AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

Australian Intercollegiate Meat Judging

Guide to evaluation of beef, lamb and pork

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1.0 Introduction

1.1 What is the Australian ICMJ competition?

The Australian Intercollegiate Meat Judging (ICMJ) Association is an organisation established to encourage and support the interests of tertiary students in the meat and livestock industries. The Association has been established and competitions held annually since 1990.

In order to foster these interests, the Association provides opportunities for students through the coaching and development of knowledge of meat appraisal and evaluation. To reward this interest, a contest is held annually to allow students to promote their knowledge.

The competition involves students competing against other Universities and colleges to potentially reap rewards for themselves and their educational institution through prizes and career opportunities.

Through involvement in the ICMJ competition, students can be assured of expanding their knowledge of meat quality and evaluation techniques which are considered invaluable skills in this associated industry.

For more information about ICMJ or to keep updated with ICMJ activities, visit www.icmj.com.au

1.2 Objective

1. To foster the interest and career aspirations of students in the meat and livestock industries
2. To provide tertiary students with the knowledge of meat attributes required to accurately evaluate beef, lamb and pork carcases and primals in accordance with customer requirements for each of these categories.

1.3 Learning outcomes

The learning outcomes of the ICMJ competition, through coaching, tutoring and competing include:

- An understanding of customer specifications with regards to quality, trimness/leanness and muscularity.
- An understanding of meat quality attributes of beef, lamb and pork carcases and primals
- An understanding of how carcase attributes influence eating quality
- An understanding of how to assess meat quality attributes
- An understanding of how to assess trimness/leanness of a carcase and primal
- An understanding of how to assess muscularity of a carcase and primal
- The ability to accurately identify retail cuts and wholesale primals
- The ability to accurately identify the major points and features of a carcase
- The ability to use the information provided to evaluate a range of provided products
- The ability to accurately answer specified questions about a range of provided products

How to use this training manual

This training manual is intended to be used as reference prior to and during training where necessary.

IT IS NOT INTENDED TO REPLACE THE INTERACTIVE GUIDE TO MEAT JUDGING

The interactive virtual program contains practice judging classes and revision activities. It is recommended all students are familiar with the content of the program.

AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

2.0 Beef evaluation

Carcases, primals and retail cuts

2.1 Beef carcase evaluation

There are three broad attributes of a carcase that contribute to its suitability to a given market specification or to a customers expectation. These are grouped as:

- Quality
- Yield
- Eating quality

When evaluating carcases according to the above factors, it is important to consider the customer that the carcase will be supplied to. Market specifications are determined by the customer and hence carcases should be produced and evaluated to ensure conformance to the specifications.

There is not any one carcase trait that makes an ideal product. When evaluating carcases, the above attributes should be considered independently and then combined to produce an overall evaluation outcome.

2.2 Beef carcase quality

Quality is defined as ‘fitness for purpose’ indicating that quality can be interpreted as many various things depending on the purpose or end use of the carcase.

For example – Food service outlets may consider marbling to be an important quality attribute of beef whereas a retail butcher may consider fat colour an important quality attribute.

The following attributes can have impact on beef carcase quality and its ‘fitness for purpose’:

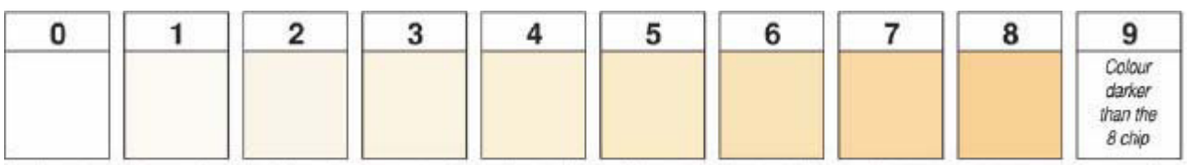
- Fat colour
- Meat colour
- Marbling
- Ossification
- Carcase defects eg. blood splash (Ecchymosis)

2.2.1 Fat colour

Fat colour is the colour of intermuscular fat lateral to the rib eye muscle. It is assessed on the chilled carcase and scored against the AUS-MEAT Fat Colour Reference Standards. Fat colour is assessed by comparing the intermuscular fat colour lateral to the M. longissimus dorsi and adjacent to the M. iliocostalis with the reference standards. Where a fat colour score falls between two of the reference standards, the number corresponding to the more yellow of the reference standard is assigned to the carcase.

Fat colour does not impact on eating quality or conformance to Meat Standards Australia requirements but can affect the saleability of the carcase due to market specifications. Consumer surveys have shown that yellow fat colour has a lower eye appeal at the retail level.

AUS-MEAT Fat Colour Reference Standards



Colours displayed show the darkest colour of each grading and is a guide only, not a true representation.

Evaluating fat colour

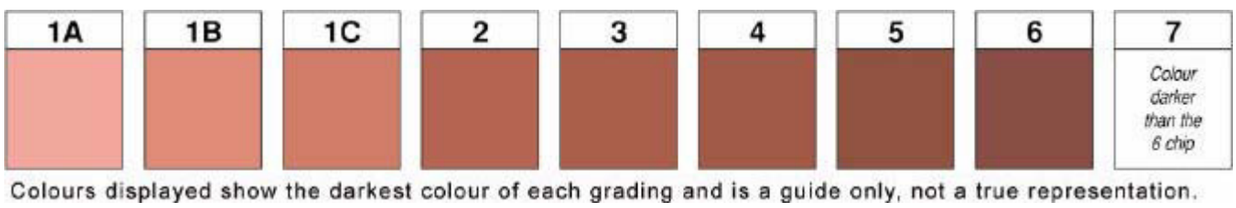
2.2.2 Meat colour

Meat colour is assessed at the rib eye muscle (longissimus dorsi) at the quartering site. It is assessed on the chilled carcase and scored against the AUS-MEAT Meat Colour Reference Standards in the area of the M. longissimus that displays the most predominant colour.

Where there is no clearly predominant colour, the darkest significant colour is assessed and scored accordingly. Where a meat colour score falls between two of the Reference Standards, the number corresponding to the darker of the Reference Standards is assigned to the carcase.

Meat colour has a scale of 0 –7. Meat colour must be in the range of 1B – 3 to be acceptable for MSA. Consumers have shown preference for bright cherry red meat colour when purchasing at the retail level.

AUS-MEAT Meat Colour Reference Standards



Evaluating meat colour

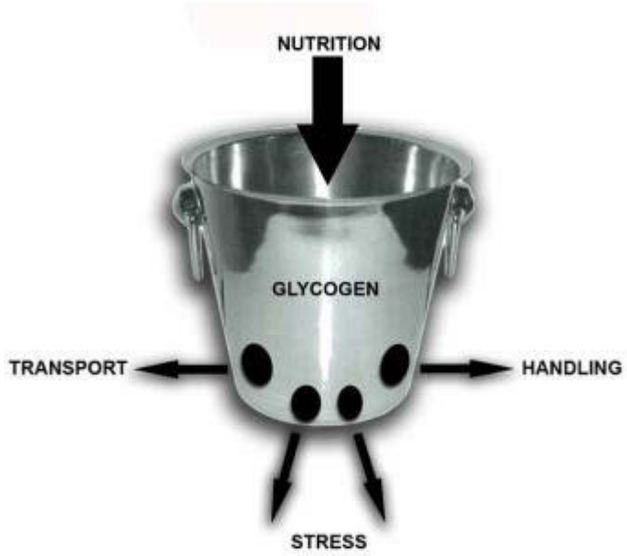
Dark cutting

Meat colour above the AUSMEAT Standard of 3 can be classified as ‘dark cutting’. Dark meat colour can be attributed to pre-slaughter stress in the live animal and the depletion of glycogen reserves in the live animal. Stress can be in the form of the following:

- Poor handling and transport
- Prolonged muscular activity
- Extreme temperatures
- Mixing of unfamiliar cattle
- Drafting of mobs
- Poor nutritional status

Glycogen is the energy store of muscle and can be visualised as a 'bucket' of energy. This energy reserve is used during stressful events, physical activity or after the death of the animal. Once the animal is dead, the muscle glycogen is used as the primary energy source and is converted to lactic acid. This lactic acid is unable to be removed from the body as the animals blood flow and oxygen supply has ceased. Therefore the acid gradually accumulates, reducing the pH of the muscle.

When muscle glycogen is depleted prior to slaughter, the lactic acid production after death is limited resulting in higher ultimate pH levels and dark cutting meat. Therefore pre-slaughter stressors need to be avoided as much as possible.



The animal builds up its glycogen levels through the nutrition it recieves. Stress or physical exertion will deplete it's glycogen levels. The bucket diagram represents this relationship.

Other than the poor eye appeal of the dark meat colour, dark cutting meat has a range of associated quality issues:

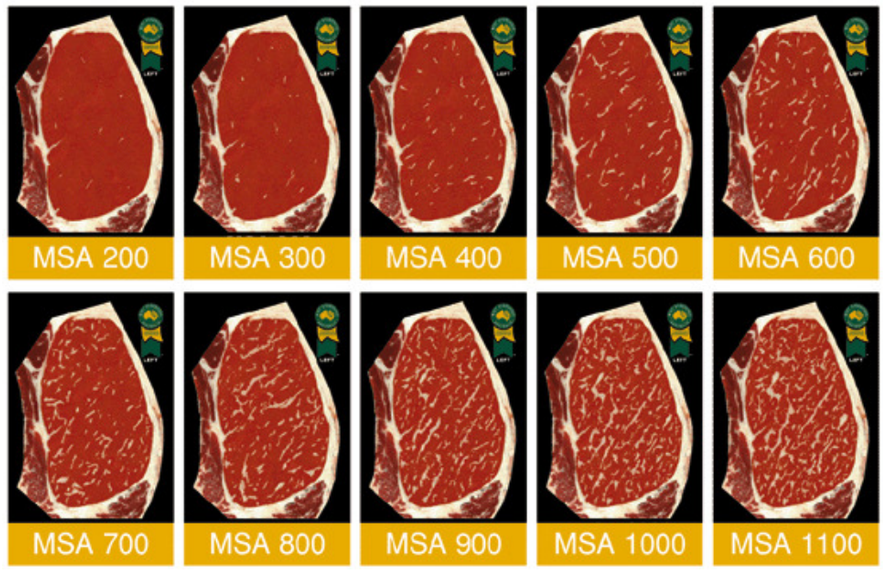
- The pH of the meat is generally higher than the acceptable MSA requirement of pH 5.70
- Shelf life of dark cutting meat is decreased due to the high pH conditions being ideal for microbial growth
- Eating quality inconsistencies
- Cooking inconsistencies

Dark cutting meat has very limited retail use. Therefore, dark cutting carcases can be heavily discounted.

2.2.3 Marbling

Reference: MSA Tips & Tools 07 – The effect of marbling on beef eating quality

Marbling is the fat that is deposited between individual muscle fibres and is assessed at the M. longissimus dorsi (eye muscle) at the ribbing site of the carcase. Assessment of marbling should encompass three factors:



a) Distribution of marbling within the eye muscle – ideally marbling is evenly distributed throughout the eye muscle resulting in the consumer having a consistent eating experience with every bite of their steak.
b) Size of marbling pieces
c) Amount of marbling.

The extent of marbling expression in a carcase is genetically pre-determined. Nutrition plays an important role in fostering the expression of marbling. It is the last body fat to be deposited and the first to be utilised by the animal as an energy source. Therefore, to maximise marbling, cattle must be on a high nutritional plane, with minimal pre-slaughter stress or growth restrictions.

The effect of marbling on eating quality

Marbling has a very positive effect on eating quality but is only one of the many factors affecting eating quality. The relationship between marbling and tenderness is variable and may interact with cooking technique. The advantage in palatability with an increase in marbling may not necessarily be attributed to an increase in tenderness but more so an effect on juiciness and flavour. Marbling is often used as a benchmark measurement for particular market specifications.

2.2.4 Carcase defects

Blood splash (Ecchymosis)

“Blood splash” or ecchymosis is a condition characterised by localised areas of haemorrhaging within the muscles of a beef carcase. ‘Blood splash’ results when the animals blood pressure is elevated to an abnormally high level before exsanguination, causing the capillaries in the musculature to rupture. An abnormally long stun-to-stick interval at the time of slaughter is thought to be the primary cause of this condition.

Blood splash does not have any effect on eating quality but can result in a reduced eye appeal for consumers.

Ecchymosis present in the longissimus dorsi muscle

2.2.5 Ossification (Maturity)

Reference: MSA Tips & Tools 06 – The effect of ossification on beef eating quality

The scoring of ossification (or maturity) provides a scale for the assessment of physiological age of a bovine animal. The term refers to the cartilage turning to bone in the spinous processes in three sections along the backbone - sacral (tail), lumbar (loin) and thoracic (head). The process starts in the sacral region in the form of red spots and as the process increases, this converts to hard yellow bones.

Processors have also realised the benefits of high growth, particularly from a dressing percentage and saleable meat yield perspective. Cattle that have had a faster growth rate and which have not suffered any setbacks, do not normally deposit very much seam and/or channel fat. As a result their yields are higher. Cattle that have a consistent growth rate from birth to slaughter at 20-24 months are also likely to have a more even fat distribution.

Effect of ossification on eating quality

Beef is made up of muscle fibre groups surrounded and supported by connective tissue. Connective tissue is made up of elastin and collagen fibres. Collagen fibres form crosslinks to strengthen muscle as the animal ages. Therefore, as the animal matures, the fibres in the meat become progressively stronger and are less likely to break down during cooking resulting in a tougher eating experience. Ossification measurements provide an indication of this collagen fibre development.

Ossification rates will vary slightly between animals. This can be due to differences in nutrition growth paths. Those animals that have experienced growth setbacks and poor nutrition will exhibit greater levels of ossification than animals of the same chronological age grown in optimal conditions.

