NSW DPI
primefacts
PROFITABLE & SUSTAINABLE PRIMARY INDUSTRIES www.dpi.nsw.gov.au
JANUARY 2007 PRIMEFACT 328 (REPLACES AGFACT A2.3.35)

Muscle scoring beef cattle

Bill McKiernan

Research Leader Animal Production, Production Research, Orange

Introduction

The muscle or red meat content of a beef animal is the most valuable part of the carcase. To help identify the red meat content in cattle, a method of evaluating shape termed 'muscle scoring' is used.

Muscle score describes the shape of cattle independent of the influence of fatness. Muscling is the degree of thickness or convexity of an animal relative to its frame size, after adjustments have been made for subcutaneous fat.

Muscle scores are an accepted part of live animal appraisal in Australia. The National Livestock Language includes muscle score, as does the National Livestock Market Reporting Service.

Research, both within Australia and overseas, has shown that when shape is assessed in this way it is an aid in predicting an animal's worth. The degree of muscling affects dressing percentage and meat yield in a positive way indicating the greater value of the more heavily muscled animals.

Analysis of saleyard reports in NSW and Victoria has shown a clear price incentive for better muscled cattle and an even clearer price discount for poorer muscled cattle.

This publication describes the method of evaluating animals for muscling to encourage its adoption by the industry.

Evaluating muscling

Subjective and objective measures of muscling

Muscle scoring is a subjective skill which needs to be honed by continual practice and evaluation against an experienced assessor. Muscle scoring is cheap, easy and quick to obtain but the skill of the assessor is particularly important.

Butt Profile as used in the AUS-MEAT carcase language was developed as a simplified two dimensional assessment of shape. It is a different assessment of shape, being affected significantly by fat, and cannot be compared with live muscle score.

Eye muscle area, measured by a real time ultrasound scanning device on the live animal or directly measured on the carcase (equally accurate) is an objective measure of muscling. However, eye muscle area per se is not very useful as an indicator of animal or carcase muscularity because eye muscle area is highly correlated to the size of the animal – as an animal gets bigger its eye muscle area gets bigger. It becomes more useful when considered in proportion to the weight of an animal or carcase and hence becomes an estimate of meat content.

Eye muscle area is probably of more use for breeding purposes where it can be adequately adjusted (as in Breedplan EBVs). It is expensive and slow to measure on the live animal, relative to a visual appraisal of muscle score.

Muscle or fat

Muscling can be confused with fat if assessors are not trained in distinguishing the two. Muscle bulges and is round, fat wobbles, shrouds and flattens shape (smooths out). Muscle is round and curved and animals with a high degree of muscling when viewed from behind, are thicker through the stifle area than they are over the top. A fat, less muscular animal is widest over the top and tends to appear flat down the stifle muscle when viewed from behind (see Fig. 1).

Muscling and eye muscle area

Eye muscle area and shape (at the same weight) in cattle are related to muscle score. It is not a perfect relationship but it is reasonable to expect that as muscle score increases so too will eye muscle area, at the same animal weight.

Eye muscle area could increase due to an increase in size of the animal, but muscle score could stay

the same, increase or decrease depending on the true muscularity of the animal. Muscle score is an evaluation of the proportion of red meat in the body, whereas eye muscle area is a surface area measurement of a sample muscle cross-section.

Bone

From an appraisal point of view, bone is very difficult to assess. Quite often, what appears to be thicker, heavier bones is in fact less dense bone and may well weigh the same as smaller, thinner bones.

Bone accounts for roughly 16–20% of the carcase weight. Bones are important from a structural and functional point of view but because of the difficulty of appraisal in terms of carcase value, it is best to regard it as relatively constant between animals and concentrate on variations in muscle and fat.

Assessing muscle score

When determining muscle score one must first estimate the level of fatness covering the body.

A pre-requisite of accurate muscle evaluation is the accurate appraisal of fatness. Once an animal's fatness is known, allowance can be made visually and mentally to ensure that fatness does not hinder the evaluation of the animal's shape.

Closely examining those areas of the body where fat is most visible or actually feeling those areas of the animals body, it is possible, with training and practice, to become extremely accurate in subjectively determining the level of subcutaneous fat.

