Beef Carcass Appraisal

By D. B. MUIRHEAD"

SUMMARY

THE system of evaluating carcasses on an objective basis is briefly described, aided by several slides.

Points of interest arising from the appraisal of several hundred carcasses during the last three years are discussed.

INTRODUCTION

In recent years there has been a considerable increase in both the amount of investigational work and in the numbers of officers in the various Departments of Agriculture and C.S.I.R.O. engaged in beef cattle production. All the southern States of Australia are for the first time engaged in beef cattle investigations.

Considerable progress can be made in handling the problems of production without examination of the final product, the carcass. In the long term, however, progress will depend upon careful carcass examination related back to the various facets of production.

Carcass assessment in Australia, and probably in most beef producing countries of the world, has been, and still is, in the hands of a relatively few specialists actively engaged in the meat industry. These specialists from long experience determine reasonably quickly and accurately by eye the desirable and undesirable features of a carcass. In competitions a point score system has been applied to this eye judgment.

Today a two-fold need exists in the industry: **The first.-A** means of confidently advising the stud and commercial cattleman of the trade requirements, and demonstrating to him the desirable and undesirable characteristics in both the carcass and the live animal.

The second.-An objective or quantitative basis for the investigator to make carcass comparisons and assessments. Whether the comparisons be breed, nutritional or yearly differences, a yardstick of assessment is required.

In 1949, whilst visiting Ruakura Animal Research Station, attention was drawn to the appraisal system of evaluating chilled beef carcasses evolved at that centre by Messrs. H. Kneebone, Auckland Freezing Co. Ltd.; T. Marks, Auckland Meat Co. Ltd.; Dr. C. P. McMeekan and Miss D. E. Walker, of the Research Station.

In this system of evaluating a carcass, 70 per cent. of the points are allotted by measurement and 30 per cent. by eye judgment. The system has been built up by taking a large number of measurements, and is designed to bring to the top the same type of carcasses as would be selected by the relatively few specialists engaged in the meat industry.

The measurement scales are tabled against a weight range, so that maximum and minimum scores are determined within each weight range.

The following table shows the distribution of points:-

By Measurement	**Points**
1. Fullness of meat (eye muscle depth)	20
2. Fat Cover (depth over eye muscle)	15
3. Blockiness (length of leg in crutch)	20
4. Balance of carcass (fore-quarters-hind-quarters)	10
5. Weight suitability	5
By Eye Judgment	
6. Rib cover (muscle and fat distribution)	5
Evenness of fat distribution	10
7. Colour and texture of muscle	5
8. Colour and texture of fat	5
9. Marbling of muscle (finish)	5
TOTAL	100

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Quite apart from the use that has been made of it in New Zealand, the system has now been used in South Australia for 3 years, and in Victoria for 5 years in carcass competitions, as well as a commencement made in its use with investigational work. In the competitions it has had a marked effect in the type and quality of animal that has been submitted by the producer and has particularly resulted in a reduction of age of entries and in the number of wastefully fat animals submitted.

In this period 5-600 carcasses have been examined and sufficient experience and data accumulated to be able to say with confidence that it has much to commend it as an exceedingly valuable tool for the extension and research worker. Working alongside men that have had considerable experience in the meat trade, including Smithfield, and who have been sceptical of its merits, it has quickly convinced them that it selects the carcass that the trade wants. Furthermore, it has sufficient flexibility to allow adjustments to meet the changing demands of the meat industry such as the present trend towards lighter weights and less fat. If these trends are firmly established it will be a simple matter to adjust the measurements and tables to fit in with the requirements of the trade.

SCALE OF POINTS BY MEASUREMENT

Blockiness

Leg length. Carcasses with a short leg measurement score well and a long measurement, poorly. This measurement sorts out the blocky compact hind quarter fleshed down to the hock. No discrimination is made between fat and lean at this measurement. Excess fat in the crutch region will shorten this measurement, however, experience has shown that a carcass that scores well because of excess fat in this region will also carry excess fat in the other parts of the carcass, which automatically precludes the carcess from having a high total score.

Fullness of Meat

Eye muscle depth. The depth of meat in the eye muscle has always been regarded as an important factor in assessing carcass quality. A good "eye" of meat and a poor "eye" of meat are easily discernible by eye judgment. By applying measurement to the depth and applying this measurement to a scale of points, accuracy is increased and relatively accurate comparisons can be made. Correct chilling of the carcass and accurate quartering are important.

Fat Cover

Depth of fat over the eye muscle is also easily determined by eye, but here again the eye judgment aided by the ruler increased accuracy and sets a standard for carcasses of different weights.