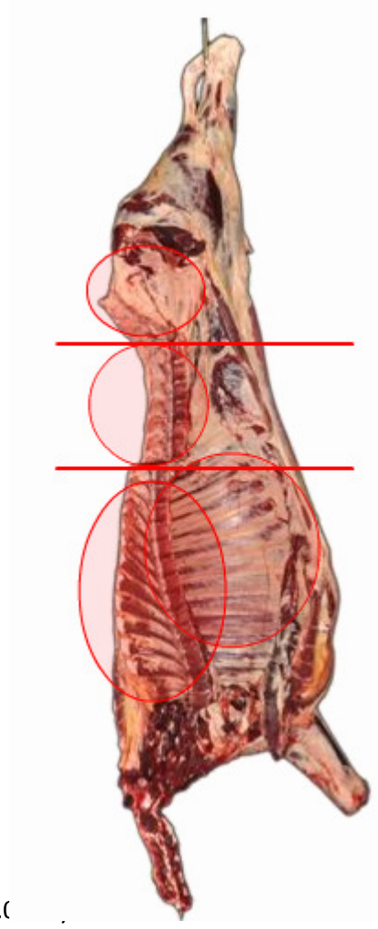
Regions of ossification

1. **Sacral region**
2. **Lumbar region**

The last 5 vertebrae – tail end of the carcase
6 vertebrae in the loin region

3. Thoracic region

13 vertebrae to which the ribs are attached



Meat Standards Australia measure maturity in increments of 10 with the lowest being 100 (youngest) and the highest being 590 (oldest). The following table details these scores with regards to the development of cartilage to bone in the respective regions.

Ossification Standard Table

SCORE	APPROXIMATE AGE IN MONTHS	SACRAL VERTEBRAE	LUMBAR VERTEBRAL SPINOUS CHARACTERISTICS	11^{TH}, 12^{TH}, 13^{TH} THORACIC SPINOUS PROCESS CHARACTERISTIC	1^{ST} – 10^{TH} THORACIC SPINOUS PROCESS CHARACTERISTICS	RIB BONE CHARACTERISTICS
100	9	No distinct ossification separation.	No ossification.	No ossification.	No ossification.	Narrow and oval. Lot of blood.
110	10	Capping has started. 10% to 20%.	No ossification.	No ossification.	No ossification.	Slightly narrow Slightly oval. Lot of blood.
120	13	Capping to 30% to 40%. Vertical gaps starting to close.	No ossification.	No ossification.	No ossification.	Slightly wide and flat. Lot of blood
130	15	Advanced capping to 50% to 70%. Vertical gaps closing. Some separation still visible.	No ossification.	No ossification.	No ossification.	Slightly wide. Slightly flat. Moderate blood.
140	18	Advanced capping 80% to 90% Vertical Gaps closing, Some separation still visible,	No or minor spots of ossification in one or two vertebrae.	No ossification.	No ossification.	Slightly wide. Slightly flat. Moderate b.lood
150	20	Capping completed but some cartilage visible.	No or small amounts of ossification in some vertebrae.	No ossification.	No ossification.	Slightly wide. Slightly flat. Moderate blood.
160	22	Capping completed but small amounts of cartilage visible	10% to 20% ossification in some vertebrae.	No ossification.	No ossification.	Slightly wide. Slightly flat. Moderate blood.
170	24	Capping completed. Almost complete fusing.	30% to 40% ossification.	No ossification.	No ossification.	Slightly wide. Slightly flat. Small amount of blood.
180	27	Capping completed. Almost complete fusing.	50% to 70% ossification in all vertebrae.	No or minor spots of ossification in one or two vertebrae.	No ossification.	Slightly wide. Slightly flat. Small amount of blood.
190	29	Capping completed. Almost complete fusing.	80% to 90% ossification in all vertebrae.	Less than 25% ossification in all 3 Spinal process., or 100% in any 1 Spinal process.	No ossification	Slightly wide. Slightly flat. Small amount of blood.
200	30	Complete fusing.	Almost complete ossification.	>25% ossification in all 3 Spinal process., or 100% in any 1 Spinal process.	Minor ossification Slightly red chine.	Slightly wide.. Moderately flat. Traces of blood..
230		Complete fusing.	Almost complete ossification.	30% to 40% ossification in all 3 Spinal process , or 100% in any 1 Spinal process.	Minor ossification in some of the first 6 thoracic vertebrae. 10% to 20% in 7^{th} to 10^{th} vertebrae.	Slightly wide Moderately flat Traces of blood

SCORE	APPROXIMATE AGE IN MONTHS	SACRAL VERTEBRAE	LUMBAR VERTEBRAL SPINOUS CHARACTERISTICS	11^{TH}, 12^{TH}, 13^{TH} THORACIC SPINOUS PROCESS CHARACTERISTIC	1^{ST} – 10^{TH} THORACIC SPINOUS PROCESS CHARACTERISTICS	RIB BONE CHARACTERISTICS
250		Complete fusing.	Almost complete to complete ossification.	>50% ossification in all 3 Spinal process, or 100% in any 1 Spinal process.	10% to 20% ossification in some of the first 6 thoracic vertebrae. 30% to 50% in 7^{th} to 10^{th} vertebrae.	Moderately wide Moderately flat Traces of blood
280		Complete fusing.	Complete Ossification.	>70% Ossification in all 3 Spinal process, or 100% in any 1 Spinal process.	>30% in the 1^{st} to 10^{th} vertebrae.	Moderately wide Moderately flat Traces of blood.
300	42	Complete fusing.	Complete ossification.	80% to 90% ossification in all 3 Spinal process , or 100% in any 1 Spinal process.	More than 30% ossification in first 6^{th} thoracic vertebrae. 50% to 70% in 7^{th} to 10^{th} vertebrae.	Moderately wide Moderately flat Traces of blood
350		Complete fusing.	Complete ossification.	Almost complete to complete ossification.	40% to 80% ossification involving all vertebrae.	Wide and flat No blood.
400	72	Complete fusing.	Complete ossification.	Complete ossification . Outlines barely visible.	Almost complete ossification. Outline plainly visible.	Wide and flat No blood.
500	96	Complete fusing.	Complete ossification.	Complete ossification.	Complete ossification. Outline barely visible. White chine.	Wide and flat No blood.
590		Complete fusing.	Complete ossification.	Complete ossification.	Complete ossification. White chine.	Wide and flat No blood..

Soft siding

When a carcase is sawn exactly in the middle of the spine, the spinal processes are clearly visible. This enables accurate evaluation of ossification.

Soft siding occurs when the carcase is not sawn exactly in the middle of the spine and is a result of slaughter floor processes. Due to the spine not being clearly visible, is must be assumed that there is complete ossification under the area affected by soft siding. The ossification score for that body may be called unnecessarily higher than it actually is.

Tips for evaluating ossification

- When possible always evaluate both sides of a carcase when deciding on a score.
- Start assessment from the head and work towards the tail.
- If there is soft siding, assume ossification is fully developed in the region in question.

2.3 Beef carcase yield

Carcase or retail product yield refers to the amount of retail or saleable product which can be achieved from a given carcase weight.

A carcase is composed of muscle, bone and fat. Carcases with high yield percentages have maximum muscle, minimum bone and optimal fat for a particular market.

The highest yielding carcases are both heavily muscled and lean while the lowest yielding carcases tend to be lightly muscled and over fat or poorly finished and both lean and lightly muscled.

Carcase yield is influenced by the following factors which require consideration when evaluating a carcase;

- Fat coverage
- Carcase weight
- Muscularity
- Bruising and carcase defects
- Sex

2.3.1 Fat coverage

Reference: MSA Tips & Tools 14 – Fat distribution and eating quality.

The primary determinant of retail product yield (%) is the amount of fatness or degree of finish on a carcase.

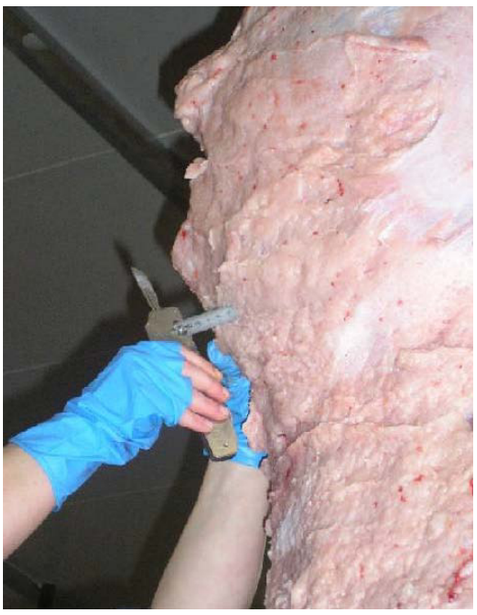
The only accurate way of determining the amount of fatness on a carcase is to completely denude the carcase of all subcutaneous and intermuscular fat. Theoretically this is an exercise which can be done in either a laboratory or boning room, but it is very time consuming, costly and impractical.

As a result, the industry uses indicators to predict degree of carcase fatness. Three fat measurements can be used to provide an indication of fat coverage:

1. Rib fat measurement – made at the rib site where the carcase is quartered
2. P8 fat measurement – made at the P8 site on the rump
3. Fat distribution across the carcase

Beef fat depth is measured at a point in the carcase known as the P8 site. To locate the P8 site:

- Locate the third sacral spinal process by counting up from the junction of the lumber and sacral vertebrae.
- Take an imaginary line from the crest of this process around the side and at right angles to the sawn chine.
- Next, an imaginary line is drawn from the centre of the junction of the sacro-sciatic ligament and the dorsal tuberosity of the pin bone parallel to the sawn chine.
- The point at which these two lines intersect is the P8 site.



Measuring P8 fat

Rib fat is measured in the chiller on the chilled, quartered carcases. MSA requires all carcases to have a minimum of 3mm rib fat.

Measuring rib fat

Carcases differ in the way they distribute fat and this can be a result of cattle breed or nutritional background.

Heavily muscled or late maturing cattle breeds (eg. Limousin, Charolais) tend to distribute fat a little more evenly over the forequarter and tend to be leaner over the hindquarter. Carcases with extreme muscularity, including cattle breeds such as the Belgian Blue usually lack finish over the butt altogether. Lightly muscled carcases tend to distribute fat very unevenly with large fat deposits through the flank up over the ribs and into the brisket. Large deposits necessitate costly and time consuming trimming and in doing so reducing the value of the carcase.

In general, carcase yield is very sensitive to fat. Exceptionally high yield can be obtained from carcases with no fat eg: bulls used for manufacturing beef. However most premium markets require some fat to market the product and ensure satisfactory eating quality.

Although excess fat can result in a decreased yield outcome, sufficient fat coverage is required to ensure carcases are protected against abattoir chilling regimes that can cause muscles to cool too quickly and result in toughened meat. Adequate fat coverage can also be beneficial in reducing weight loss during chilling.

Figure 12. Adequate and inadequate fat distribution (left to right respectively)

The following descriptions may help you assess carcases characteristics and determine the amount of yield from carcases. Description 1 has the highest yield potential and description 5 has the lowest.

Beef fat score classification

Fat score	P8 fat	Rib fat	Description
2	3-6mm	2-3mm	• Thin layer of external fat over the butt loin, rib and clod • Slight deposits of fat in the flank, cod or udder, kidney, pelvic and heart regions. • Very thin layer of fat over the outside of the butt and over the chuck. • Muscles are usually visible through the fat in many areas of the carcase.
3	7-12mm	4-7mm	• Nearly completely covered with external fat • Lean is very visible through the fat over the outside of the butt, chuck and neck. • Slightly thin layer of fat over the inside butt, loin and rib • Slightly thick layer of fat over the rump, sirloin and clod.
4	13-22mm	8-12mm	• Usually completely covered with external fat • Lean is plainly visible through the fat only on the lower part of the outside of the butt and neck. • Slightly thick layer of fat covering the inside butt loin and rib • Moderately thick layer of fat over the rump, sirloin and clod. • Usually significant deposits of fat in the flank, cod or udder, kidney, pelvic and heart regions.
5	23-32mm	13-18mm	• Usually completely covered with external fat, except where muscle is visible in the shank, outside of flank and plate regions. • Moderately thick layer of external fat over the inside of the butt, loin and rib • Thick layer of fat over the rump, sirloin and clod • Large deposits of fat in the flank, cod or udder, kidney, pelvic and heart regions.
6	33mm+	19mm+	• Thick layer of fat on all external regions • Extensive fat is found in the brisket, cod or udder, kidney, pelvic and heart regions.

2.2.2 Muscularity

Muscularity is often used as a predictor of carcase yield. Often carcases with a muscle score of D or less get heavily discounted as they can have very poor yields regardless of their potential eating quality.

When evaluating carcases muscularity, eye muscle area can be measured to predict carcase yield.

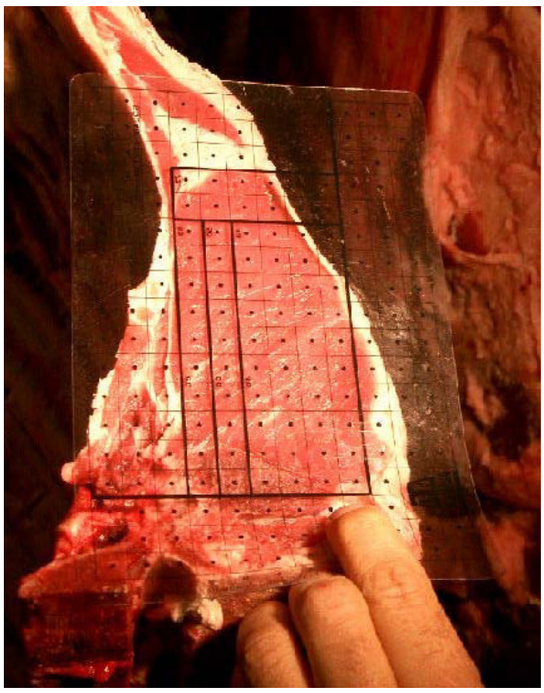
Eye Muscle Area (EMA):

Eye Muscle Area is a measure of the size of the longissimus dorsi muscle also known as the rib eye in square centimetres. This measurement is made at the carcase quartering sites which can be between the 10-13th rib.

Assessment is manually conducted using an AUS-MEAT EMA grid to calculate the area of the eye muscle.

The rib eye area is used because it is practical and has commercial significance. However, it must be remembered that the longissimus dorsi is just one muscle in the body and its relative size at the quartering site is only an indicator of total muscularity.

Eye muscle area does not have any affect on eating quality for the MSA program and is used solely as a feedback tool for vendors/producers



2.2.3 Bruising and hidepuller damage

Reference: MSA Tips and Tools 14 – Fat distribution and eating quality

Bruising and hidepuller damage can make carcases unsaleable or less profitable. Bruising in an animal as a result from poor transport or mishandling pre-slaughter can result in large sections of the carcase have to be trimmed by meat inspectors. Hidepuller damage occurs when fat is removed during the mechanical removal of the hide, exposing the underlying muscle.

Bruising and hidepuller damage has the greatest impact on yield when high value primals are affected. Carcase yield is not only reduced due to muscle damage and limited saleability but is also reduced through the lack of fat coverage that provides protection against chilling regimes which also dehydrate the exposed muscles.