The best places to assess muscling are those areas least influenced by fat, i.e. the hindquarter, the round and the top line.

Indicators of muscling in order of importance are:

- thickness and roundness of the hindquarter,
- stifle thickness and width in the twist,
- width across the back and loin.

Forearm thickness and leg stance are useful only when differences in muscularity are large. When forearm circumference can be measured then it is the best *measurement* indicator of muscle score.

Observe cattle from behind to assess thickness through the lower hindquarter (stifle area). Heavily muscled stock are thickest here. They also stand with their hind legs further apart than lightly muscled stock.

There are three broad categories of shape – average, poor and good. Picking the differences when they are as simple and clear as this is not difficult (see Fig 3)

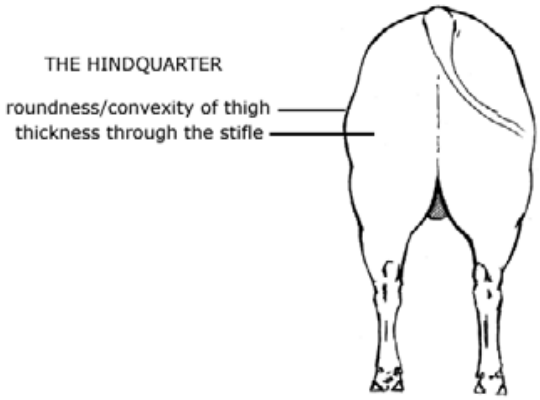


Figure 1. Areas of reference for assessing muscling

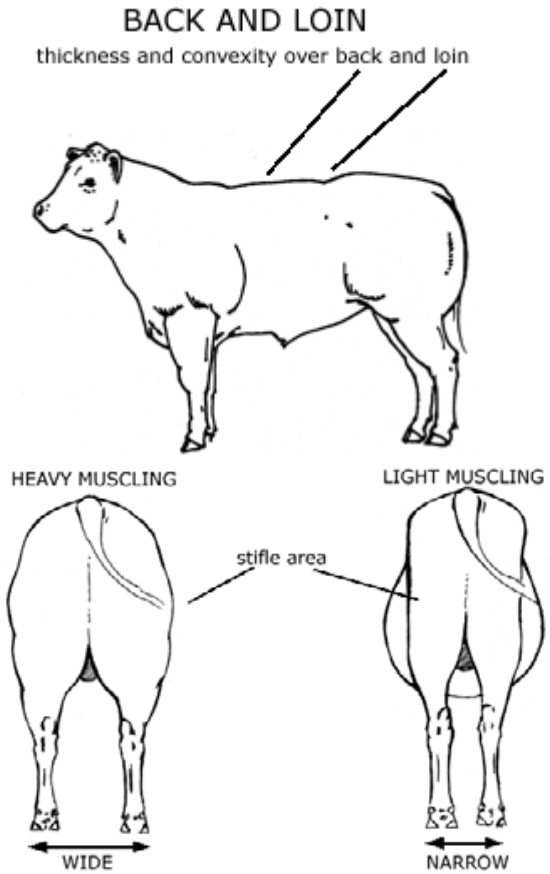


Figure 2. Observing cattle from behind

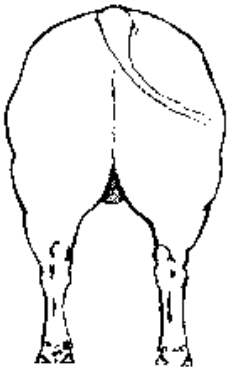
Most British-type steers would be classified as average shape. If an animal appears better than average then the assessor needs to distinguish whether this change is due to an increase in subcutaneous fat cover, or to an increase in muscle. Fatter animals generally do not exhibit the roundness or convexity which is present in more heavily muscled animals. Well-muscled, leaner cattle display clearly evident seams between the muscles of the hindquarter. Poorly-muscled cattle are thin through the stifle and are clearly widest across the hip area.

