieved by drafting off the tail (1 and 2 scores) and supplementary feeding or saving the best feed to allow weight gain to achieve 3 score by joining time (early March). Ewes are monitored for worm burden by using foecal egg counts and only drenched if counts are high. Rams are fed 3kg lupins per head per week six weeks prior to joining. All sheep are monitored 4-6 weeks from weaning over the summer period and ewes are monitored prior to lambing.

Joining

Rams are generally joined at 3 -4 score and feet are checked for deformities. Maiden ewes are joined at 18 months of age to the older rams at a 2% joining ratio, with older ewes joined at 1% plus 1 per mob. All ewes are joined for 5 weeks (2 cycles), timed for a mid-august lambing. Approximately 70% lamb in the first cycle with the remaining 20-25% in the second cycle. Teasers have been used in the past when Autumn lambing occurred but are not deemed important and this creates an extra job. Ewes get access to lime dumps to allow them to stockpile calcium in their bones for later use.

Pre-lambing

There are several causes of abortive loss, but it is not clear what the main causes are on this enterprise.
Management attempt to maintain ewes at a visually assessed condition score of 2.5-3 score throughout pregnancy. Maiden ewes are run separately to allow some extra frame growth. Dry ewes are not culled on the basis of being dry, only on fleece value, as past results suggest dry ewes usually conceive in the following year (i.e. nutrition seems to have a bigger impact than genetics). Udders are assessed at classing and shearing time. In the last trimester management try to have grazing wheat available for all ewes or if a tail still exists, those ewes get first preference o of quality feed. Twin bearing ewes are also run separately as their requirements are more significant. Fox baiting is carried out on an ad hoc basis, pending fox number predictions. Ewes are all vaccinated with 6-in-1 2weeks prior to lambing & drenched if required.

Lambing

It is understood that the main causes of losses at lambing are exposure, fox predation and dystocia.
Paddocks with the best shelter are selected for lambing and more importantly those paddocks are phalaris/clover based with a minimum of 1200kg/ha dry matter and 1500kg/ha dry matter for twin bearers. Twin bearing ewes are lambed by themselves and set stocked at around 6 ewes/ha. All single bearing ewes are set stocked at around 8 ewes/ha. The enterprise usually achieves 150% lambs in twins.
Management does not interfere at lambing time and usually check ewes once or twice weekly on the assumption that too much interference may create more problems such as mis-mothering, especially in maidens.

Marking

Losses are minimal between marking and weaning and the main cause is believed to be infection associated with mulsing.
At marking lambs are administered a 6-in1 vaccination as well as ear tagging, ear marking and a Guidar vaccination. All lambs are mulsed, tail docked with hot knife and males castrated with rings. CLICK is applied on the mulsing cut. Marking is carried out in portable yards in the paddocks to reduce the risk of infection and mis-mothering and to reduce the stress on the lambs.

Weaning to First Shearing

In the past weaner losses have reached unacceptable levels for management and it is understood that the main causes of weaner loss on this enterprise are:

- Grain poisoning by introducing weaners onto grain too fast;
- Poor balance of silage & grain whereby the weaners become full on silage (low energy) and as such do not eat adequate grain (high energy) to get the nutrition they require resulting in malnutrition.
- Misadventure, particularly getting stuck in dams.

Lambs are weaned at between 8 and 13 weeks of age (youngest through to oldest) and the group is predominantly 11 to 13 weeks of age as approximately 70% of ewes lamb in the first cycle.
Lambs are imprint fed grain twice weekly for two weeks before weaning. At weaning or soon after, all lambs are weighed and drafted accordingly to a cut off weight. Lambs that are 20 kilograms or below in weight are given the best feed available (such as Lucerne).
Lambs are given their booster vaccine at weaning and in 2006 were given a vitamin A,D and E injection. Lambs are monitored for weight every four to six weeks, especially over the first summer. Lambs are also monitored for worms with feocal egg counts undertaken at similar intervals.
Management also draft-off ewes that are two score or lee to attempt to achieve 3 score by joining.

CASE STUDY CRC NSW RB 07

ENTERPRISE PROFILE

This enterprise operates an effective area of approximately 1,735 hectares located approximately 50 km northwest of Wagga Wagga. The property receives a long term average annual rainfall of approximately 450 mm and the topography of the property is characterized by undulating red-brown loam that is lacking in magnesium and calcium and as such, requires regular application of lime. The effective area is allocated approximately 60 percent to wheat, canola, barley and lupin production and 40 percent to sheep production. The sheep enterprise is primarily a merino flock with a small number of culled merino ewes joined to Poll Dorsets for prime lamb production.

Labour

The enterprise employs 2 permanent labour units and engages contractors for all ancillary services such as shearing and crutching.

Production Goals

The enterprise is equally focused on crop production and wool production, with the primary purpose of the prime lamb operation being to obtain increased productivity from sub-optimal merino ewes. The focus of the wool enterprise over the past five years has been to decrease micron and increase fleece weight. This has been implemented with the assistance of a local stud and sheep classing expert.
Management is typically consumed with cropping activities during April, May and June which conflicts with additional tasks that might be required to manage the sheep enterprise. As such, management are seeking actions that improve performance but make managing the sheep enterprise easier.

NRM

From a natural resource management perspective the enterprise has historically undertaken some tree planting. However, this has ceased because adverse seasonal conditions and drought has resulted in a poor survival rate of planted trees. Furthermore, the possible obstruction to future production that might occur as a result of not being able to remove trees once they are established serves as a deterrent to planting trees.