Not only can carcase saleability be reduced, eating quality can be compromised through uneven chilling of carcase muscles. This can cause an irregular pattern of pH and temperature decline in those muscles and result in increased muscle toughening.

A serious bruise as determined by AUS-MEAT, is one that requires:

- An area of muscle (exposed) by trimming into the muscle tissue to the extent that it cannot be covered by a 100mm diameter circle or an irregular shaped equivalent area, or;
- Where the trimming of a serious bruise has exposed muscle tissue smaller than 100mm and deeper than 20mm.

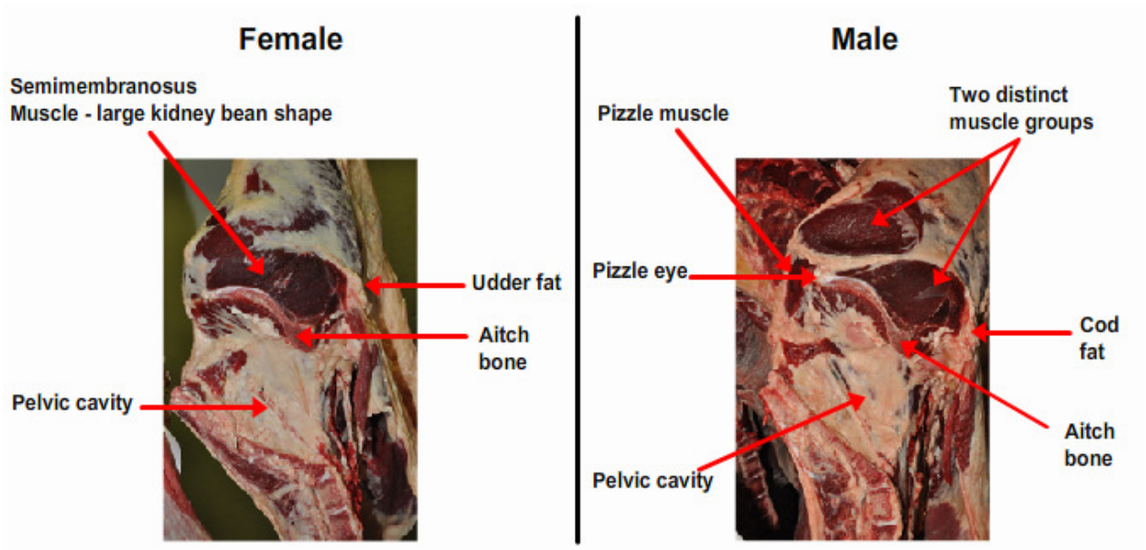
Figure 14. Examples of yield loss due to bruising and hidepuller damage.

2.2.4 Sex Class/Gender

Sex can play a role in determining yield of a carcase due to differences in mature weight, mature composition and maturing patterns for individual tissues.

Male carcases are recognised by the typically rough and irregular fat in the region of the cod, the relatively small pelvic cavity, a small “pizzle eye”, a curved aitch bone, and a lean area above the aitch bone that is about half as large as that in a female carcase.

Female carcases are identified by very smooth fat in the region of the udder, a slightly larger pelvic cavity, a straighter aitch bone than is typical of steers and a lean area above the aitch bone that is about twice as large as that in a steer carcase. This lean area is shaped like a kidney bean.



2.4 Beef eating quality

The eating quality of beef is ultimately determined by the consumer based on their eating experience. When a consumer makes a judgement on eating quality of beef, they consider the following attributes to be of importance:

- Tenderness
- Flavour
- Juiciness
- Overall liking

A combination of carcases attributes are measured to provide indicators that are used to predict eating quality. In addition to livestock factors, the following attributes can be used to predict eating quality of beef.

- Marbling
- Ossification
- pH

2.4.1 pH and eating quality

Reference: MSA Tips and Tools 08 - The effect of pH on beef eating quality

pH is a measure of the acid or alkaline level of the meat. As previously mentioned meat colour is directly associated with pH. Beef which measures a pH value below 5.70 is more likely to provide a consistent eating experience.

Accordingly, 5.70 has been set as the maximum acceptable pH level for MSA grading. In addition to unacceptable eating quality high pH meat has the following features:

- It is often found to be dark cutting (refer to carcase quality section for more information)
- A coarse texture
- Reduced shelf life – bacteria grow more rapidly due to high pH conditions
- Lower water-holding capacity – which result in moisture loss during coking and a less juicy product.

2.5 Evaluating beef carcases

Key points when evaluating carcases

- Consider the market specification – domestic and export markets can have very different product specifications.
- Understand quality and yield attributes and commercial implications of each
- Dark cutting carcases are always heavily discounted
- A key quality attribute used in carcase evaluation is marbling
- Highest yielding carcases will be those with heavy muscling and light fat coverage
- Eye muscle area is an important factor used in determining muscling and yield
- Significant bruises on key primals will affect yield
- The sex of a carcase should not impact on your evaluation (judging) of carcase but should definitely be observed

Emphasis: The emphasis placed on carcase attributes during evaluation will largely depend on the market destination of the product.

Generally, export markets will have the following emphasis: Quality followed by yield (muscling plus trimness)

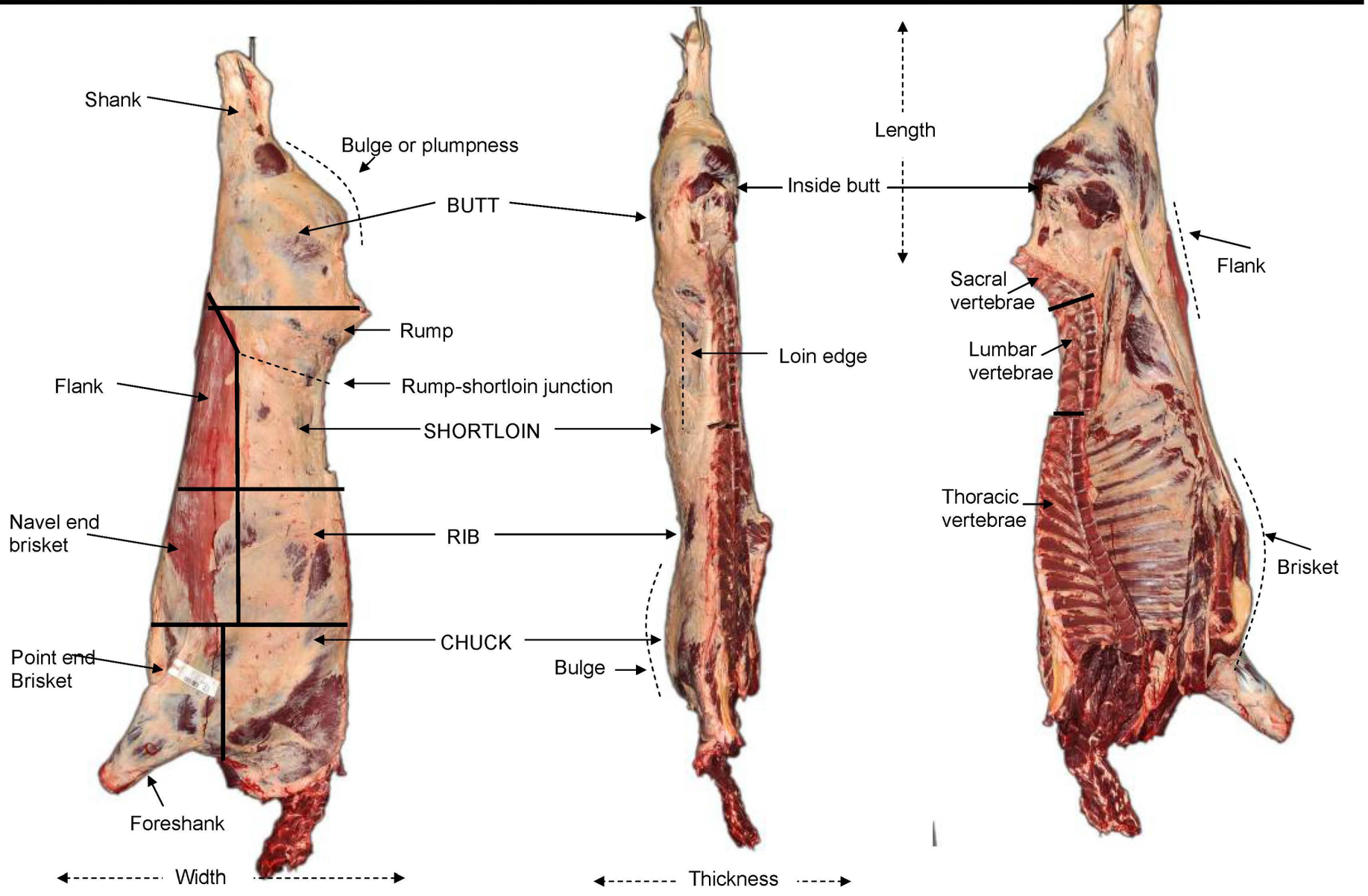
Domestic markets will generally have the following emphasis Yield (muscling plus trimness) followed by quality.

The following table provides terminology for each major assessment point that can be used to describe and justify appraisal of a carcase.

Evaluation terminology for beef carcases

Muscling	Trimness	Quality
Rib eye Larger More symmetrically shaped **Butt** Thicker Plumper More bulging Wider Longer More muscular **Sirloin** Thicker Fuller More muscular More bulging More prominent **Loin** Thicker Fuller Wider More muscular **Rib** Plumper Fuller More muscular **Chuck** Thicker Wider Deeper More muscular More bulging **Shank** Shorter	**Less fat opposite the:** • Ribeye **Less fat over the:** • Lower rib • Butt • Sirloin • Rump-shortloin junction • Loin • Loin edges • Rib • Chuck • Brisket • Flanks	**Marbling in the rib eye** Higher degree Greater amount More finely dispersed More evenly dispersed **Colour of lean in rib eye** Brighter More youthful More cherry red **Firmer lean in rib eye** **Finer textured lean in rib eye** **Ossification** **Fat** More desirable Whiter Firmer textured **Ribs** More youthful Redder, rounder Feathering between **Sex**

Beef carcase terminology



Examples of questions asked during ICMJ contest Beef carcase judging

Questions asked may be based on:

1 Observations over the whole class (eg. How many males)

2 Observations made on the extremes (eg. Which carcase had the largest eye muscle area?)

3 Comparisons between carcases (eg. Between Carcase 2 and 3, which was the older animal?)

Tip: It is likely that a proportion of questions will be based on very noticeable carcase attributes rather than slight differences between carcases. For example, if one carcase has significantly more yellow fat than the others, this is likely to be a question to test your observation skills, rather than asking you which was fatter over the rib eye if there was only 2mm difference between all carcases.

Which carcase (or between carcases) has:

- The smallest/largest eye muscle area?
- Least trimmable fat alongside the rib eye?
- The thinnest poorest/heaviest muscled butt?
- Heaviest muscled chuck
- The highest amount of marbling?
- The thickest, widest, deepest, heaviest muscled butt?
- The brightest, most youthful lean (meat) in the rib eye
- Highest cutability (i.e highest yielding)
- Finest/coarsest meat texture
- Highest/lowest quality
- The most trimmable fat/least fat over the brisket; sirloin; loin; ribset; chuck; rib-eye; butt cushion; centre section (the question could ask about these individually or a combination)
- Younger/older ossifications score How many females/males? Which is the highest yielding carcase?

2.6 Beef pricing class

The beef pricing class assesses your observation skills in identifying carcase attributes that can affect yield and/or quality of a carcase.

This class is based on current industry practices and uses a pricing grid reflective of a standard processor pricing grid that carcases must be graded against and how producers are paid.

The main features of a pricing grid include:

- Carcase weight
- Fat depth (P8)
- Gender
- Dentition
- Maturity
- Meat and fat colour
- Bruising
- Marbling
- Blood splash

Carcase tickets

During the beef pricing class in the ICMJ contest, some information will be provided to you by ICMJ in the form of a carcase ticket. This information will include:

- Carcase weight
- Fat depth (P8)
- Dentition

Note - during this class, ignore any carcase tickets that have been generated by the processor and may still be attached to the carcase.

Example of a carcase ticket

Maturity

For the ICMJ beef pricing class you must understand the scoring system for ossification. The example pricing grid uses the ossification score of 200 as the distinctive score where a price adjustment is made.

A 200 maturity score is described as:

Sacral vertebrae	Lumbar vertebrae	11/12/13th thoracic vertebrae	1-10th thoracic vertebrae	Ribs
Complete fusing	Almost complete ossification	>25% in all 3 vertebrae or 100% in any one	Minor ossification	Slightly wide Moderately flat Traces of blood

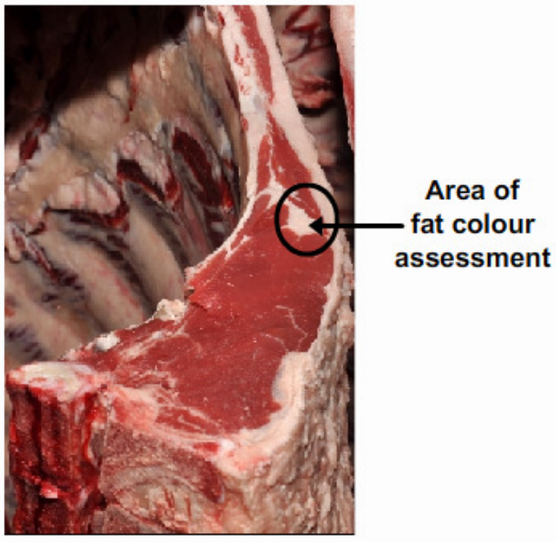
Meat colour

The pricing grid applies a price penalty when meat colour is assessed as being greater than an AUSMEAT Meat Colour 3.A meat colour above 3 will show signs of being dark and may also look to have a 'sticky' texture.