When shape differences are as clear as in figure 3, assessment is easy. However, within the normal cattle population differences in shape are far less

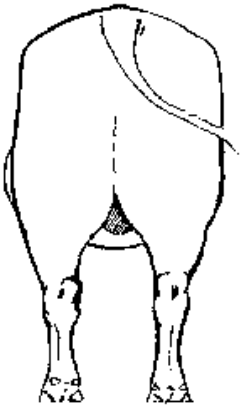
distinctive. It is these situations which can cause confusion. To help separate animals with smaller differences a more expansive descriptive scoring system (5 scores) was developed based on the three levels as in figure 3, but expanded to include quite good muscle development (e.g. heavily muscled European breed bull) and quite low muscle development (e.g. poorly muscled dairy breed cow).

Figure 3. The three simple shape categories

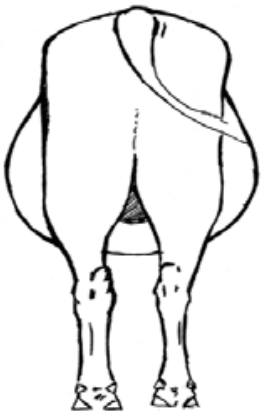
Good
Wide, well-rounded topline; maximum width through stifle; has a wide stance and the stomach cannot be seen.



Average
Not as wide or well-rounded over the topline; hip bones can be seen; has a narrow stance and the stomach is clearly visible.



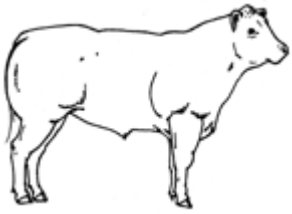
Poor
Narrower over topline, tapering through stifle; narrower stance; more prominent hip bones; stomach is more clearly visible.



Muscle Score Categories

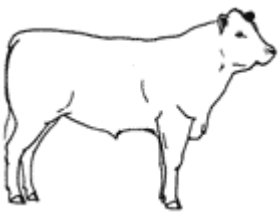
A score from A (very heavily muscled) to E (lightly muscled) can be given based on the roundness (convexity) and thickness of the body due to muscle (see the illustrations below).

To help distinguish smaller differences between animals, and add continuity to the scoring system, the five scores can be further extended to 15 by adding plus and minus to each score (A+ to E-).



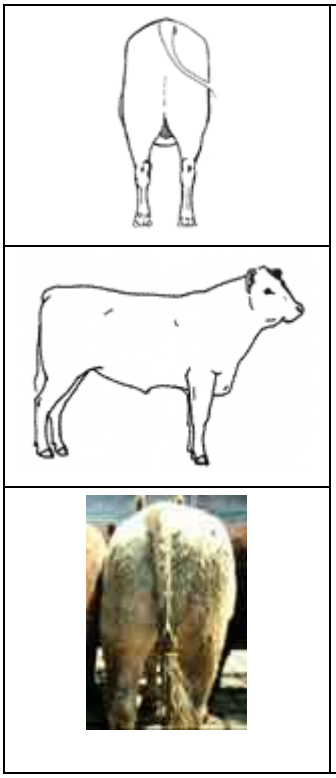
A. Very heavy muscling

- Extremely thick through stifle area
- Muscle seams or grooves between muscles are evident
- 'Apple bummed' – when viewed from the side, hindquarters bulge like an apple
- Butterfly top line - loin muscles along the top of the animal are actually higher than the backbone



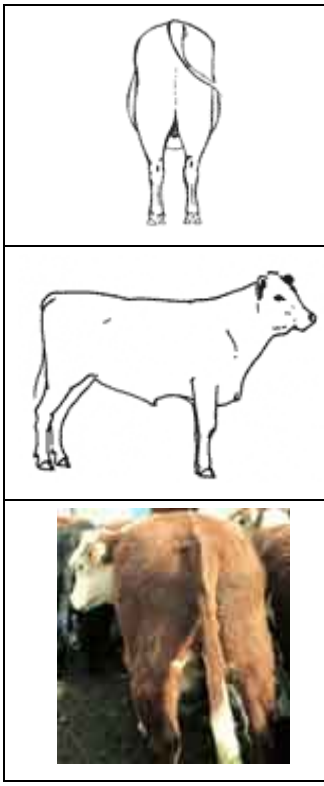
B. Heavy muscling

- Thick stifle
- Rounded thigh viewed from behind
- Some convexity in hindquarter from side view
- Flat and wide over top line – muscle is at the same height as backbone