Non Sheep Enterprise

Crop production e.g. 60 percent to wheat, canola, barley and lupin and 40% sheep

Whole-of-Enterprise Performance

On average, the enterprise achieves a return on assets of approximately 2 to 3 percent.

Sheep Production

Current Flock Structure

The sheep enterprise is comprised of approximately 2,000 ewes, 1200 wethers and 1700 merino lambs in a self-replacing merino flock with an additional 600 culled merino ewes joined to Poll

Dorsets for prime lamb production. The sheep are managed across five mobs. Traditionally, the mobs have been managed according age groups. However, more recently the age groups have been mixed and there are plans to start managing mobs according to micron.
The enterprise does not manage according to a formal stocking rate, but stocks the enterprise based on an estimate of what management believe to be the number of sheep that the enterprise can carry in a given season and this estimate is based on their long-term experience with the property. The enterprise is currently carrying approximately 2.5 sheep per hectare. Grazing is managed according to set stocking because once the crop is sown, sheep occupy all remaining paddocks.

Selection Practices

Rams are acquired on the advice of a local stud and sheep classer whom do not select on the basis of EBVs. The objective has been to reduce micron, increase fleece weight, maintain body size and lambing percentage. Over the five years the enterprise has been taking the stud and sheep classing experts advice, average micron has reduced from 23 to 20.

Importance of Lamb and Weaner Survival

Management are satisfied with their average lamb and weaner survival rates and only become concerned enough to take action when something goes significantly wrong. Management are of the view that there is a significant amount of variation in things that can go wrong when managing reproduction. For example, in the mid-1990s, the enterprises suffered considerable losses as a result of a *campylobacter* infection. In another year, neighbours suffered considerable losses as a result of pneumonia. Because of the wide range of factors that can effect lamb and weaner losses it is not only difficult to manage, but specific management interventions designed to prevent one problem can't guarantee that there will be losses from another problem.

Sheep Enterprise Reproductive Performance

Causes of Lamb and Weaner Loss and Management Interventions

This enterprise does not scan the merino flock for three reasons:

- There are not adequate paddocks for the differential management of twins and singles;
- Dry ewes are not culled because they still produce wool income; and
- Management is comfortable with its current lambing percentage and does not see value in investing in such interventions to try and achieve an incremental improvement.

However, maiden ewes that are culled into the prime lamb operation are scanned and conception is only approximately 50 percent due to the maiden nature of the ewes joined to the Dorsets conceive. The ewes that failed to conceive are then rejoined in February and conceptions rates of 70 percent are achieved.
Historically, the self-replacing merino flock was lambed in April and achieved an average marking rate of approximately 70 percent. In 1996, management changed the time of lambing to August and since then, the average marking rate has been approximately 97 percent. In the recent drought years however, average marking rate has fallen to approximately 85 percent.
While lambing is not routinely monitored, monitoring was undertaken in one year. In that year, 30 percent dead lambs were collected and the enterprise still achieved a marking rate of 100 percent.
The enterprise maintains data relating to marking and first shearing and in some cases, weaning. In 2005, the enterprise achieved a marking rate of 79 percent. Table 1 below demonstrates available data for 2006 and 2007

	No. Ewes Joined	Marking		Weaning		1st Shearing	
		Number	% of Ewes Joined	Number	% of Ewes Joined	Number	% of Ewes Joined
2006	1850	1740	94.0	1714	92.6	1700	92.0
2007	1850	1600	86.5			1562	84.5

Table 8 – 2006 and 2007 Lamb and Weaner Survival Data

Observations on Reproduction Cycle

Pre-joining

Management does not undertaken any formal weighing or scoring of ewes. Ewes are maintained in the best possible condition given the season and usually grazed on a stubble paddock immediately prior to joining. Supplementary feeding is only undertaken if absolutely necessary and this is determined if the sheep are visibly in very poor condition. No other intervention is undertaken with respect to ewes prior to joining.

Joining

Rams are checked in October when the classer is classing maiden ewes and are managed for good condition where feed availability allows. In September the classer also undertakes crutching, drenching, rump sampling, micron testing, footpairing and vaccination. A joining percentage of 1% plus 1 is used for older ewes and 2 percent for maiden ewes. Ewes are joined for six weeks and joining is timed for Spring lambing.

Pre-lambing

There is no differential management of maiden ewes or between the prime lamb and wool flocks. Ewes are inoculated with a 6-in-1 vaccine one month before lambing in conjunction with shearing. Dry ewes are not culled because marking rates are approximately 100 percent and dry ewes still produce wool income.

Lambing

It is understood that losses at lambing can be as high as 30 percent and this is acceptable given the nature of the causes – lambing sickness in ewes, mis-mothering and still-births.

The lambing process is monitored daily at the beginning of the lambing process and then every second day once it is underway. The paddock available with the best feed is chosen for lambing. In poor seasons where supplementary feeding is applied, acid salts are added to the feed to assist the ewes in drawing calcium reserves from their bones. This supplements the calcium deficiencies in the soil that is characteristic of the property.

Fox baiting is undertaken occasionally, but not routinely.

Marking

It is understood that very few lambs are lost between marking and weaning (less than 1 percent). At marking lambs are given a 6-in-1 vaccination and mulesed. They are not tested for worms. The ewe portion of the lambs are also inoculated for OJD.