Fat colour

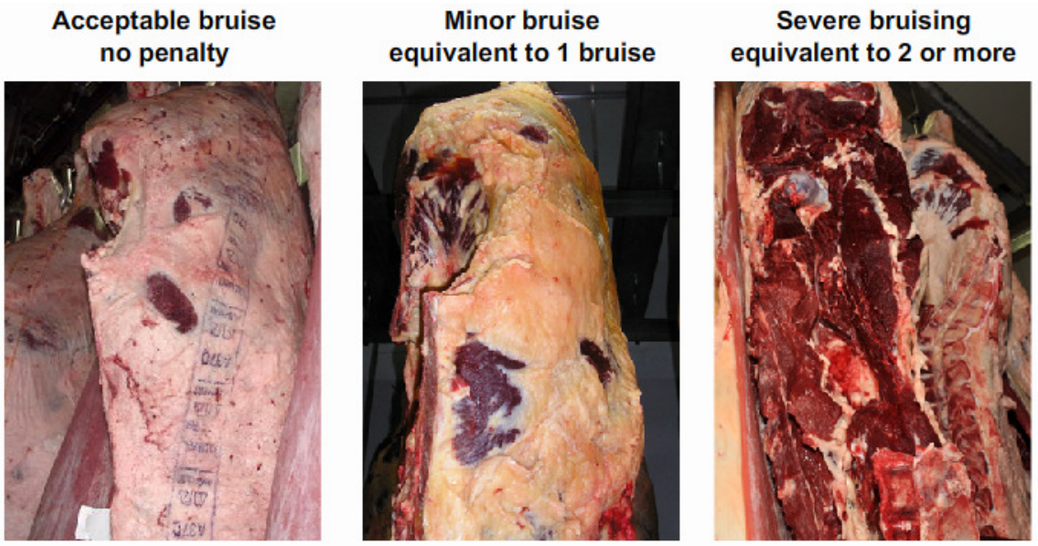
The pricing grid applies a price penalty to carcase with a fat colour above AUSMEAT Fat Colour 3. This does not affect eating quality but is primarily due to consumer acceptance of fat colour.

Here is a picture illustrating where fat colour is assessed. Note this is not an external fat colour measurement.



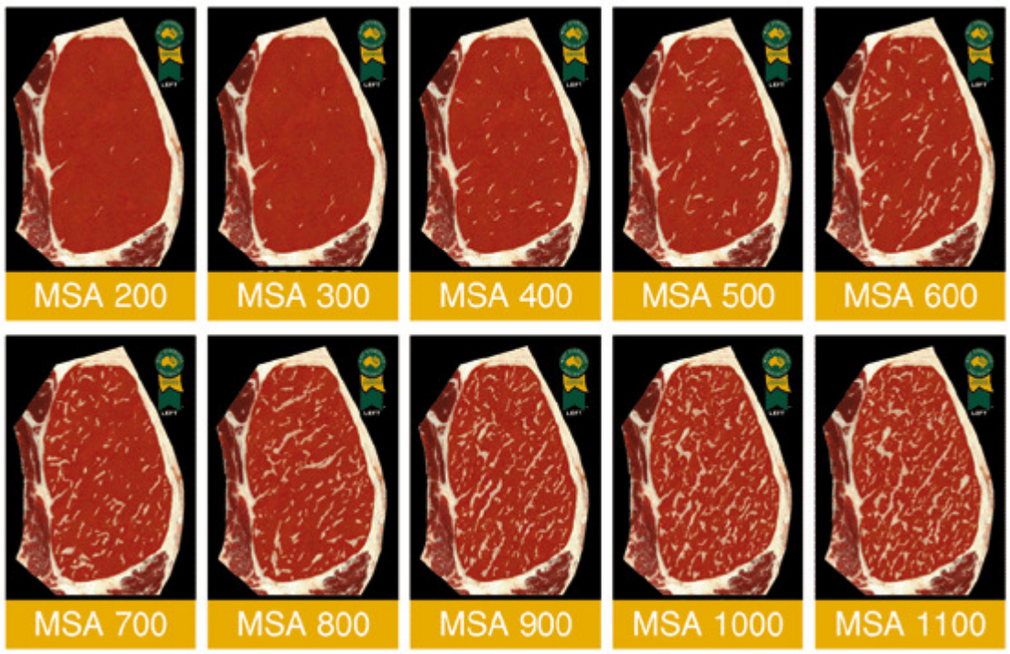
Bruising

A carcase will be penalised for bruising if the bruise is affecting valuable areas of meat.
A serious bruise is determined as an area that is greater than 10cm2 on any one single primal
Multiple bruises or individual bruises that greatly exceed this size will incur larger price penalties.
Below are examples of varying degrees of bruising.



Marbling

Marbling increases eating quality of a carcase and so a price adjustment is made in the pricing grid for various marbling scores. Below are examples of the MSA marbling scores which you should be familiar with.

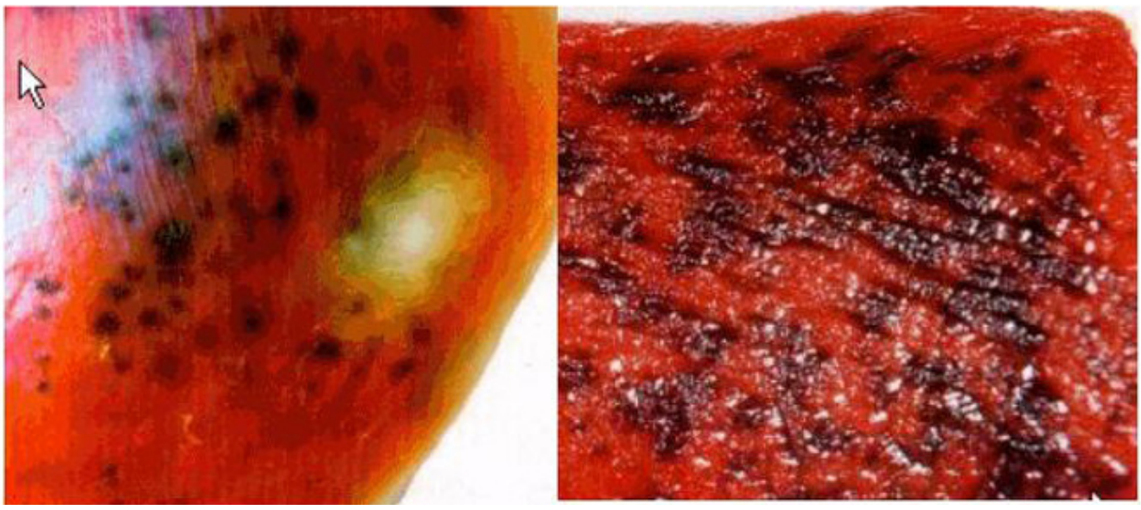


<u>Blood splash</u>

Blood splash must be considered quite severe before a price adjustment is made.

Severe ecchmoysis would be very obvious in the eye muscle and appears as numerous burst blood vessels throughout the muscle.

Below are pictures of severe ecchymosis that would incur a price penalty.



AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

Beef Pricing Class

Beef Traders Carcase Price Grid

Price adjustments in cents per kilogram, plus or minus the benchmark price of **$3.20** per kilogram, HSCW.

Weight and Fat Grid ***(Price Adjustment)***

Hot Standard Carcase Weight (kg)	**P8 fat (mm)**					
	0-2	**3-5**	**6-12**	**13-17**	**17-21**	**>21**
150 -200	-50	-40	-20	-30	-40	-55
201-220	-20	-10	0	-5	-10	-25
221-240	-25	-15	0	0	-5	-20
241 –260	-30	-20	0	0	0	-20
260+	-35	-25	0	0	0	-20

Additional Assessment Criteria

Sex	**Male**			**Female**
Cents Adjustment	0			-20
Dentition	**0 teeth**		**2 teeth**	**4+ teeth**
Cents adjustment	0		-10	-20
Ossification			**>200**	
Cents adjustment			-20	
Meat Colour	**1A – 3**			**>3**
Cents adjustment	0			-60
Fat Colour	**0 – 3**			**>3**
Cents adjustment	0			-30
Bruising	**Nil**		**1**	**2 or more**
Cents adjustment	0		-10	-60
MSA Marbling	**Under 210**	**210 – 390**	**400 - 590**	**600 +**
Cents adjustment	0	+5	+10	+15
Blood Splash (ecchymosis)			-60 for visible signs	

Contestant Number: _____

Team Number: _____

Carcase	**1st**	**2nd**	**3rd**	**4th**
Price per kilogram				
Carcase number				

2.7 Beef Eating Quality Class

This class will apply the industry practice of carcase eating quality evaluation, based upon the Meat Standards Australia grading system.

Students are required to determine an eating quality score for each carcase through assessing required carcase attributes and applying positive and/or negative adjustments to an eating quality score using a provided grid.

Carcase measurements

The eating quality evaluation class requires you to make assessments of a number of carcase attributes including:

- Sex.
- Ossification.
- MSA Marbling.
- Rib fat (no rulers will be provided).
- Fat distribution.
- Meat colour.

The following carcase attributes are provided by ICMJ:

- Tropical Breed Content.
- Hormonal Growth Promotant treatment.
- Carcase weight.
- pH.

Tips for evaluating carcases for eating quality

- Have a good understanding of the Meat Standards Australia grading system.
- Read MSA materials, in particular MSA Tips & Tools, on MLA website: www.mla.com.au/msa.
- Ensure you are familiar with MSA marbling standards.
- Have a thorough understanding of ossification chart and have a good knowledge of your 'key' ossification scores as per the grid.
- Ensure you know where rib fat is measured and have a good idea of what different measurements look like. You can practice this by drawing lines on a page, estimating their length and then measuring them.

- Make sure you have a good idea of what the fat distribution standard is. i.e carcases with inadequate fat distribution of an area of 10 x 10cm are classified as ungrades. Again, practice drawing different shapes on a page and guessing the area, then measuring it.
- Make sure you understand the working sheet and answer sheet.
- If you do not have access to beef carcases, practice by making up carcase details on paper and using the work sheets to increase your speed in recording details and doing calculations.
- Download practice carcase detail sheets. These sheets have all carcase assessments filled in already but will give you good practice in using the eating quality grid and applying adjustments.

2.8 Beef primal evaluation

When carcases are boned, they are broken down into primals. The same broad attributes that are used in carcase evaluation are also used when appraising beef primals. These are grouped as:

- Quality
- Yield
- Eating quality

Importantly, there are differences between the evaluation of primals within a carcase. This difference is dependent on the relative market value of each primal and therefore the importance of quality and yield for each primal.

There is not any one trait that makes an ideal product. When evaluating beef primals, the above attributes should be considered independently in combination with the market suitability of the individual primal.

Key points for evaluating/judging beef primals

You MUST know your primal face names – they will be used during questions and important when writing reasons

2.8.1 Evaluating butts

Emphasis: Yield (muscling plus trimness) followed by quality

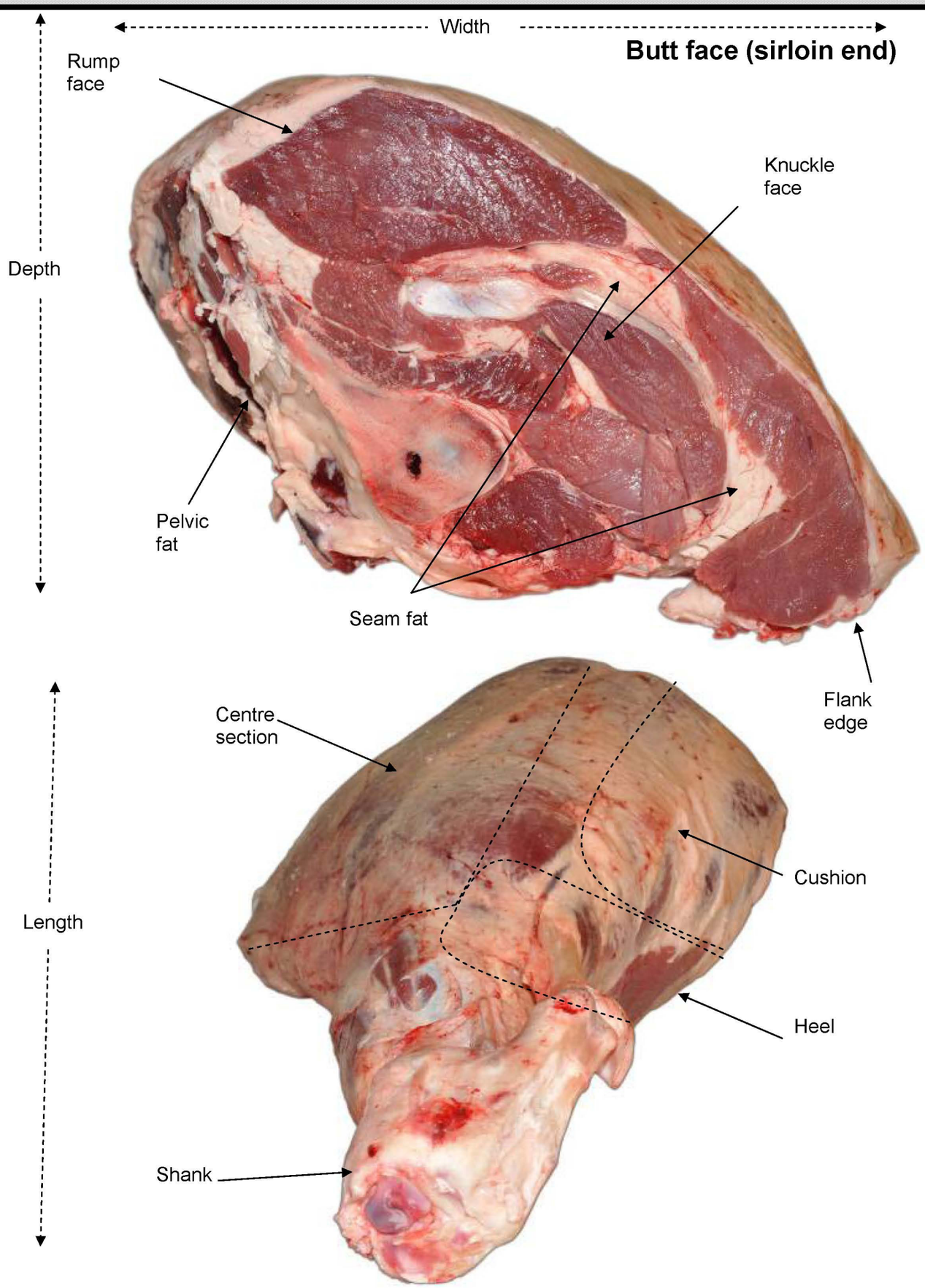
Areas of evaluation:

- Exposed lean on the butt face – trimness and quality
- Cushion area (diagonally as well) – trimness and yield
- The heel – trimness and yield

Evaluation terminology for beef butts

Muscling	Trimness	Quality
Butt face Larger Greater area of exposed lean **Rump and knuckle face** Greater area of exposed lean Deeper Wider Meatier Larger **Cushion** Plumper More bulging More muscuar Deeper Thicker **Centre section** Wider Deeper Longer More muscular **Heel** Fuller **Shank** Shorter	**Less fat over the:** • Butt face • Rump face • Knuckle face • Cushion • Centre section • Rump section • Heel • Less internal seam fat in the round face • Less pelvic fat	• Focus on brighter, more cherry-red colour of firmer lean in the round face • Marbling and texture if differences are obvious • External fat – whiteness and firmness

Beef butts terminology



Examples of questions used for butt evaluation classes in ICMJ contest

2005

1. Which butt had the heaviest muscled butt face?
2. Which butt had the least amount of seam fat in the butt face?
3. Which was the fattest over the butt face?
4. Which butt had the most undesirable fat colour?
5. Between 1 and 2 which was the trimmest over the butt face?
6. Between 3 and 4 which butt had the heaviest muscled heel and cushion?
7. Which butt was the fattest over the heel and cushion?
8. Which was the lowest yielding butt?
9. Which butt had the most pelvic fat?
10. Between 2 and 3 which butt had the heaviest muscled butt face?