C. Medium muscling

- Flat down thigh when viewed from behind
- Flat, tending to angular over top line

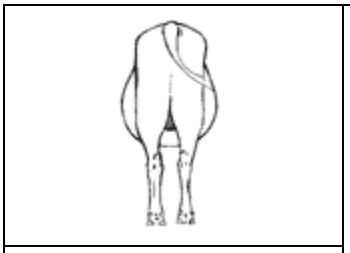


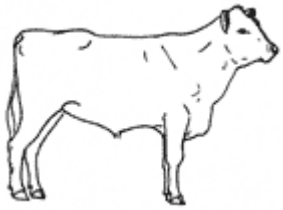
D. Moderate muscling

- Narrow stance
- Flat to convex down the thigh
- Thin through stifle
- Sharp, angular over the top line (except when very fat)

Bulls	Steers/Yearlings	Heifers	Cows
A. Very Heavy			
European types and Exceptional British types	Rare European types and Exceptional British types	Extreme types	Extreme types
B. Heavy			
European types European crosses High muscle British breeds High muscle Bos indicus	European crosses High muscle British breed types High muscle Bos indicus	European types, their crosses and High British	European types, their crosses and High British
C. Medium			
Most British and Bos indicus types Low muscle European types	Most slaughter steers British breeds and Bos indicus Best dairy types	Average to high British and Bos indicus types	Average to high British and Bos indicus types Some Europeans
D. Moderate			
Best dairy breeds British/Bos indicus types	Average to low muscled British and Bos indicus types Dairy breeds	Most beef breed types and Bos indicus	Most beef breed cows and Bos indicus
E. Light			
Most dairy breeds	Dairy types Extremely low British and Bos indicus types	Very ‘leggy’ light heifers Dairy breeds	Dairy breeds and low-muscle beef breeds

Table 2. A user’s guide to general types of cattle which fit into muscle score categories. The score A+ is reserved for double muscle cattle. All scores referred to here can apply to non-double muscle cattle.
Source: Derived from R. Gaden, NSW Agriculture Beef Marketing Workshop Handbook, 1992





E. Light muscling

- Dairy type – very angular
- Sharp 'tent topped' over top line
- Virtually no thickness through stifle at all
- Stands with feet together; concave thigh

Further reading

- McKiernan, W.A. (1990). 'New developments in live animal appraisal of meat quantity in beef cattle' in *Proc. 8th. Conf. Aust. Assoc. Anim. Breed. and Genet.* pp 447-50, Hamilton, New Zealand.
- McKiernan, W.A. (1995). 'Growth, Carcass Value and Body Measurements from High and Low Muscled Bulls'. M.Sc. Thesis, University of New South Wales.
- Perry, D. and McKiernan, W.A. (1994). 'Growth and dressing percentage of well and average muscled Angus steers' in *Proc. Aust. Soc. Anim. Prod.* 20: 349-50.
- Perry, D., McKiernan, W.A. and Yeates, A.P. (1993). 'Muscle score: its usefulness in describing the potential yield of saleable meat from live steers and their carcasses' in *Aust. J. Exp. Agr.* 33: 275-81.
- Perry, D., Yeates, A.P. and McKiernan, W.A. (1993). 'Meat yield and subjective muscle scores in medium weight steers' in *Aust. J. Exp. Agr.* 33: 825-31.

Acknowledgments

This Primefact replaces the previous Agfact A2.3.35, which replaced A2.3.27 Assessing cattle for muscle by M. Elliot, R. Gahan and B Sundstrom, 1987.

Editorial assistance: Bob Gaden, Technical Specialist (Quality Beef).

Artwork: Bridget Cumming.

ISSN 1832-6668

Replaces Agfact A2.3.35

Check for updates of this Primefact at:
www.dpi.nsw.gov.au/primefacts

Job number 7113