Weaning to First Shearing

It is understood that losses between weaning and first shearing are minimal (approximately 1 percent) and that the main cause of loss from weaning to the first shearing are the lack of robustness in individual animals that can results in starvation and disease in weak young sheep. Irritation from grass seeds can also be problematic.

At weaning lambs are drenched, given a booster vaccination and backlined with CLICK. Clean paddocks are selected for weaning where there is no barley grass.

CASE STUDY CRC SA IM 02

Enterprise Profile

The interviewee in this case study has been involved in the operation of the farm business for approximately for 25 years. The interviewee is in his mid 40's, is single and has a secondary education.
This business operates approximately 931 hectares 7 kilometres NW of Lucindale in the Upper South East of South Australia, The property consists of approximately 460 hectares of range country which is characterised with red and white sand interspersed with stone, the remaining area of the property is heavy black soil flats. The long term average rainfall for this property is approximately 600 mm, although rainfall received has been significantly below this for the last 8 years. This area has a growing season of approximately six months.
This business operates a mixed enterprise system with a beef cattle enterprise, a self replacing Merino flock and prime lamb production. The beef enterprise accounts for approximately 50% of farm income, wool 30%, prime lambs 10% and sale of surplus sheep 10%. A small area (16ha) of wheat is being sown in 2008.
The business enterprises have changed since taking over farm with the introduction of prime lamb production, backgrounding cattle, increased stocking rate, reduced wether numbers and undertaken pasture improvement.

Labour

The business operates with approximately 1.5 labour units (which includes input by elderly father) and engages contractors for ancillary services such as mulesing, hay making and shearing. Uncertain on the percentage of time spent on sheep but estimated it could be 60%.

Production Goals

Make a decent wage
The interviewee has no personal preference towards either the sheep or cattle enterprise.

Sheep Production

Sheep enterprise goals
Good wool cut (5.5-6.5 kg/hd) and under 19 micron
Enterprise details
Sheep
'Traditionally chased wool'. Has changed focus from wool to a dual purpose flock over the last few years. Ram source has changed from 'fine wool/Victorian type' to Moorundie Park rams ('SA plain bodied, faster growing, good frame rams'). Shearers don't like shearing sheep due to wrinkle. Buying finer rams from this stud (average stud micron 21.5)
Currently shearing approximately 3000 sheep, this has reduced from 4000 due to the poor season. If 2008 proves to be a reasonable year numbers may be increased.
Current flock structure consists of 1300 Merino ewes, 800 ewe & wether hoggets and 100 Merino/White Suffolk ewes.
Cull ewes and Merino wether hoggets are sold in December/January

With the issue of mulesing some consideration will be given to changing flock structure away from Merinos if no **suitable alternatives** for mulesing are available.
Prime lamb enterprise
Approximately 550 of the Merino ewes and 100 Mo/White Suffolk ewes are mated to Dorset rams.
Merino ewe hoggets (30%) are culled on size and wool quality and used in the prime lamb enterprise.

Non Sheep Enterprise

Cattle

The beef enterprise accounts for approximately 50% of gross farm income and currently approximately 40% of the time input. This time input is generally less but the shift to opportunistic backgrounding has increased this input.
Breeding cow numbers have been reduced from 90 to 70 and went into backgrounding cattle for feedlots. Have been purchasing lightweight heifers in February/March and backgrounding to 350-380 Kg for sale into feedlots in August to October.
Cows calve in March/April. Progeny are turned off as vealers (75%) in January with the remainder grown out.

Stocking rate

Current stocking rate is 7.4 DSE/ha (calculated by consultant preparing business plan), although the interviewee thought this should have been higher.
The current stocking rate would not be increased because the interviewee believed the chance of no rains in the October to May period may increase the need for supplementary feed. He questioned the value in having to feed. Lucerne would replace supplements in better seasons over summer.

Grazing strategy

Depends on time of the year. Has a mixed system of rotation and set stocking. Cattle are not run on the flats in winter because of pugging issues.
The sheep are run in approximately 8 mobs with the Merino ewes running in age mobs (4). There are 2 mobs of crossbred ewes, 3 mobs of hoggets and a mixed mob.
Approximately 140 hectares consisting of six paddocks have been sown to lucerne over the last 10 years. A further 40 hectares is to be planted in 2008. Soil testing has indicated a need for dolomite, so this has been applied on the high sand country the year before the lucerne is sown. The lucerne is then sown in July/August and in a good year will be grazed in December.
Approximately 16 hectares of oat/ryegrass is cut for round bale silage and 12 hectares of ryegrass/clover hay is baled.

NRM

Has been planting approximately 500 trees/year on the flats.
Approximately 80 hectares of native vegetation has been fenced off.

Sources of Information

Includes Elders agronomist, PIRSA (mentioned Peter Nosworthy), seed companies. Scott attends field days and workshops (e.g. Prograze course).

Importance of Lamb and Weaner Survival

Lamb and weaner survival management

Medium to high priority but there are some things you can't do a lot about e.g. weather.

Causes of Lamb and Weaner Loss and Management Interventions

Current lamb and weaner survival issues

Does not pregnancy scan so is unaware of the conception rate. Scanning is regarded as just another job.

Average lamb marking percentage in adult ewes is 85-90%. Maiden ewes have a marking percentage of 65-70%.

A blood test survey last year indicated that his maiden ewes were positive to Leptospirosis. At this point in time the interviewee has taken no steps to address this issue, mainly because he has found it difficult to get advice. Adult ewes achieved 100% with one older mob marking 120%. Feeding silage to the ewes at mating was believed to be the reason for better lambing %.