2006

1. Which butt had the heaviest muscles cushion and heel?
2. Which butt had the most trimmable fat over the centre section?
3. Which butt had the most marbling in the rump face?
4. Between 1 and 2, which primal had the larger area of exposed lean in the butt face?
5. Between 2 and 3, which primal had the lighter muscled centre section and heel?
6. Which primal had the most seam fat in the butt face?
7. Which butt had the darkest, least desirable lean colour in the butt face?
8. Between 1 and 3 which butt was deeper, partially due to fat?
9. Between 2 and 3, which primal had the least amount of trimmable fat over the cushion?
10. Which butt would have the lowest retail value?

2007

1. Between 1 & 2 which Butt has the trimmer, heavier muscled centre section and cushion?
2. Which butt has the highest degree of marbling in the top rump?
3. Which butt has the least amount of trimmable fat over the cushion and heel?
4. Between 1 & 2 which butt has greater amount of seam fat?
5. Which Butt has the most fat over the top rump?
6. Between 2 & 3 which butt has the trimmer trimmer centre section, cushion and heel?
7. Between 2 & 4 which butt has the heavier muscled cushion and heel?
8. Which butt has the least desirable external fat colour?
9. Between 1 & 2 which butt has the greater area of exposed lean?
10. Between 1 & 3 which butt has the higher amount of trimmable fat alongside the knuckle?

2.8.2 Beef rump and loins

The rump and loin primals are high value cuts for the Australian and export markets.

Emphasis: Quality followed by yield and trimness

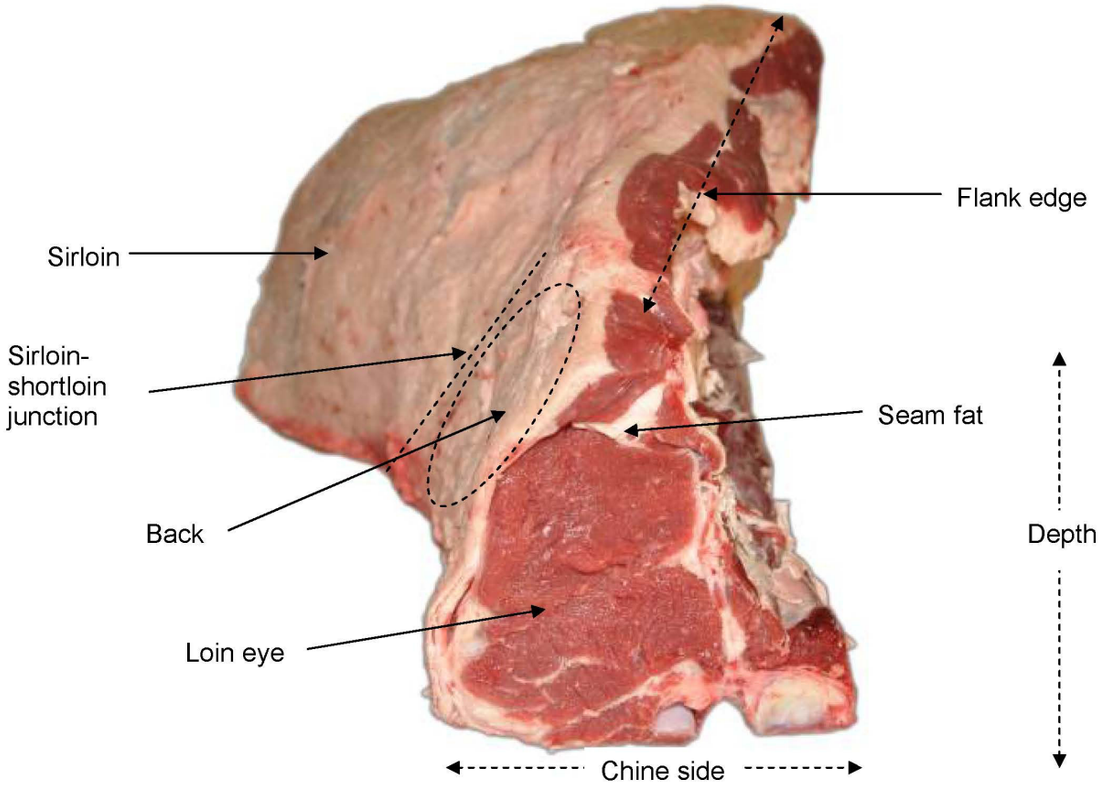
Areas of evaluation for rump and loins:

- Loin eye – muscularity, trimness, quality
- Rump face – quality, muscularity, trimness
- Loin edge – external trimness
- Flank – external trimness

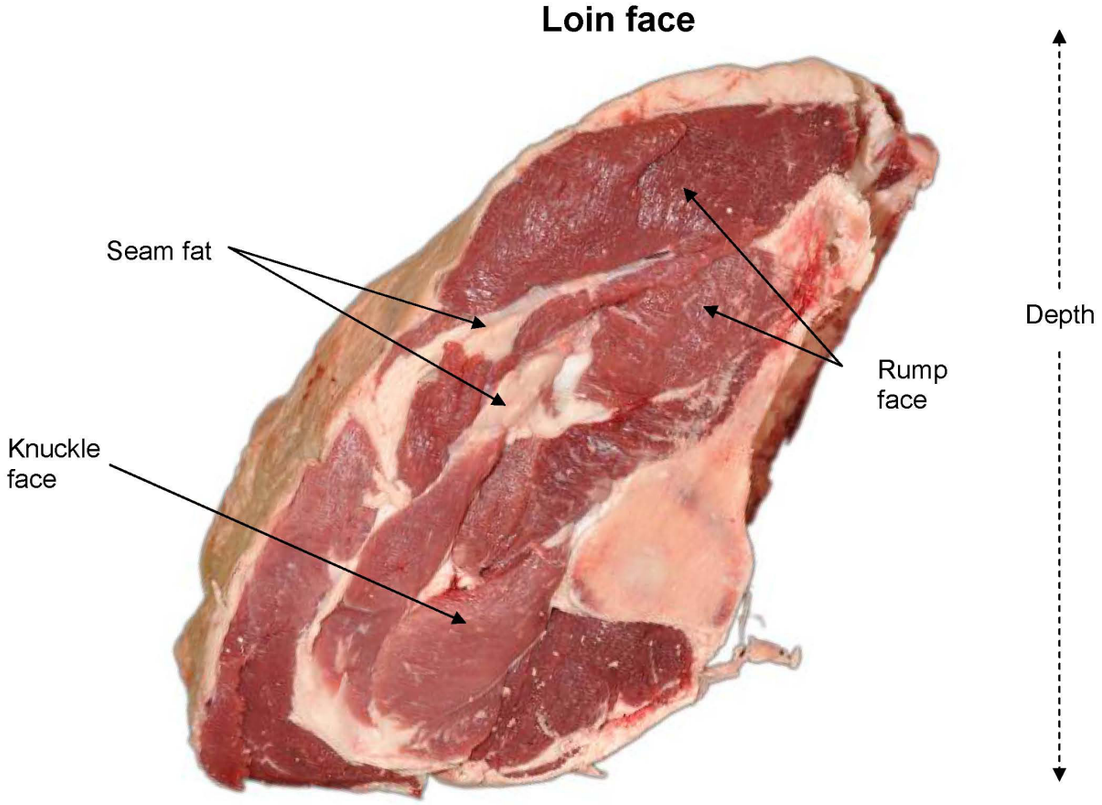
Evaluation terminology for rump and loins

Muscling	Trimness	Quality
Loin eye Larger More symmetrically shaped **Sirloin face** Greater area of exposed lean Deeper Wider Meatier Larger **Shortloin** Plumper Wider More muscular Fuller Longer **Sirloin section** Plumper Fuller Wider More muscular	**Less fat over the:** • Loin eye • Tail region • Sirloin face (top and bottom) • Shortloin section/back • Sirloin section • Sirloin-loin junction • Loin edge • Flank edge Less seam fat in the sirloin face Less kidney and pelvic fat	**Marbling in the loin eye and sirloin face** • Higher degree • Greater amount • More finely dispersed **Colour of lean in loin eye and sirloin face** • Brighter • More youthful • More cherry red **Firmer lean in loin eye and sirloin face** **Finer textured lean in loin eye and sirloin face** **Fat** Whiteness Firmness

Beef rump and loin terminology



Loin face



Sirloin face

Examples of questions used for rump and loin evaluation classes in ICMJ contest 2005 (rump and loins)

1. Which primal had the largest loin eye?
2. Which primal had the smallest loin eye?
3. Which primal was the trimmest over the loin eye?
4. Which primal had the whitest fat colour?
5. Which primal had the most marbling in the loin eye?
6. Which primal has the most seam fat in the loin face?
7. Which primal had the brightest colour lean in the loin eye?
8. Which was the highest yielding rump and loin?
9. Which primal was the fattest over the loin eye?
10. Which primal is the fattest over the rump face?

2006 (Shortloins)

1. Between1 and 2, which primal has the smallest loin eye?
2. Which primal had the most desirable meat texture as well as the brightest, most youthful lean in the loin face?
3. Which primal displayed the highest degree of marbling in the loin eye?
4. Which primal had the most trimmable fat along the loin edge?
5. Between 1 and 2 which primal had the most marbling in the loin eye?
6. Which primal had the least trimmable fat alongside the loin eye?
7. Which primal has the smallest tenderloin in the sirloin face?
8. Which primal has the thickest external fat over the sirloin face?
9. Between 1 and 3 which primal has the larger area of exposed lean in the sirloin face?
10. Between 1 and 2, which primal displayed the most seam fat in the sirloin end?

2007 (Shortloins)

1. Which primal is the trimmest alongside the loin eye in the loin face?
2. Which primal has the darkest colour loin eye in the loin face?
3. Which primal has the least amount of kidney fat?
4. Between 1 and 3 which primal has the least amount of seam fat in sirloin face?
5. Which primal has the most trimmable fat alongside the sirloin face?
6. Which primal is trimmest along the flank edge?
7. Between 1 and 2 which primal has the larger loin eye in the loin face?
8. Between 1 and 2 which primal has the more desirable meat colour in the tenderloin
9. Between 1 and 2 which primal has the softer meat texture?
10. Between 3 and 4 which primal has more marbling in the loin eye in the loin face?

2.8.3 Beef Shortloins

The shortloins are high value cuts for the Australian and export markets.

Emphasis: Quality followed by yield and trimness

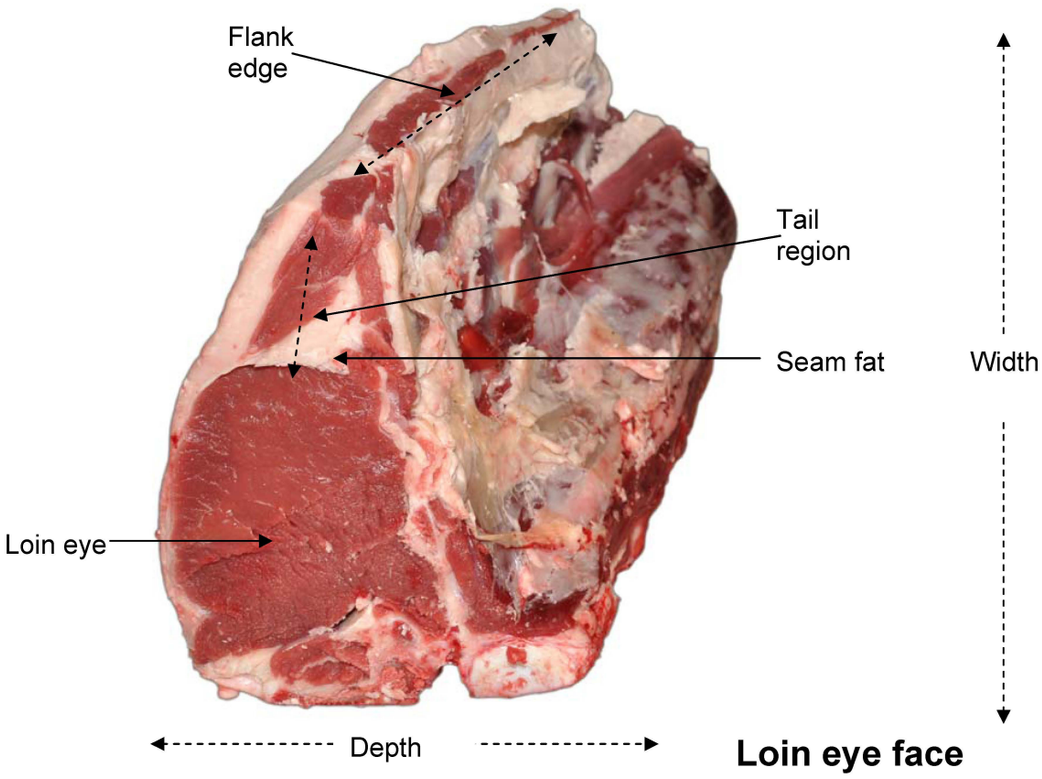
Areas of evaluation for shortloins:

- Loin eye – muscularity, trimness, quality
- Sirloin face – quality, muscularity, trimness
- Back - muscularity
- Top Loin and Tenderloin - muscularity
- Loin edge – external trimness
- Flank – external trimness