Balance of Carcass

The principle involved is that the more valuable cuts are in the hindquarter, and it, therefore, should be heavier than the forequarter. Experience has shown that the majority of carcasses under Australian conditions score full points, and it would appear that the present scale could be adjusted so that a slightly heavier weight of hindquarter is required for optimum point score. Some criticism has been levelled at this measurement on the basis of heavy hindquarter weight being achieved even in dairy breeds by excess channel and kidney fat. When this is the case the carcass is, in the writer's experience, also heavily penalised for excess fat over the eye muscle and in fat distribution elsewhere in the carcass.

Weight Suitability

Weight of joint and cut has become increasingly important in recent years in relation to consumer demand. The present scale is based on pre-war Smithfield trade requirements for chilled beef. The optimum weight range is set at 581-640 lb. In view of the increasing demand for lighter weight, this scale may now need adjustment.

SCALE OF POINTS BY EYE JUDGMENT

Little comment is needed on the 5 carcass characteristics assessed by eye judgment. Of these, colour and texture of muscle is probably the most difficult to assess due to variation in lighting in meat works. It is important that this assessment should be made shortly after the eye muscle has been exposed to the air.

Considerable variation exists in the colour and texture of fat, ranging from soft oily fats, high in colour, to bright firm fat.

In the class of animal examined to date, high scores for marbling have not been achieved unless the carcass is showing excess fat throughout. With good quality young cattle in which the meat is tender and muscle fibres small, marbling is not as important as in the older animal grown as a store and then topped up.

DOES THE APPRAISEMENT SYSTEM FAVOUR ONE BREED?

It has been said by some critics that this system favours one breed, or that it was evolved in New Zealand where the Aberdeen Angus is the dominant breed, and it, therefore, favours that breed.

It is true that the Aberdeen Angus breed has won more of the competitions than any other breed, but this is also true under visual judging systems where the breed has been equally represented. A somewhat similar situation exists in lamb carcass competitions, the majority of competition winners having been sired by the Southdown.

The results of several carcass competitions in South Australia and Victoria have shown that several breeds are capable of serving as well, or better than, the Aberdeen Angus entries.

Details are as follows:—

State	Year	Breed	Position	No. of Carcasses Competing	Points Score
S.A.	1953	Poll Hereford	3rd	79	69
S.A.	1954	Poll Hereford	= 2nd	93	70
S.A.	1954	Hereford	= 4th	93	69
S.A.	1955	Hereford	1st	136	78
S.A.	1955	x Shorthorn	4th	136	76
Vic.	1954	Poll Hereford (under 18 months)	1st	9	77
	1955	Red Poll (over 18 months)	1st	10	79

From this it will be appreciated that one should not be too hasty in condemning any one breed on carcass quality, and that good and bad types probably exist within each breed. Further, it should be appreciated that a carcass competition is designed to bring to the top and demonstrate the most desirable carcass from the trade point of view. Under such conditions where the animals are often selected two or three months before the date of slaughter, some steers become overfat whilst others remain unfinished. It does not necessarily follow that the particular breed or cross is the most profitable or the one that is best adapted to the practical conditions of production.

When the system is applied to a line of cattle of similar age and breeding from a particular property, it clearly shows the differences that exist in each individual as far as trade suitability is concerned.

Appendix I. gives details of carcass appraisal of 15 Hereford steers of approximately 22 months of age, and a report prepared by a leading Adelaide butcher of the suitability of the highest scoring carcass to the retail trade.

THE EFFECT OF AGE ON CARCASS QUALITY

It is generally recognised that high carcass quality cannot be achieved in animals that are old or animals that have suffered considerable variation in the plane of nutrition before being brought to slaughter.

Considerable attention is now being devoted to examining methods of reducing age of turnoff and economical means of eliminating these long static periods when cattle make little or no gain.

When sufficient data has been accumulated it should be possible to determine more clearly the carcass changes that result in this reduction of quality.

A preliminary analysis of some of the carcass competition data has suggested that the precise effects of age fluctuate with the season. In 1955 there was a significant difference (P.001 1 per cent. level) between the two tooth group and older cattle, a difference which was absent in the previous year. In 1954 the mean carcass scores show a non-significant downward trend with age. As yet total numbers of cattle slaughtered are insufficient for satisfactory analysis, particularly in the higher age groups.

In a similar way, when sufficient numbers are available, interesting analysis will be possible for such other characters as eye muscle depth, leg length, depth of fat over eye muscle and balance of carcass.