An estimated 5% loss from birth to marking occurs. These losses are assumed to be a result of mismothering (especially in dry years when feed is limited) and/or poor weather. In 2005 approximately 15% of ewes died due to lack of feed.

Weaner losses are regarded as more important than losses elsewhere. Approximately 5% of losses occur after weaning with no obvious reason why.

Observations on reproduction Cycle

Management practices – lamb & weaner survival

Pre-joining

Rams are placed on better paddock feed (6 weeks before mating). They may also be fed silage. The ewes tend to be in good condition coming out of spring.

Joining

Ewes are joined in February with just less than 2% rams. Rams are left with the ewes for approximately 7 weeks. Interviewee believed the extra time may result in bonus of a few extra lambs.

Pre-lambing

Ewes are crutched in early May and given a Glanvac 3 vaccination.

Familiar with condition scores (completed a Prograze course) but wouldn't break mobs up based on CS. Unsure whether CS would make more money. Time was raised as a factor for not hands-on condition scoring. Visually scores sheep.

Lambing

Lambing occurs in July/August. Where ewes are grazed depends upon the season break and where feed is available. If it has rained the Merino ewes tend to be lambed down on the range country where it has more protection from the weather.

Marking

Lambs are vaccinated with a Glanvac 3in1, scabby mouth and Vitamin B12. Scotch thistles tend to cause a problem with scabby mouth.

Weaning

The Merino lambs are weaned late October/early November, given a booster vaccination, drenched into a clean paddock, and then shorn in December.

Approximately 50-60% of crossbred lambs are sold off as suckers before weaning and shearing in December.
A cobalt bullet is given to all lambs remaining on the property.

Parasites Current and Historic problems

Parasite Management
Worms are a high priority.
The interviewee was unsure of what worms are present on his property although he thought 'small brown scour worm' was the biggest problem. A feedback sheet from T&R indicated lungworm in a line of lambs in November 2007.
Appeared to have a parasite problem about 2-3 years ago so an Ivomec capsule was given to all ewes a week before lambing. This appeared to rectify the problem although he felt the capsules were too expensive.
Within the district there is an issue with sheep scouring on the pastures on the flats during July/August. This has been diagnosed as a bacterial scours, treatable with antibiotics.

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites
Introduced rams are not drenched although the interviewee asks about the drench history of the rams.
All sheep are normally given two summer drenches, the first in December after shearing & the second in February.
A drench test was done 8-10 years ago by one of the drench companies. At this stage clear drenches were ineffective. & white drenches were OK.
Sheep are rotated between sheep & cattle paddocks.
The interviewee felt that there was insufficient information available on drench testing and that simple instructions were required. Chemical companies had been providing a testing service in the past but no longer did this.
Needs to see evidence that worm counts are worthwhile then would find time to do this – just another job.
Uses combination & Cydectin drenches, rotating annually.

Practice Change and the Future

Future management of parasites
Interviewee believed that breeding was the best cost effective solution to future parasite control.
Less drenching due to the misuse of new chemicals.

Future Management of Parasites – Drenching 30%

Research would need to show a benefit before another strategy was used, including leaving proportions of mobs undrenched.

CASE STUDY CRC SA IM 04

Enterprise Profile

This case study has been prepared using the combined responses of the father and son-in-law involved in the business. The father has been involved in the operation of the farm business for over 40 years. The son in law is in 30's, and has been involved in the farm business for about 5 years.

Business Profile

This business operates approximately 800 hectares near Kybybolite in the Upper South East of South Australia. The business operates two properties, the home property ('Mullinben') consists of 500 hectares (5 kms NE of Kybybolite, just over the border into Victoria) and the other block ('Arkoona') consists of 300 hectares located 4 kilometres NW of Kybybolite.

The long term average rainfall is 525 mm.

The business operates a system with sheep, small seed and hay production and cattle on Mullinben and sheep, apples and small seed production on Arkoona. The sheep enterprise returns approximately 20 % of gross farm income and consists of prime lamb production, finishing and wool production. Of the other enterprises apples and small seed production accounts for 80% of gross farm income (40% each). Cattle tend to be an opportunistic enterprise.

Labour

The business operates with 5 labour units, this includes 3 full time in the orchard (and one more in May). Casuals (6-15 backpackers) are hired for seasonal work in the orchard. Contractors are engaged for ancillary services such as harvesting, hay making, crutching and shearing.

Production Goals

Business Goals

Maximise profit through intensification.

Currently installing another pivot irrigator (replacing flood irrigation). Also proposing to increase area of apples.

Sheep Production

Sheep enterprise goals

Increase lambing percentages

Sheep are last on the priority list basically from an economic point of view.

Enterprise details

Sheep

Prime lamb production from 1600 Mo/BL ewes and Dorset terminal sire. All MO/BL ewes are purchased annually in from the Naracoorte first cross ewe sale in November

There is some but generally minimal movement of stock between properties.

A further 3000 store lambs are purchased in January/February for finishing on lucerne, barley/oats, straw. A feeder yard has been established and depending on the quantity of lucerne lambs may be moved from the paddock to the yard.

Approximately 320 hectares are allocated to the sheep enterprise.

Dorset rams are purchased from one stud and selected visually – not sure if stud uses Lambplan.
Small seeds & hay
150 hectares are irrigated at Mullinben for small seed production (lucerne and sub-clovers)and hay (small & large bales) and 150 hectares at Arkoona for lucerne and oats for lambs.