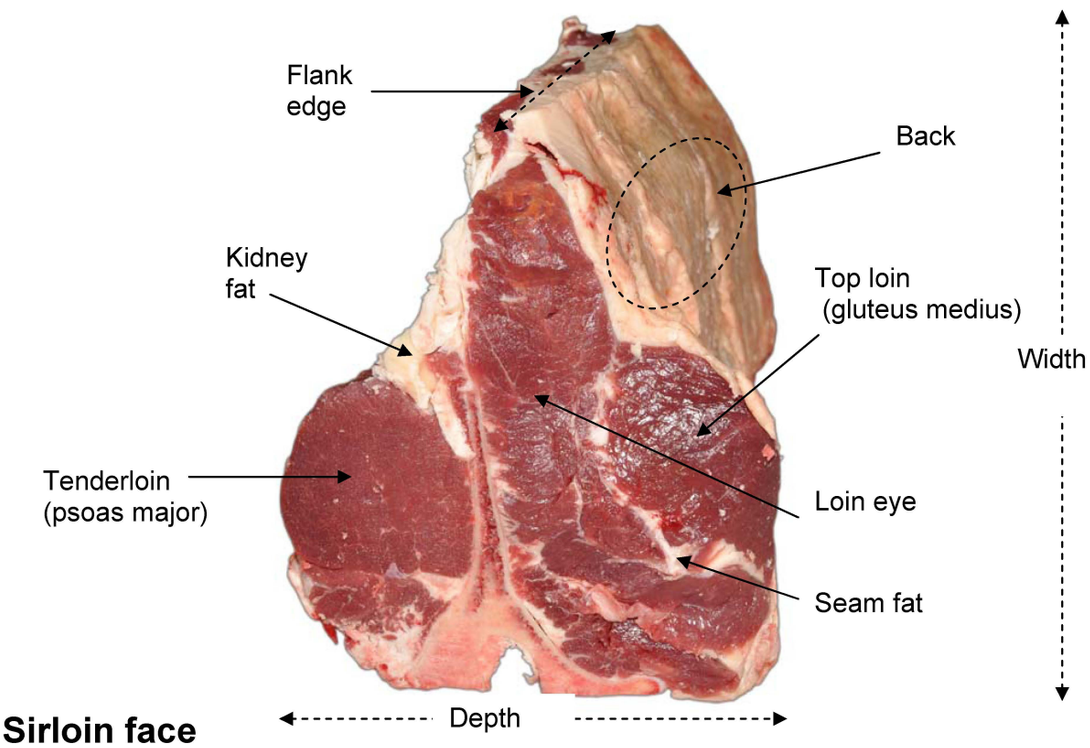
Evaluation terminology for shortloins

Muscling	Trimness	Quality
Loin eye Larger More symmetrically shaped **Sirloin face** Greater area of exposed lean Deeper Wider Meatier Larger **Back** Plumper Wider More muscular Fuller Longer **Tenderloin** Larger	**Less fat over the:** • Loin eye • Sirloin face (top and bottom) • Back • Flank edge Less seam fat in the sirloin face Less kidney fat	**Marbling in the loin eye and sirloin face** • Higher degree • Greater amount • More finely dispersed **Colour of lean in loin eye and sirloin face** • Brighter • More youthful • More cherry red **Firmer lean in loin eye and sirloin face** **Finer textured lean in loin eye and sirloin face** **Fat** Whiteness Firmness

Beef shortloin terminology



Loin eye face



Sirloin face

2.8.4 Beef ribs

The ribs are another high value primal for the Australian and export markets.

Emphasis: Quality followed by yield and trimness

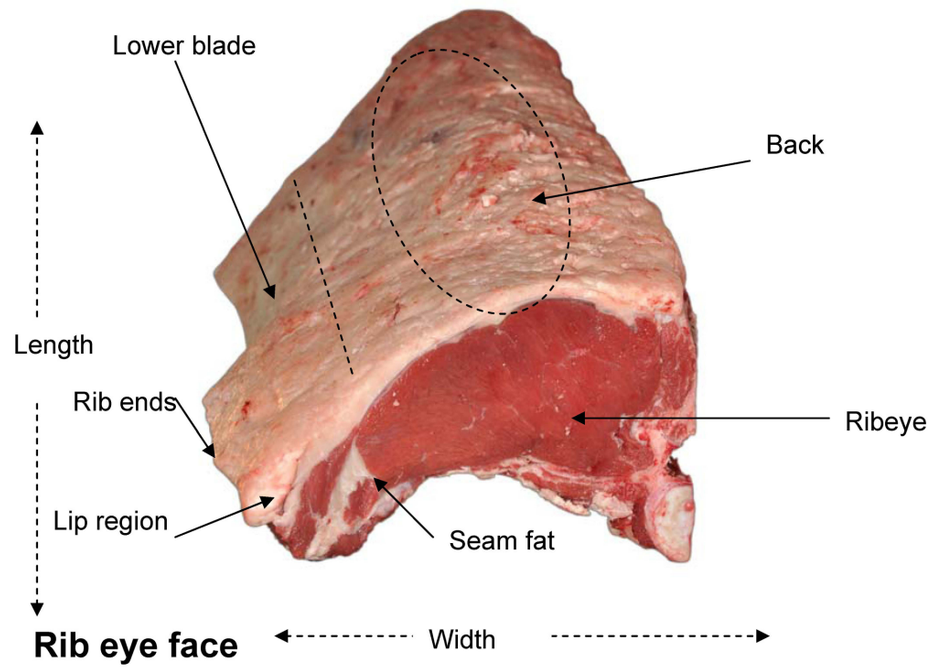
Areas of evaluation for rib sets

- Rib eye – muscularity, external trimness, quality
- Blade face – quality, muscularity, trimness
- Rib ends – external trimness
- Back – trimness and yield
- Flank – external trimness

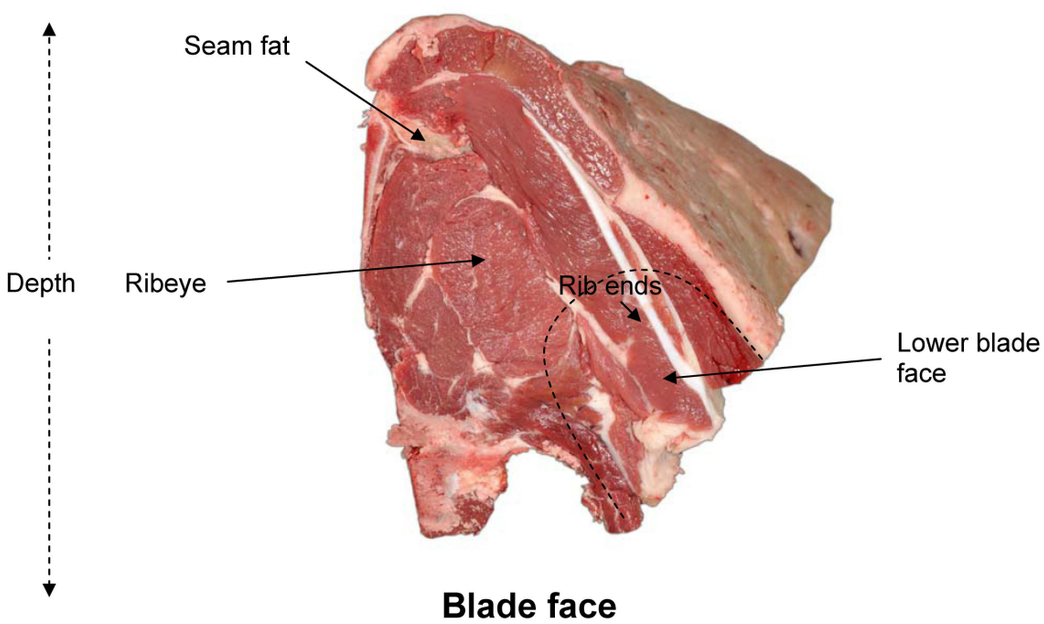
Evaluation terminology for rib sets

Muscling	Trimness	Quality
Rib eye Larger More symmetrically shaped **Blade face** Greater area of exposed lean Deeper Wider Meatier Larger eye of the blade face **Back** Plumper Wider More muscular Fuller Longer	**Less fat over the:** • Rib eye • Lower rib • Blade face • Back • Rib ends • Lower blade Less seam fat in the blade face	**Marbling in rib eye and blade face** • Higher degree • Greater amount • More finely dispersed **Colour of lean in rib eye and blade face** • Brighter • More youthful • More cherry red **Firmer lean in rib eye and blade face** **Finer textured lean in rib eye and blade face** **Fat** Whiteness Firmness

Beef ribset terminology



Rib eye face



Blade face

Examples of questions used for rib set evaluation classes in ICMJ contest

2005

1. Between 1 and 3 which rib had the most marbling in the blade face?
2. Which rib had the smallest eye in rib and blade face?
3. Which rib had the most fat over the rib ends?
4. Which was the highest yielding rib?
5. Between 2 and 3 which had the poorest texture in the rib face?
6. Which rib had the most fat over the rib eye on the rib face?
7. Between 1 and 2 which rib had the most marbling in the rib face?
8. Which rib had the least amount of fat over the rib eye on the rib face?
9. Which rib would yield the lowest amount of retail cuts?
10. Which rib had the least desirable fat colour?

2006

1. Which Primal has the largest area of exposed lean in the blade face?
2. Between 3 and 4, which primal has the brighter, whiter external fat colour?
3. Between 1 and 3, which rib has the higher degree of marbling in the rib eye at the rib eye face?
4. Which rib has the largest rib eye in the blade face?
5. Between 3 and 4 which rib exhibits more marbling in the rib eye on the blade face?
6. Between 1 and 3, which rib has less trimmable fat alongside the rib eye at the rib eye face?
7. Which rib has the smallest rib eye at the rib eye face?
8. Which rib has the highest cutability?
9. Between 2 and 3 which rib has more external fat over the back?
10. Which rib has the most fat along the rib ends?

AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

3.0 Lamb Evaluation

Carcases and retail cuts

3.1 Lamb carcase evaluation

There are three broad attributes of a lamb carcase that contribute to its suitability to a given market specification or to a customers expectation. These are grouped as:

- Leanness
- Muscularity
- Quality

When evaluating carcases according to the above factors, it is important to consider the customer that the carcase will be supplied to. Market specifications are determined by the customer and hence carcases should be produced and evaluated to ensure conformance to the specifications.

There is not any one carcase trait that makes an ideal product. When evaluating carcases, the above attributes should be considered independently and then combined to produce an overall evaluation outcome.

The AUS-MEAT definition of a lamb carcase is: Female or castrate or entire male ovine that has 0 permanent incisor teeth

3.2 Lamb carcase yield

The leanness or trimness of a carcase will ultimately influence the yield of that carcase and hence profitability. Leanness will influence time spent trimming a carcase to customer specifications and will affect the saleable retail yield.

The highest yielding carcases are both heavily muscled and lean while the lowest yielding carcases tend to be lightly muscled and over fat or poorly finished and both lean and lightly muscled.

Carcase leanness is influenced by the following factors which require consideration when evaluating a carcase;

- Fat coverage
- Fat distribution
- Sex

3.2.1 Fat coverage

Sufficient fat coverage is necessary on a carcase to:

- Minimise carcase dehydration which can result in yield losses
- Protect muscles from severe chilling regimes that can result in muscle toughening.
- Prevent discolouration (blackening) during prolonged chilled storage

The best indication of carcase fatness is fat depth over the middle of the eye muscle. As this is difficult to measure (or assess), the best practical site for objective measurement is the GR site. The GR site is defined as:

11 cm from the mid line over the 12th rib (GR site).

GR measurements then determine the AUS-MEAT fat class a carcase falls into. Figure 18 illustrates the various fat classes, with Class 1 being the leanest and Class 5 the fattest. Carcases of fat score 2 and low 3 would yield the most acceptable subcutaneous fat coverage over retail cuts. These classes would ensure adequate carcase coverage as well as minimal trimming requirements.

AUSMEAT fat classes for sheepmeat

Measuring fat depth at the GR site

3.2.2 Fat distribution

The yield of saleable meat in a carcase is primarily affected by the fatness of the carcase in relation to its weight. The thickness and distribution of external fat on the carcase (subcutaneous fat) is an important factor in carcase yield. At the same weight, a fat carcase will have a lower yield than a leaner carcase.

Other than having a moderate fat cover, carcases should have a normal fat distribution for optimal yields. It is important to be aware that fat is usually deposited last on the leg and shoulder. Points on the carcase to assess include:

- Leg and shoulder – ideally a light cover (light bluish colour rather than thick white fat).
- Flank and breast – will generally see heavier deposits
- Tail (dock) – fat lambs will exhibit a deep fat deposit
- Leg and chump junction
- Kidney and pelvic fat - excess channel fat will reduce the yield of a lamb carcase.

3.3 Lamb carcase muscularity

Muscularity of lamb carcases can aid in yield assessment and can potentially be important in determining the saleability of cuts due to shape and size.

Therefore if two carcases have the same apparent fat measurements and carcase weights the more heavily muscled carcase in the major primal cuts would be more desirable.

Main areas for assessment of carcase muscularity (thickness and depth) include:

- Leg and chump - well developed muscle will be displayed through thick and bulging legs, evaluated from front and side observations.
- Loin – good loin eye development will be evident through a well rounded loin
- Shoulder – ideally should be well muscled down onto the breast
- Ribs – good muscularity will be shown through well fleshed ribs

It is important when assessing muscularity, that this is not confused with the fatness of the carcase.

3.4 Lamb carcase quality

Regardless of leanness and muscling, quality is of paramount importance when assessing carcases for a customer specification.

In lamb carcases, a limited number of quality factors can be assessed and include:

- Fat colour
- Fat properties (firmness)
- Meat colour

3.4.1 Fat colour

White or creamy white fat is most desirable. However variation in fat colour of lamb carcases tends not to be a significant problem in the Australian domestic market.

Fat colour will not affect eating quality of sheepmeat, but can influence the eye appeal to consumers as a retail cut.

3.4.2 Fat properties

As with beef carcases and primals, the fat should be firm on the chilled carcase. Fat on lamb carcases can range from being dry and firm to exhibiting flaky characteristics through to being soft and oily, which is undesirable.

Assessment of meat quality of a lamb is somewhat limited but can be predicted by assessing the degree of feathering between the ribs. Feathering can be described as the white streaks of fat between the rib bones. A high degree of feathering is an indication of high marbled lean within the carcase.

3.4.3 Meat colour

As lamb carcases are not quartered at the rib eye for assessment, meat colour assessment is limited to the flank and thoracic areas.

