



Sheep CRC Practical Wisdom Notes

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On-farm impacts on meat eating quality

Key points

- Meat eating quality is important for consumers' choice of lamb over other meats.
- Whilst processing effects are significant, so are on farm practices.
- Age at slaughter, nutrition and genetics impact on the quality of meat.

Introduction

Consumers assess the acceptability and quality of meat by its colour, fatness, tenderness, flavour and juiciness. Today's consumers prefer to purchase meat with low levels of external fat, but in many cases prefer to eat meat with some intramuscular fat, commonly known as marbling.



How does breed or genotype affect meat quality?

The effect of breed or phenotype is generally not large and negative impacts can be selected against, although there are some general trends.

Merinos tend to exhibit an increased meat pH, due to faster depletion of glycogen between the farm and the abattoir. This can result in meat that is less tender and darker in colour. Also, Merinos aren't as lean as commonly thought, as they lay down as much fat as the related crosses at the same weight, but it takes them much longer. Reducing the impacts of high pH in Merinos is covered in another Practical Wisdom note: Quality Sheepmeat—Merinos Can Deliver.

The Border Leicester breed tends to be inherently fatter, which is expressed in higher levels of intra-muscular fat and subcutaneous fat. As a maternal breed however, it is important to realise that increased fatness may also contribute to improved reproductive fitness.

How do particular sires affect meat quality?

Individual sires within each breed vary considerably in key characteristics that can affect meat quality. In particular, growth rate - measured as weaning weight - (WWT), carcass fatness (FAT) and eye muscle depth (EMD) are important and can be significantly improved using genetics. Sires can be selected using Australian Sheep Breeding Values (ASBVs) for these traits, with ASBVs relating to the post-weaning age most commonly used; P refers to the post-weaning age in the ASBV abbreviations.

- Selection for lower post-weaning weight fat depth (PFAT) ASBVs in terminal sires mated with Border Leicester x Merino ewes will be effective in reducing overall carcass fatness.
- Selection for high muscling (PEMD) ASBVs in terminal sires will also contribute to reducing fatness in the prime lamb offspring, however
- Selection for high muscling (PEMD > 2mm) without sufficient growth (PWWT > 6kg) increases the risk of toughness in the meat of the progeny.

High genetic potential for muscle (high PEMD) or leanness (negative PFAT) may produce progeny with low levels of intramuscular fat, which can negatively impact on the overall liking of lamb meat. Hence, some caution is required in selecting too strongly for leaner meat, both in relation to meat eating quality and possibly for reproduction in replacement ewes.

As carcass fatness increases, lean meat yield decreases. Selection for sires with high growth only will tend to increase fatness, whilst selection for eye muscle depth only will increase lean meat yield, but may lead to meat toughness. Therefore, production of lambs with high lean meat yield and meat quality requires a balance of these traits in the selection of sires. See Practical Wisdom note: Quality Sheepmeat—Selection for Growth and Lean Meat Yield.

How does age at slaughter affect meat quality?

As animals age, muscle becomes darker due to an increase in an oxygen binding pigment. For this reason, unweaned lambs (suckers) produce the lightest coloured meat, which consumers prefer. Between 12 and 14 months of age (as lambs become hoggets), muscle generally becomes darker and redder than is acceptable to most consumers. This is one reason for price discrimination in the fresh meat market.

A further benefit of slaughtering lambs at young ages, straight off their mothers, is that they produce meat with a lower pH, provided pasture quality is high enough to support rapid lamb growth. Lower pH enhances keeping quality and helps to produce a more tender meat. In leg cuts particularly, tenderness and eating quality decrease as animals age and is more apparent in animals after they have cut their permanent incisors.

For example, between lamb and yearling ages, eating quality of an easy-carve leg can decline by about 8% (or 5 index points on overall liking). Therefore, the recommendations from MLA's Sheep Meat Eating Quality (SMEQ) program, regarding the dentition and definition of lamb has not changed. See Tips & Tools: MSA sheepmeat information kit (MLA website) and also the Practical Wisdom note: Quality Sheepmeat—Taking the Mutton out of Lamb.



How does nutrition affect meat quality?

Consumers prefer meat with low levels of external fat, but some fat—especially intramuscular fat—is required for acceptable eating quality, therefore, the Meat Standards Australia (MSA) recommendation is for sheep meat to be a minimum fat score of 2. However, subcutaneous fat depth beyond fat score 2 can reach very high levels with little change in intramuscular fat (IMF) levels, indicating that expensive feeding programs to increase IMF may not be justified.

If periods of feed restriction occur, they reduce intramuscular fat. In these cases, sires with a higher PFAT can still produce progeny with acceptable quality. For example, where lambs were restricted from weaning for up to 8 weeks and then re-fed (to a carcass weight of about 22 kg), those with sires with ASBV PFAT above -1mm had higher overall liking in taste panel trials.

Nutrition, in the short-term pre slaughter, will impact on factors such as meat pH. If lambs have sub-optimal nutrition then, with the additive effects of handling stress, weather and environment change, they are at risk of depleting muscle glycogen (sugar) below the critical level. Also see the Practical Wisdom note: Quality Sheepmeat—A Brilliant Finish.

Implications

Understanding the impact of the key genetic traits that affect meat quality and meat yield will help refine the balanced selection required for prime lamb sires of the future. Heavy selection for muscling, whilst having a positive impact on lean meat yield, will have negative impacts on meat quality through meat that is tougher and likely to have lower intramuscular fat. Heavy selection for lamb growth may reduce lean meat yields and increase fat in heavy lamb carcasses.

Take home messages

- Finish animals at fat score 2 for good eating quality traits; extra fat does not provide further benefit.
- Use terminal sires that have leanness and muscle over first-cross (Border Leicester x Merino) ewes, to counteract their higher fatness.
- Where poor or maintenance nutrition is experienced at some stage in the lamb's life, provide a period of feeding to counteract the negative effects on meat and eating quality; sires with breeding values for fat above -1 mm will also help counteract negative effects.
- Use sires that are balanced in the main carcass traits of growth, fat and muscle, to produce lamb that is efficient in production, but also appealing to consumers,
- Provide Merinos with good nutrition and minimal stress prior to and during transport and lairage to reduce meat toughness and dark meat colour.

Further information

For further information visit: <http://www.sheepcrc.org.au>.

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