Non Sheep Enterprise

Apples
Apples have been grown since 1993 with currently 120 hectares of apple trees. Picking occurs in early March/April. Thinning occurs in November/December with pruning occurring throughout the year. With dedicated labour there is minimal impact on other enterprises.
Cattle
This is an opportunistic enterprise, currently have 4 head of cattle. Normally have about 100 head on the property.

Stocking rate and grazing strategy

Ewes are set stocked at approximately 10 DSE/hectare during lambing and strip/cell grazed post weaning from September to November.
Mob size is approximately 500.
Grind the teeth ewes at about 4.5 year old and keep until 5.5 year old.

NRM

Some fencing of creeks has been carried out. Have cleared some larger trees clearing land for centre pivot this has been offset by planting trees on fencelines and establishment of a treelot.

Sources of Information

Talk to a range of people including stock agents, Agronomists, apple consultant
Read Stock Journal & books.

Importance of Lamb and Weaner Survival

Current lamb and weaner survival issues

Lambing percentage is regarded as paramount. However, lambing percentages on this property are already relatively good.

Causes of Lamb and Weaner Loss and Management Interventions

Lamb and weaner survival management

Conception rates – 95% (older ewes)
Abortive losses – unsure (maybe 1-2%)

Lambing

Weather conditions (cold snaps) are responsible for a loss of 10-20% of lambs at birth.

Marking to weaning

Minimal losses occur between birth and weaning although handfeeding post lambing is an issue with multiple births. Lamb losses are a high priority within this enterprise. Ewes are placed in sheltered paddocks
Lose 1-2% of finisher lambs on introduction to feedlot/lucerne

Observations on Reproduction Cycle

Management practices – lamb and weaner survival

Joining

Rams are not given any special treatment prior to joining unless a drought year. Joining occurs in November followed by a second group on 24th December. Rams left in with ewes for 3-4 months (until crutching – 'late lamb is better than no lamb'). 2.5% rams used.

Pre-lambing

Ewes scanned for first time in 2007. Maidens 80% pregnant, older ewes only 1% dry. Comment – 'scanners in a rush, don't want to scan for multiples'. Scanning has not been done regularly as 'conception rates are good, so no need to do scanning. Its another cost and job – sheep are not highest priority.

Ewes on dry pasture until the break. Hand feed approximately 3-4kg of grain/head/week and a similar quantity of hay, although quantity dependant on paddock conditions. Feed out three times a week.

Condition of ewes is visually assessed – 'have bought a lot of lambs, so know how they look'.

Free access to lime and salt is given in paddocks to all stock over summer.

Lambing

Lamb April/May.

Currently achieving 120-130% marking percentage in adults and 70-80% in maidens.

Marking

Lambs are marked about 6 weeks after the start of lambing, followed by a second marking 6 weeks later (about weaning of older lambs). At marking lambs given a 3in1 vaccination & Vitamin B12

Used rings on tails for the first time in 2007 (rather than gas detailer) which appeared to give lambs less of a setback.

Weaning

Lambs not sold as suckers (to Safeway & Woolworths) are weaned in September (just before shearing). Given a booster vaccination.

Unsold lambs are often finished on pellets with all being sold by January.

Parasites Current and Historic problems

Parasite Management

Worms have not been an issue in the past.

Management Practices Currently used to Manage Parasite Infection

Management practices – parasites

All sheep given a first summer drench (compulsory).

A faecal egg count is done at lamb marking, weaning and before the second summer drench is due. Drenching occurs if FEC > 100 in summer and >150 in winter. Haven't had to give second summer drench to ewes for last few years – based on results.

Faecal egg count – saves time and money. Easier to collect faecal samples than to drench. Note: FEC done via a family member (who is a vet nurse) for no cost.

Drench into fresh paddocks –used ML drenches for 6-7 years – no rotation

Resistance test has not been done, although considering doing it this year.

Future Management of Parasites – Drenching 30%

Future management of parasites

Not comfortable about drenching only a proportion of a mob.

CASE STUDY CRC SA IM 12

Enterprise Profile

The interviewee in this case study has been involved in the farm business as manger for approximately 4 years. The interviewee is in 30's and has a tertiary education. Daily operational decisions are made by the manager, whilst strategic decisions are developed in conjunction with the owner. The property is owned by a professional living in Adelaide.
This business operates approximately 3,235 hectares near Willalooka in the Upper South East of South Australia. The business is composed of a cattle enterprise, Merino ram stud and small commercial sheep flock.
Property consists of undulating deep sand over clay hills (approximately 25% of property area) and sand over limestone/clay undulating country (25%) and flats (50%). The flat are composed of lucerne, silvergrass, clover and cocksfoot. The hills grow phalaris, silvergrass and primrose. Perennial pastures lucerne 25% of mix. Pure lucerne stands causing problems. Not spraying out grasses and incorporating chicory and phalaris into the stands.
The long term average rainfall is 600 mm.
The cattle enterprise contributes 55% of the gross income whilst the Merino stud 45%. The sheep enterprise consumes approximately 75% of the time.

Labour

The business operates with 4 labour units and engages contractors for ancillary services such as shearing and A.I.

Production Goals

Business Goals
Sustainably increase stocking rates through improved pastures.
Fence off remnant vegetation
Minimise erosion risk
- Aim for a minimum of 200-300 kg DM/ha over summer autumn
- Sacrificial paddocks used

Increase pasture utilisation.