A bright reddish pink is the most desirable meat colour. Dark colour is undesirable to consumers and can indicate poor eating quality. An explanation of the important of meat colour can be found in the beef carcase evaluation section.

3.5 Lamb carcase evaluation

Emphasis: Yield (muscularity and leanness) followed by quality

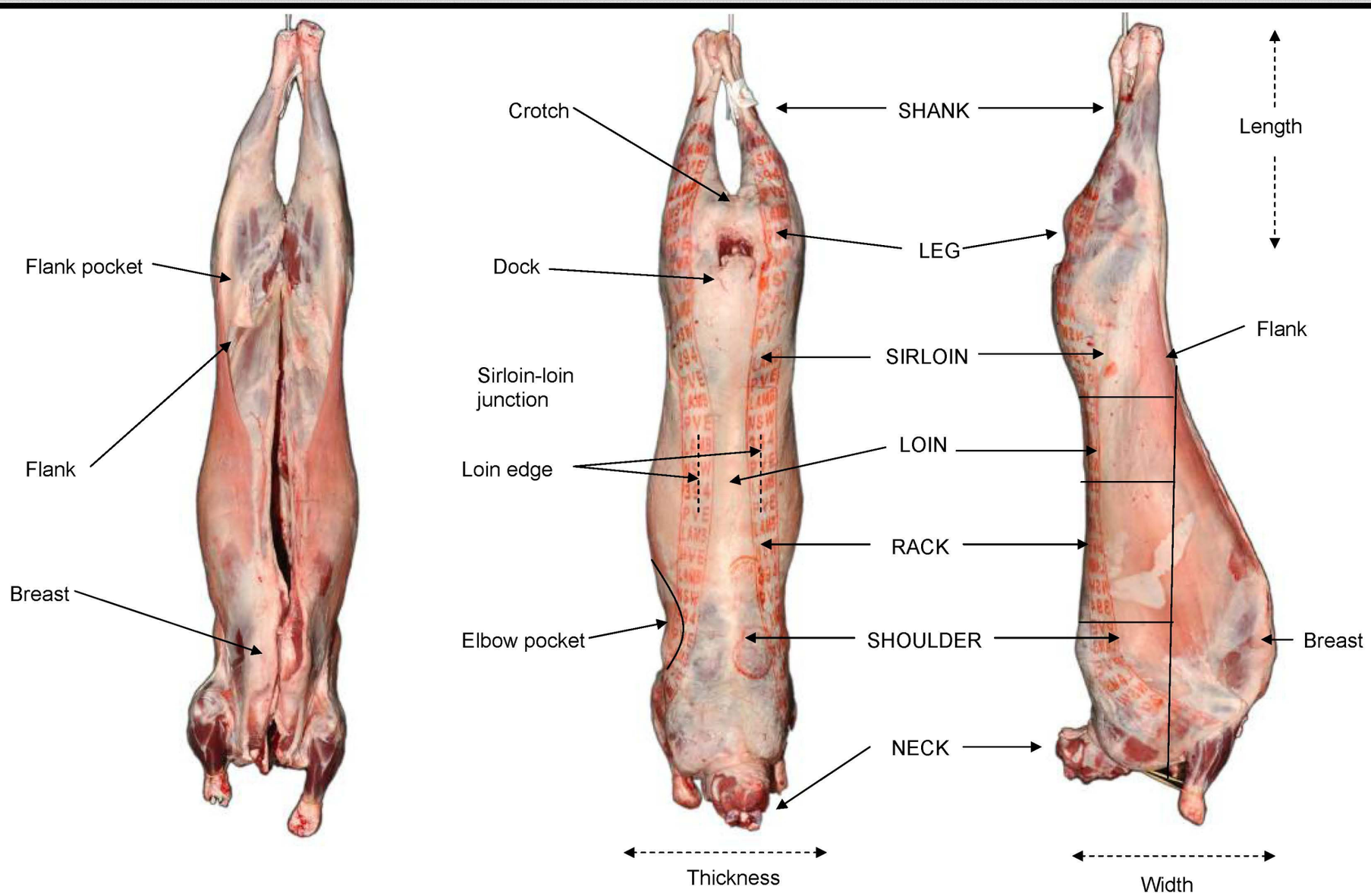
Areas of evaluation for lamb carcases

- Leg
- Chump
- Loin
- Shoulder
- Dock
- Flank
- Kidney and pelvic area
- Breast

Evaluation terminology for lamb carcases

Muscling	Trimness	Quality
Leg Thicker Wider Longer Plumper More bulging More muscular **Sirloin** More prominent Thicker Plumper More bulging Fuller More muscular **Loin** Thicker Fuller More muscular **Rack** Thicker Fuller More muscular **Shoulder** Thicker Wider Deeper More muscular More bulging **Shank** Shorter	**Less fat over the:** • Loin • Loin edges • Leg • Sirloin • Rack • Shoulder • Dock • Breast • Flanks • Elbow pockets • Crotch	**Flank streaking** Greater amount More extensive **Lean** Colour in flank region Brighter More youthful More reddish pink **Ribs** Feathering Redder Rounder **Fat colour** Firmer Whiter

Lamb carcase terminology



Examples of lamb carcase questions in ICMJ contest

2005

1. Which lamb has the thickest most muscular leg?
2. Which lamb has the poorest muscled shoulder?
3. Between 1 and 4 which lamb was leaner in the shoulder pocket?
4. Which lamb would yield the highest amount of retail cuts?
5. Which lamb has the poorest muscled leg?
6. Between 3 and 4 which lamb was leaner over the leg?
7. Which lamb had the most fat in the shoulder pocket?
8. Between 2 and 3, which lamb was leaner over the chump?
9. Which lamb had the leanest breast?
10. Which lamb was the lowest yielding?

2006

1. Which is the overall poorest muscled lamb?
2. Between 3 and 4 which lamb had the wider, more muscular leg?
3. Which lamb was the leanest over the sirloin, loin and shoulder?
4. Which lamb had the most cod/udder fat?
5. Which carcase had the most trimmable fat over the sirloin and dock?
6. Between 1 and 2 which lamb had the heavier muscled leg, loin and shoulder?
7. Between 1 and 2 which lamb had the least amount of bluing over the leg?
8. Between 3 and 4 which lamb had the most fat in the flank?
9. Between 1 and 3 which lamb had the heavier muscled rack and shoulder?
10. Which lamb was leanest over the breast?

2007

1. Which carcase was fattest over the dock and loin?
2. Between 2 & 4 which carcase was the higher yielding?
3. Which carcase had the least elbow pocket fat?
4. Which carcase had the heaviest muscled leg, loin, rack and shoulder?
5. Between 2 & 3 which carcase had a higher amount of trimmable fat over the rack?
6. Which carcase had the thinnest, poorest muscled leg?
7. Which carcase was fattest in the flank?
8. Which lamb does not have kidneys?
9. Which carcase had the lowest percentage of closely trimmed retail cuts?
10. Between 1 & 4 which carcase was trimmest overall?

AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

4.0 Pork evaluation

Carcases

4.1 Pork carcase evaluation

There are three broad attributes of a pork carcase that contribute to its suitability to a given market specification or to a customers expectation. These are grouped as:

- Muscularity
- Trimness
- Quality

When evaluating carcases according to the above factors, it is important to consider the customer that the carcase will be supplied to. Market specifications are determined by the customer and hence carcases should be produced and evaluated to ensure conformance to the specifications.

There is not any one carcase trait that makes an ideal product. When evaluating carcases, the above attributes should be considered independently and then combined to produce an overall evaluation outcome.

4.2 Pork carcase muscularity

Muscularity of pork carcases can aid in yield assessment and can potentially be important in determining the saleability of cuts due to shape and size.

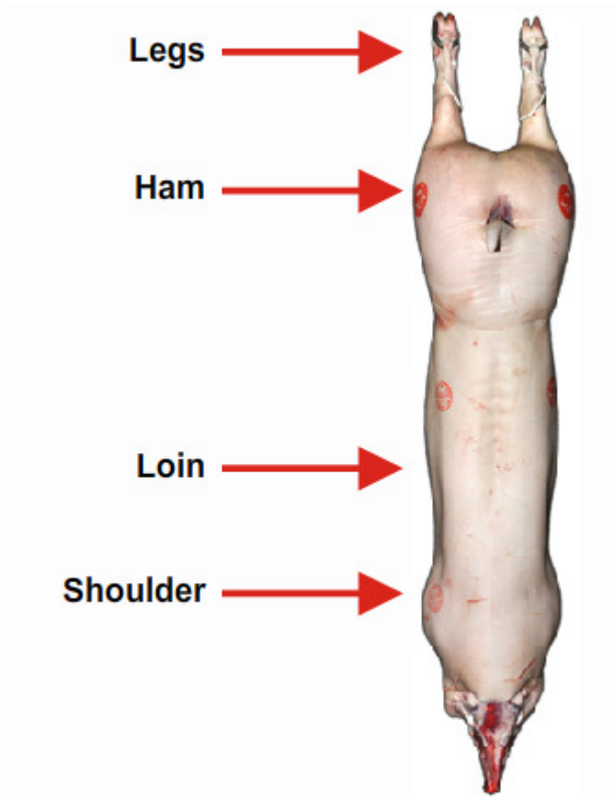
It is important to be able to distinguish between the thickness, plumpness and firmness of a carcase is due to muscle development rather than fat deposition.

Main areas for assessment of carcase muscularity include:

- Legs
- Loin
- Shoulder

Note: Pork carcases in the Australian ICMJ contest will not be split (i.e they will be whole carcases).

Muscling assessment points of a pork carcase



The following table provides an indication of the difference in carcase attributes between thick and thin muscularity.

Assessment of pork carcase muscularity

Point of assessment	This muscling/ low fatness	This muscling/ high fatness	Average muscling	Thin muscling/ low fatness	Thin muscling/ high fatness
Legs	Thicker than loin	Slightly thicker than loin	Equal thickness through legs and loin	Thicker in centre of legs than loin	Thinner than loin
Loin	Appear full and well-rounded	Flat over the loin		Appear sloping and flat	Thicker than legs
Shoulder				Thicker than loin	

It is more desirable to produce carcases with thick muscling and low fatness to yield the highest percentage of saleable retail cuts that require minimal trimming.

4.3 Pork carcase trimness

The trimness of a pork carcase, in particular external fat will ultimately influence the yield of that carcase and hence profitability. Leanness will influence time spent trimming a carcase to customer specifications and will affect the saleable retail yield.

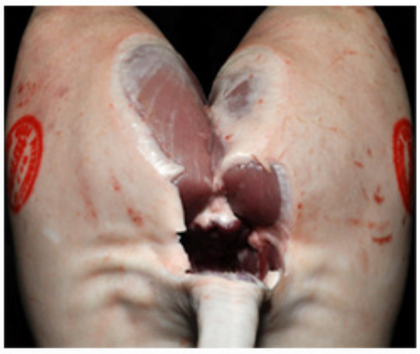
The highest yielding carcases are both heavily muscled and lean while the lowest yielding carcases tend to be lightly muscled and over fat or poorly finished and both lean and lightly muscled.

The following areas are points to evaluate when assessing a carcase for trimness in determining the ability of the carcase to yield the greatest amount of lean saleable retail cuts.:

- Collar fat - on the inside of the leg area
- Internal belly edge – fat thickness
- Sternum – fat thickness

Areas to assess for trimness:

1. Collar area



2. Belly edge

3. Sternum

4.4 Pork carcase quality

In pork carcases, a limited number of quality factors can be assessed as carcases in the Australian ICMJ contest are left entire (i.e not split or quartered)

- Meat colour and texture
- Fat properties of external fat coverage
- Skin
- Meat quality (intramuscular fat)

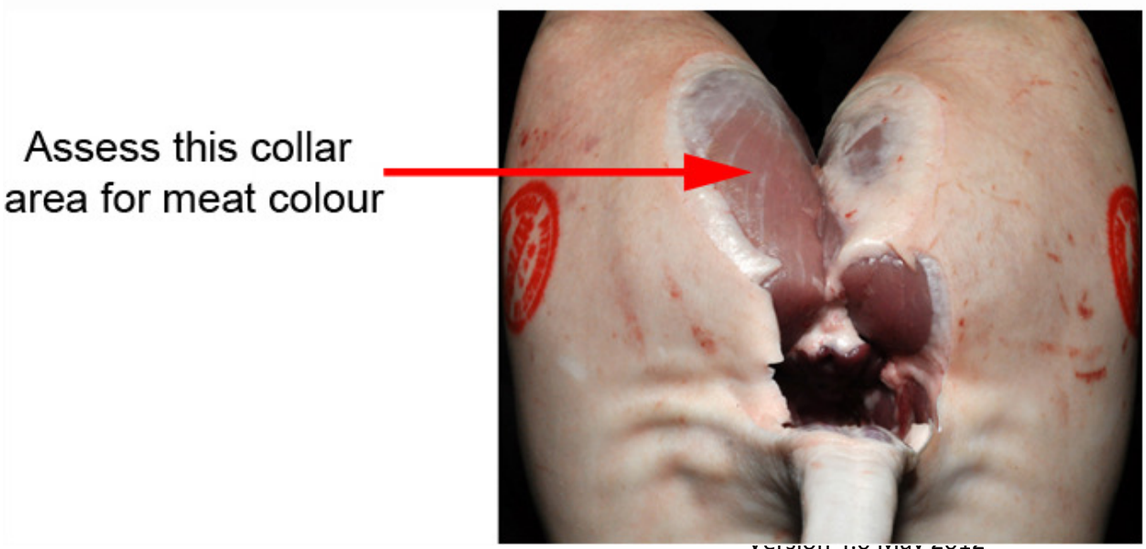
4.4.1 Meat colour and texture

The colour and texture of the exposed lean sometimes visible in the collar area should be:

- Fine textured.
- A bright greyish pink colour is highly desirable.
- Pale coloured soft watery lean is severely criticised.
- Dark coloured lean is undesirable.

In a full carcase, the lean can be assessed by viewing the lumbar lean or exposed lean around the collar.

Pork carcases can exhibit a meat quality phenomenon called PSE (pale, soft and exudative meat). PSE meat also is a problem at retail as it exudes large volumes of drip in the retail pack, which is unsightly to the consumer. Also from the food service perspective, the yield of PSE meat is lower when cooked. PSE meat is a major problem in pig meat.



4.4.2 Fat properties

The exterior fat covering should be:

- Firm
- White coloured
- Dry to touch
- Dry in appearance.
- Soft oily and discoloured fat is undesirable.