STUD BREEDER INTEREST

As far as stud cattle are concerned, beef carcass appraisal in Southern Australia has commenced to bridge the gap between the stud breeder, the commercial breeder and the retail butcher.

In Melbourne, where beef carcass appraisal has been used for 5 years now to assess carcass quality in the fat cattle section of the Royal Show, stud breeders have taken a very real interest in proceedings. It has created the urge to have a look inside and see what the butcher wants, and has taken some of the emphasis and glory away from the winning stud animal, outwardly symmetrical, but sometimes internally loaded with useless fat.

The big challenge to the stud breeder today is to breed weight for age on to an early maturing frame; the one proviso always being that this weight for age is meat in the right places and not fat. Keen stud breeders have discerned differences between bulls in their ability to leave progeny that lay on fat or lean.

Appraisal has also created the desire to find correlations between the live animal and the desirable carcass. How, for example, does one select a young bull that will breed desirable carcass characteristics? Weight for age is known to be important. Sires that leave high scoring carcasses are becoming known. Attention has been drawn to the conformation of the lower thigh as an indication of highly developed muscles within the carcass. That is width of the lower thigh about two inches above the hock when the animal is viewed from the side and from behind; the curve of bulge outwards of flesh on the outside of leg or thigh above the hock being regarded as a criterion for good muscle development.

IN CONCLUSION

Probably no one system of judging carcasses or assessing their value to the trade is entirely satisfactory. Quite naturally differences of opinion exist between experts employed in the trade.

The New Zealand system may have some weaknesses in it, nevertheless, it is fulfilling a much wanted need, and in its present form has made a valuable contribution to beef cattle production in Southern Australia.

REFERENCES:

I. H. Kneebone, T. Marks, C. P. McMeekan, and D. C. Walker (1950). N.Z. J. Sci. Tech. Sec. A. 31: 3-14.

APPENDIX

No.	Live Weight	Total Gain 331 Days	Dressed Weight	Eye Muscle		Fat		Leg Length		Balance		Diff.	Pts.	Weight Suitability	Rib Cover	Even Fat	C. & T. Muscle	C. & T. Fat	Marbling	Grand Total
				M.M.	Pts.	M.M.	Pts.	Ins.	Pts.	F.Q.	H.Q.									
72	1028	548	556	54	9	24	14	16	11	270	286	—16	9	3	4	7	4	3	2	66
43	1032	464	574	55	10	22	14	17[1]	6	280	294	—14	9	4	3	7	4	3	2	62
73	1028	488	558	49	6	19	11	16	11	268	290	—22	10	3	3	7	4	4	1	60
66	1024	524	548	54	10	20	13	16[1]	9	272	276	— 4	8	3	3	6	1	4	2	59
31	972	456	502	48	6	19	13	16[1]	8	244	258	—14	10	1	3	7	3	4	2	57
13	1072	524	589	54	8	23	14	17[3]	5	286	303	—17	9	5	2	6	4	3	1	57
40	1076	408	634	55	8	30	11	18[1]	5	307	327	—20	9	5	4	7	3	3	1	56
06	1148	488	638	51	5	25	14	18[1]	5	313	325	—12	7	5	2	8	4	4	2	56
32	1116	496	603	54	8	28	12	18	5	292	311	—19	9	5	2	5	3	2	2	53
37	1220	504	671	49	3	24	12	19	3	323	348	—25	9	3	4	7	4	3	2	50
68	1076	528	562	40	—	28	10	17[1]	6	275	287	—12	8	4	4	8	4	4	1	49
60	1008	468	559	43	2	33	5	16[1]	10	273	286	—13	9	3	4	8	3	4	1	49
36	1008	508	541	50	7	25	12	17[2]	4	264	277	—13	10	3	3	6	2	1	1	49
08	1120	432	607	56	9	21	11	18[3]	2	296	311	—15	8	5	1	7	2	2	1	48
04	1180	564	662	55	7	41	1	17[3]	8	327	335	— 8	6	3	3	6	2	1	3	40

SUMMARY APPRAISAL RESULTS 15 STEERS APPROXIMATELY 22 MONTHS OLD

Average Liveweight	1073.8
Average Dressed Weight	586.9
Dressing per cent.	54.6
Average Score	54.1

REPORT ON CARCASS No. 72 AS TO SUITABILITY FOR RETAIL TRADE, PREPARED BY RETAIL BUTCHER, S. H. B. WALL.

As requested, I submit my report on the body of beef delivered into my shop on Friday, March llth, 1955.

The general appearance, that is, colour, texture, shape, was excellent, being of the nuggety breed with well proportioned fat without any excess.