Sheep Production

Sheep enterprise goals
Reduce micron to 17 (last year flock average was 18.6 microns).
Increase frame size
Develop a dual purpose sheep - using 14% index
Trialing alternatives to mulesing including shearing twice a year. Currently don't jet and extra crutchings may need to be considered.
Enterprise details
Footrot in sheep has caused major management challenges over the last few years.
Stud Merino Ram breeding

Stud has been established for 19 years and is a passion of the property owner. 1400 ewe flock
Closed flock with AI is used to introduce genetics with semen selected on visual traits as well as SGA and Central Test trial results.
Manager uses TopStud software program for recording data.

Commercial Merino Flock
Currently only 100 ewe hoggets culls from stud. The business is in the process of rebuilding this flock.

Non Sheep Enterprise

Cattle
Consists of a breeding herd of 800 Angus cows with a target of 1000. Progeny sold at about 8 months of age (315 kilogram) to backgrounders in December to January.

Stocking rate

Average stocking rate of 9 DSE/hectare (includes cattle).
Stocking rate across the property varies from 3 DSE/ha on the lighter country to 15 DSE/ha on the lucerne flats.

Grazing strategy

Set stocking/rotational system using cattle and sheep. Property has a problem with footrot therefore cattle and sheep are given a 7 day gap between grazing. Previously cattle and sheep were grazed together.
Being a stud enterprise the number of mobs varies greatly, depending on the time of year, currently there are 23 mobs.

NRM

Approximately 200 hectares of land has been allocated as a national park. Wet areas and tree lines have been fenced off.

Information sources

A breeding program consultant is used and a vet is held on a retainer for advice when required. The interviewee is extremely well networked previously working for both MLA and AWI. He sources information from friends and other producers, and uses the internet.

Importance of Lamb and Weaner survival

Lamb and weaner survival management

Lamb and weaner survival is of high importance for this business.

Causes of lamb and Weaner loss and management interventions

Current lamb and weaner survival issues

Conception - 140%.
Scanning for wet/dry – 5% dry

Abortive losses – unsure but estimates 15- 20% losses from scanning to marking.
Birth to marking - 5% losses
Weaning to shearing – 3% losses

Observations on Reproduction Cycle

Management practices – lamb and weaner survival

Pre-joining

Ewes are shorn September/October and condition scored. Ewes maintained in CS 2.5 to 3. The cost is believed to be too high to maintain them in a higher condition.
Ewes are flushed with lupins for 14 days prior to joining. A worm egg count is done.
Ewes are kept based on performance therefore some are up to 11 years of age.
Culls sold post shearing in November/December.
Rams are shorn twice a year in April and September. Maintained in CS 3.
Drench, vaccinated and given lupins pre-joining.

Joining

Aim for a minimum joining weight of 35-40 kg. Three mating groups - AI, natural (single sire – 1 ram per 150 ewes) and backups. 6-8 week joining (4week mating period, followed by a backup ram 2 weeks later for 2 weeks.).
Ewes are joined at this time only to fit in with the ram sale system and ensure sale rams are at a similar size to other studs.

Pre-lambing

Coordinated fox control program within the district before lambing.

Lambing

Lambing occurs in May/June. Lambs are mothered up at birth with all lambs being tagged with an electronic ear tag and given a vaccination (6 in 1) and vitamin B12.

Marking

Lambs mulesed. Used pain relief at mulesing last year (2007). Planning to trial clips, pain relief, mules and control (no mules) in 2008– outcome??

Weaning

Target 21 kg at weaning. Occurs approximately 6-8 weeks after marking (August/September).
Vaccinated (6in1 & B12).
Ram lambs given oats or barley on feeders.

Parasites Current and historic problems

Parasite management is regarded as of high importance, this is reflected in the stud program (individual faecal egg count testing of all lambs).

Worm Management

Adult sheep have not drenched for 18 months based on faecal egg counts.
Faecal egg counts done at weaning and monthly after weaning. Individual faecal test on all lambs when mob counts reach 350. Weaners require egg count of 330-350 before drenching.
Drench resistance test two years ago indicated ML 97-98% effective, whites/clears 80%.

Practice Change and the Future

Future management of worms includes a combination of grazing management (including pasture height to reduce larval crawl), genetics and understanding chemicals and how to use them.
The use of capsules was seen as a potential risk to increasing resistance.

Future Management of Parasites - Drenching 30%

Why not cull the bottom 30%, may increase resistance to worms. Create a worm mob which can be culled first when necessary.
Would be willing to change strategy if the benefit can be demonstrated.

CASE STUDY CRC SA SM 01

Enterprise Profile

The enterprise comprises a partnership of three brothers and their father farming land that is owned by each of the individuals, with a combined area of approximately 670 ha. Of this, approximately 160 ha are irrigated, and this resource is shared by the four partners. The subject of this case study owns approximately 180 ha of the combined area and produces second cross lambs from 1,100 first cross ewes. This case study focuses predominantly upon this portion of the enterprise.

The enterprise is located approximately 10 km east of Naracoorte in the South East of South Australia and receives an annual average rainfall of approximately 550mm. The landscape is the archetypal red gum country of the region and comprises scattered trees dominated by mature red gums (*Eucalyptus camaldulensis*) with a flat to slightly undulating aspect, and soils classified as red loams over dark clays. Approximately 40 ha (of the 180 ha) of this landscape is irrigated annually by a centre pivot, and up to an additional 120 ha (of the partnership's 670 ha) of shallow dark clay on limestone country is irrigated by flooding. Water used to irrigate is of high quality and is sourced from the shallow unconfined aquifer that underlies the region. Pumping depths for the centre pivot and flood areas are approximately 25 m and 5 m, respectively. The enterprise conducts some opportunistic cropping to produce grain (oats, barley or beans) to supplementary feed late lambs and pre-lambing ewes during summer and across the autumn break.

Approximately 90% of farm income is derived from the sale of lambs and 10% from the wool harvested from the first-cross ewes and up to 400 second-cross lambs that are retained over summer to be finished on the irrigated pasture.

Over the past decade, stocking rates have increased in the order of 15-20% as a result of increased use of phosphorus fertiliser in combination with rotational grazing.

Labour

The enterprise does not employ permanent labour from outside the family partnership. All four partners contribute during peak labour periods. Shearing and crutching is performed by contractors.

Production Goals

The enterprise is focused on producing second-cross lambs for both the domestic and export lamb markets. A focus of the enterprise over the past 10 years has been to increase stocking rate in order to improve profitability but without increasing labour requirements, and whilst achieving in excess of 100% lamb marking.

Non Sheep Enterprise

NRM

From a NRM perspective, the enterprise is reliant on a base of permanent perennial pastures. Grazing to maintain this pasture base is at the forefront of farm management. Consequently,

ground cover is monitored and maintained by manipulating stocking rates over summer using the following strategies;

- lambs are turned off dryland pasture as they are finished
- lambs unsuitable for sale at the end of spring are moved to irrigated pasture to be finished
- cast for age ewes are disposed of through the local market, and
- the breeding ewe flock is supplementary-fed over summer.

Whole-of-Enterprise Performance

Over the past 10 years the enterprise has achieved an average lamb marking percentage in excess of 100%. In most years lamb marking approximates 120%, however this has declined to approximately 100% between 2005 and 2007. This is attributed to the effects of drought in the region over this period, and the enterprise is anticipating a return to an 'average' marking percentage this year following signs of a return to a more typical autumn break.

Sheep Production

The flock is comprised of 1,100 first cross (Border Leicester x Merino) ewes mated annually to Poll Dorset rams using 4% rams. Terminal sires are bred on-property from a Poll Dorset stud flock, with both stud rams and stud ewes purchased from a leading Poll Dorset stud in the region. Stud animals are purchased with reference to Lamb Plan figures, and an emphasis is placed upon individuals exhibiting high growth rate and low fat characteristics.

Replacement first cross ewes (150 to 200 per year) are purchased annually from reputable breeders through the Naracoorte sale yards at the feature first-cross ewe sales. Maiden ewes are mated at 1.5 years and are cast for age at 9. Mobs of approximately 250 are structured on age (two age groups per mob i.e. 1.5+2.5 y.o., 3.5+4.5 y.o. etc.). Stocking rates exceed the district average (14 DSE/ha cf. 10-12 DSE/ha), and this has been achieved through increased use of phosphorus fertilisers and rotational grazing during the pasture growing season. Ewes are set-stocked for the period immediately before lambing until marking.

Selection Practices

The enterprise is focused upon producing lean, fast growing lambs suitable for supply into the domestic (trade) and export markets using both dryland and irrigated pasture resources.

Importance of Lamb and Weaner Survival

Lamb and weaner losses have not been significant problems for the enterprise, with an exception during the period from 2005 to 2007. This period has been negatively influenced by an 'abnormal' seasonal rainfall pattern, principally late opening (autumn) rainfall followed by reduced spring rainfall and an early finish to the growth period for dryland pasture. This has placed stress upon the autumn-lambing ewe flock resulting in increases in the incidence of single lambs that arise principally from the death of one individual in sets of twin lambs.

Causes of Lamb and Weaner Loss and Management Interventions

The enterprise attributes the cause of lamb deaths to a nutritionally-induced reduction in the volume of milk produced by the ewes, and an inability to source sufficient cost-effective supplementary feed supplies off-farm to alleviate the perceived nutritional deficiency post-lambing.

Predation by foxes is an additional and noticeable source of young lamb deaths. However, the owner has not noted any significant change in the occurrence of fox predation over time.

The likely development of drench resistance is noted as a significant threat to the future of the enterprise. Time (labour) is perceived to be a constraint to routinely collect samples for faecal egg counts (FEC), thus FEC is rarely monitored. Nevertheless, the owner has a good understanding of the types/species of intestinal parasites previously identified in the flock, and indicated that drenches are rotated on the basis of their class. The owner had a clear understanding of the different classes of drench and the concept of rotating drenches as a risk management strategy against drench resistance.

Management Practices Currently used to Manage Parasite Infection

Sheep Enterprise Reproductive Performance

This enterprise does not scan pregnant ewes to assess conception rates. Neither are ewes palpated manually in an effort to identify single and twin bearing ewes to target them for differential management pre-lambing. The enterprise is unable to estimate losses between conception and lambing. Moreover, the enterprise has not noted abortive-losses in the past and does not rate such losses as a significant issue.

Prior to 2005, lamb marking rates of approximately 120% were recorded annually and it is believed that nutritional issues associated with poor seasons in 2005, 2006, and 2007 are the major cause of the decline in marking rate (to 100% on average in these years).

Observations on Reproduction Cycle

Pre-joining

Prior to joining, ewes are managed to keep them in a visually assessed condition to maximize fecundity (equivalent to score 3+). Animals are not manually condition scored as the time required to assess the flock was not considered to be worth the additional effort compared to visual assessment. Ewe condition is maintained by supplementary feeding with grain (+/- lucerne hay) from early summer to and post the autumn break (depending on seasonal conditions) by making use of feed produced on the farm. Udders are not assessed and no attempt is made to cull ‘drys’. Ewes are vaccinated with a 6-1 vaccine prior to joining.