On cutting, the bone wastage was at a minimum because, although the body was well developed and fairly substantial, the bone structure was very small as you will see when you quiz my cutting chart.

In serving the cuts I asked selected customers to give me a report on how the beef ate in order to gauge opinion, and all were unanimous in their praise, and mostly asked for more to be saved for the week-end — **Too late.**

The various details of joints and cuts are as follows, subject to error through human frailty:-

Bodyweight ex Abattoirs 552.

First breaking up:—				
Rump and Loin	58	58	=	116
Buttocks	66	67	=	133
Crops	92	94	=	186
Briskets—				
Trimmed for salting		35		
Bone		13		
Fat		12¾		60¾
Shins				15¾
Kidney and Suet				10
Thin Flanks				14¼
Cods				8½
Tail				2¾
				547
Trimmings				5
				552
Second breaking up:—				
Bodyweight		552		
Bone	89			
Fat, including Suet	36	125		
				427
Blades—				
Whole		60		
Trimmed	45		£5	12 6
Clod meat	10		1	0 0
Bone	5			
Chuck (4 rib)—				
Trimmed	54			
Bone	12	66	6	13 0
Ribs (6 rib)—				
Trimmed	46			
Bone	10	56	6	2 8
Rumps—				
Trimmed	33½			
Bone	6½	40	6	11 3
Sirloins—				
Trimmed	54			
Wing Rib	8¼		7	17 6
Bones	13¾	76	1	0 0
Thick Flank		13	2	1 2
Topside		32	5	1 4
Silverside—				
Trimmed	32			
Gravy Beef	5½	37½	4	10 8
				10 0
Briskets—				
Trimmed for salting	35			
Bone	12¾			
Fat	13	60¾	4	4 7

	Meat	= 368¼	441	£51	4 8
Leg Beef—					
Gravy Beef		11½			
Bone		10	21½	1	3 0
Shin—					
Gravy Beef		10¼			
Bone		5½	15¾	1	0 6
	Meat	= 390 plus bone	478¼	£53	8 2
Plus—					
85 lb. bones @ ⅝d.				0	4 7
36 lb. fat @ 5d.				0	15 0
				£54	7 9
Less 2% cutting error				1	2 0
				£53	5 9

Add	478¼	
Fat	36	
Flanks	14¼	
Body	8½	
Tail	2¾	
Extra trimming	12¼	
	552	lbs.

These are fairly accurate computations, but a margin of error may exist nevertheless, but I believe that they are sufficiently accurate for the purpose of establishing a point.

The trading margin gives the trading 6¼ approximately on cost.

DISCUSSION OF PAPERS PRESENTED BY MESSRS. MUIRHEAD,' PANARETTO AND SHELTON.

Mr. BRIGGS: Could Mr. Shelton suggest any means of preventing the extensive losses in weight of cattle at Wairuna, or alternatively is anyone doing anything to reduce or eliminate these losses?

ANS.: (1) By moving young cattle from this and similar areas to improved coastal pastures at the stage when they will begin to lose weight. It must be realised that this would involve a revolutionary change in present husbandry methods. The economics of these practices would also have to be considered. (2) By pasture improvement and fodder conservation. The investigation and establishment of these practices are still in the very early stages.

Mr. MUIRHEAD: Mr. Panaretto has painted a grim picture in relation to carcass quality. It is necessary to have quickly grown cattle finished at young ages. The main fault is too much finish — too much fat which result in down grading.

Mr. PANARETTO: The Tasmanian carcasses had a satisfactory fat score but eye muscle development was very poor. Mr. Muirhead's remarks could apply to "Delatite" when the carcasses could have been marketed earlier than they were.

Dr. FRANKLIN: I think there is probably a satisfactory compromise between these somewhat divergent views on carcass appraisal as expressed by Messrs. Muirhead and Panaretto. Experimental steers from Belabula Farms have been sold at a slightly lower degree of finish than have steers from other investigational centres in the southern States, and possibly because of this have produced a carcass with a better balance between fat and muscle development. There is no doubt, however, that genetic factors play an important part in carcass quality.

Mr. SERGEANT: Belabula experience over 7-8 years has been that the carcasses of the animals produced meets the requirements of the city retail butchers. This assessment is based on the prices the butchers have paid for these carcasses.

Mr. BOTT: In my experience, based on butchers' opinions, carcass weight at a desirable degree of finish could vary from 500-650 lb. weight for steers reared under optimum conditions. This character appeared to have a genetic background and differences occurred between the progeny of different sires.