Joining

Rams are managed to maintain good condition, judged visually to an equivalent of condition score 4, and tested for faults prior to joining. The joining percentage is 4% rams to ewes. The ewes are joined for a period of eight weeks commencing in December, thus timing for an autumn lambing. Maiden ewes are joined at 18 months of age.

Pre-lambing

Ewes are not scanned so conception data is not available. The time required to scan ewes is seen as an inhibition to adopt the practice, and the enterprise perceives little additional benefit considering its historically high (120%) lambing marking rate.

Depending on the quality (condition) of maiden ewes purchased in the year, maidens and other older ewes in poor condition may be differentially managed through summer on irrigated pastures. All ewes are offered grain supplements where seasonal conditions become limiting. Ewes are drenched immediately prior to lambing.

A number of ewes are lost each year to pregnancy toxaemia, however this is highly linked to the prevailing seasonal conditions; i.e. timing of the autumn break and associated pasture availability.

Lambing

The owner believes that most losses between lambing and marking occur in the first few days after birth as a result of exposure and mis-mothering, particularly in the case of twins. Additional losses were attributed to fox predation, and dead lambs are routinely inspected for evidence of damage caused by foxes. Fox bating is not a routine practice due to the perceived risk to working dogs from baits laid on the property for any length of time.
Paddocks with the best feed and available shelter are used for lambing. Lambing is monitored by daily inspection of ewes in the paddock.
Where there are obvious incidents of mis-mothering immediately after lambing, the enterprise intervenes and will place the ewe and lamb/s in a cage in order to improve the chance of the ewe accepting the lamb/s.

Marking

Lambs are marked as close as practical to the conclusion of lambing (within 8 weeks of the last lambs dropping), and losses at marking are negligible. Ewes and lambs are drenched at marking, and lambs are vaccinated and provided with a selenium supplement.

Weaning to Sale

The main causes of loss from marking until sale are internal parasites. Lambs are generally not removed from the ewes until they are sold, or ewes are shorn in November. Approximately 70% of lambs are sold at 6-7 months of age over the hooks.
The remaining 30% of unfinished lambs are weaned onto irrigated pasture to be finished over the summer months. Weaners are provided with a long-acting anthelmintic capsule (albendazole) prior to being placed onto irrigated pastures. The enterprise values their irrigated pastures highly and makes a significant effort to only introduce 'worm-free' animals to these pastures. However, faecal egg counts are not regularly conducted on the property, and 'worm-free' status is only assumed by means of precautionary drenching with capsules.
Lambs are given a booster vaccination if they are to be moved to an irrigated pasture to be finished. The enterprise owns a set of scales and they are used to class finished lambs for sale over the hooks where there is an obvious premium available.

Summary and Analysis

Time is the major limiting factor when it comes to making and implementing changes or adopting and managing 'improved' technologies. The enterprise is profitable and manageable whilst achieving its current level of production, and there is no great desire to make minor incremental progress. Systems change would be considered desirable if productivity (profitability) could be improved by more than 10% as an outcome of implementation. Rewards for past change have been significant and measurable, for example increased applications of phosphorus fertilisers have enhanced soil fertility, stocking rates, pasture composition and farm income. There is willingness to attempt to change practices and/or adopt new technologies, but this is heavily influenced by a view to maintain a desirable work/lifestyle balance.

Sources of Information

A major source of information for decision making for this enterprise comes from traditional outlets; namely the local farm merchandise supplier, the printed news media and farming peers. The owner supplements this knowledge by working off-farm on a part-time basis (up to 2 days per week) with an agricultural agency. Consequently, the enterprise is well informed on 'best-practice' agriculture but considers the consequence of change carefully before adoption.

Conversely, the enterprise is less well informed on emerging technologies and issues, for example carbon trading, however attempts to seek information from informed sources at early opportunities.

Practice Change and the Future

Anthelmintic resistance is a high priority issue for the enterprise and is a substantially higher priority than reproductive efficiency. The relative importance of minimising anthelmintic resistance was previously highlighted when a switch was made away from white drenches to clear drenches more than two decades ago. Immediate and significant increases in productivity and post-marking lamb survival were observed during this transition and it has been an observation that has driven the subsequent early uptake of the 'drenches in rotation' concept, and the use of long-acting capsules for sheep moved onto irrigated pasture.

Risk management strategies are employed across the enterprise, for example progressive destocking over summer to maintain groundcover, and long-acting drenches for animals moved onto irrigated pastures. There is a desire to implement further strategies to limit the rate of development of drench resistance as a high priority for the future. Whilst substantial faith is placed in breeding programs to develop genetic resistance to parasite infection in the future, the enterprise is currently willing to sacrifice some productivity (circa 5%) in order to keep the current suite of anthelmintics effective for the long term.

Future Management of Parasites – Drenching 30%

The enterprise was undecided on whether it was acceptable to suffer a greater loss in production if there was a market for zero-residue products, as the current body of evidence in the market place to suggest that trade-offs between 'natural' or organic produce and reduced productivity, *per se*, is economically beneficial or sustainable is thin. However, the enterprise indicated a clear willingness to shift the mix of farming activity away from its current focus of prime lamb production to one that includes cropping on a substantial portion of the property as a means to both mange intestinal parasites and maintain/increase farm profitability.