4.4.3 Skin

The skin of a high quality pork carcase should be smooth and fine grained.

4.4.4 Meat quality

Assessment of meat quality of a pork carcase is somewhat limited but can be predicted by the assessing the degree of feathering between the ribs. Feathering can be described as the white streaks of fat in the meat between the bones.

A high degree of feathering is an indication of high quality marbled lean within the carcase.

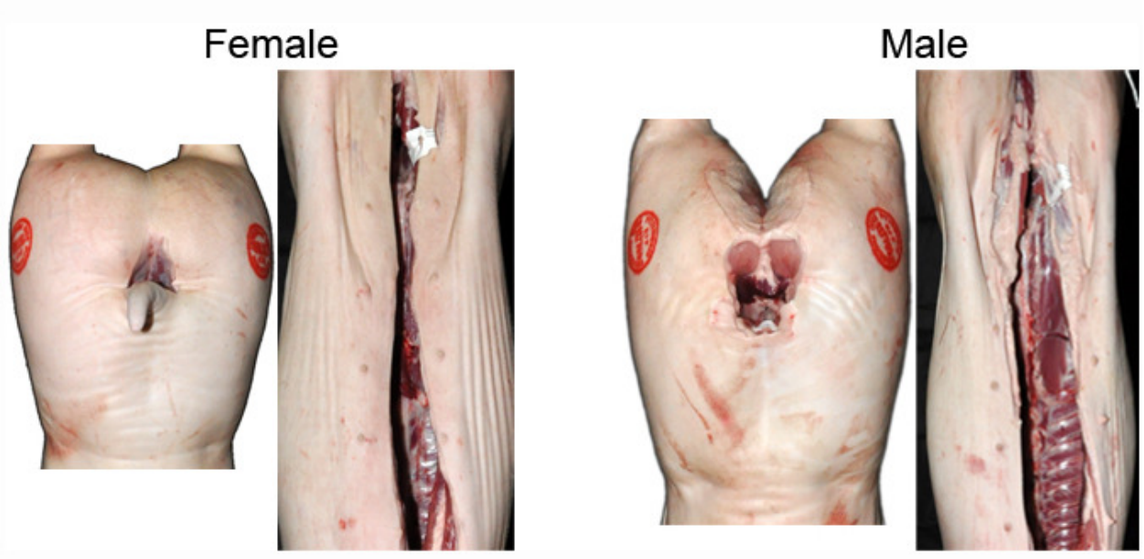
4.5 Determining gender of pork carcases

4.5.1 Male:

- Rough fat surface in the naval edge and the belly pocket along the split edge of the body where the preputial sheath was removed.

4.5.2 Female (gilt):

- Smooth fat surface in the naval edge and belly pocket along the split edge of the belly



4.6 Pork carcase evaluation

Emphasis: Yield (muscularity and trimness) followed by quality

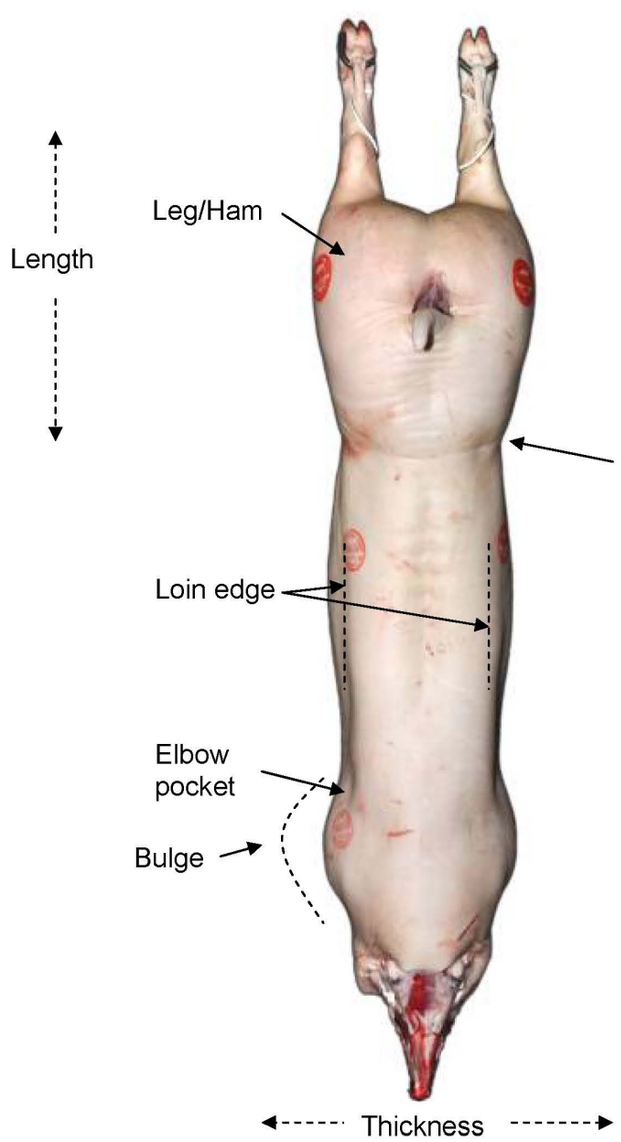
Areas of evaluation for pork carcases

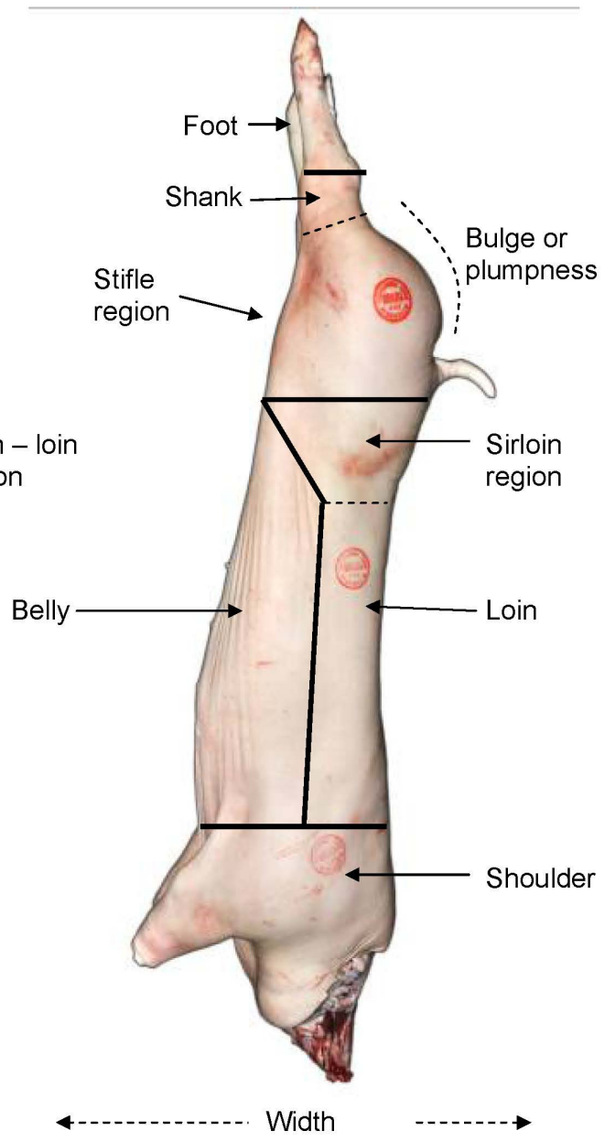
- Ham
- Sirloin
- Mid-loin
- Rib-loin
- Shoulder
- Belly
- Butt collar
- Ribs

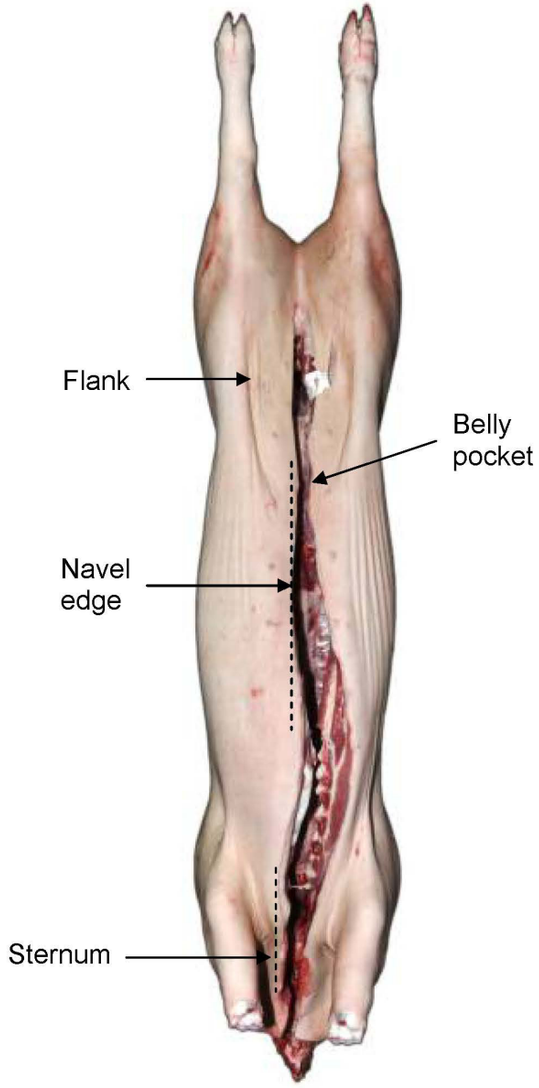
Evaluation terminology for pork carcases

Muscling	Trimness	Quality
Ham Thicker Wider Longer Plumper More bulging More muscular **Sirloin** More prominent Thicker Plumper More bulging Fuller More muscular **Mid loin** Thicker Fuller More muscular **Rib Loin** Thicker Fuller More muscular **Shoulder** Thicker Wider Deeper More muscular More bulging **Shank** Shorter	**Less fat over the:** • Collar • Belly pocket • Navel edge • Sternum	**Ribs** Feathering **Lean** Firmer Brighter

Pork carcase terminology







Examples of pork carcase questions in ICMJ contest

2005

1. Between 1 and 3 which carcass had the more muscular shoulder?
2. Which carcass had a more muscular, bulging ham?
3. Between 1 and 2 which carcass was leanest over the loin?
4. Which carcass had the poorest muscular ham?
5. Between 3 and 4 which carcass was leaner over the shoulder?
6. How many gilts?
7. Between 1 and 4 which carcass had the least muscular loin?
8. Which carcass was the fattest over the loin?
9. Between 2 and 3, which carcass had more fat over the sternum?
10. Which carcass is the highest yielding?

2006

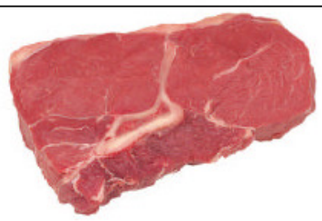
1. Which carcase had the deepest, heaviest muscled ham?
2. Between 1 and 3 which carcase has the wider shoulder?
3. Between 1 and 2 which carcase had more trimmable sternum fat?
4. Which carcase had the poorest muscled ham?
5. Between 1 and 3 which has the more shapely, heavily muscled loin?
6. Which was the longest carcase?
7. Between 1 and 2 which carcase had the trimmer sirloin and loin?
8. Which carcase had the highest cutability?
9. How many barrows were there?
10. Between 3 and 4 which carcase had the least amount of elbow pocket fat?

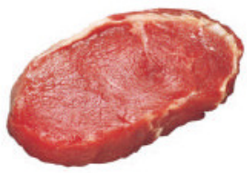
2007

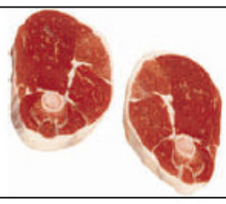
1. Which carcase had the heaviest muscled ham and loin?
2. Which carcase had the least shoulder pocket fat?
3. Between 1 & 2, which carcase had the fattest belly?
4. How many gilt carcases were in the class?
5. Which carcase has the lowest yielding ham?
6. Between 3 & 4 which carcase had the wider shoulder partially due to fat?
7. Between 3 & 4 which carcase was fatter over the sternum?
8. Between 1 & 3 which carcase had the leaner ham, loin and shoulder?
9. Which carcase had the least feathering?
10. Between 3 & 4 which carcase was the highest yielding?

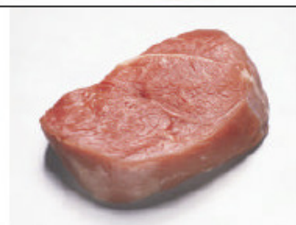
AUSTRALIAN INTERCOLLEGIATE MEAT JUDGING ASSOCIATION INC.

5.0 Retail cut identification

Beef	Blade steak bone in	Blade	Wet	Look for the Y-bone	
Beef	Blade steak boneless	Blade	Wet	Contains a number of muscles including the oyster blade. It will contain an obvious seam of connective tissue where the Y-bone has been removed.	
Beef	Oyster blade steak	Blade	Dry	Oval in shape, grainy texture and often darkish meat colour. Will have an obvious seam of connective tissue through the middle.	

Species	Cut name	Primal	Cook method	Features	Picture
Beef	Rump steak	Rump	Dry	Will include a large cap muscle and external fat coverage.	
Beef	Fillet steak	Tenderloin	Dry	Fine texture, little connective tissue. No external fat. Small portion size in diameter	
Beef	Rib eye steak	Cube roll	Dry	A roundish shaped steak roughly the size of your palm. Will include the spinalis muscle that runs along the side of the steak, separated from the rib eye muscle by a piece of seam fat.	
Beef	Rib steak bone in	Rib set	Dry	Will include a bone which is usually frenched (ie. trimmed of meat and fat). Looks like a large cutlet.	
Beef	Shin beef boneless	Shin	Wet	Coarse texture and exhibits a lot of connective tissue.	

Beef	T bone steak	Shortloin	Dry	Contains fillet muscle and external fat over sirloin edge. Bone is shaped as a 'T'	
Beef	Sirloin steak bone in	Shortloin	Dry	Will not include fillet muscle but will have external fat coverage. Will also have a bone on 1 side.	No image available
Beef	Sirloin steak boneless	Striploin	Dry	Will not include fillet muscle but will have external fat coverage. Looks similar to rib eye steak but has external fat.	
Beef	Round steak	Knuckle	Wet	May contain a cap muscle and will have little or no external fat. The meat colour is often paler in this cut and the cut will be round in shape.	
Beef	Topside steak	Topside	Wet	Contains a cap muscle and will have a coarser texture. Will be quite large in shape and flat. Generally will be very lean.	
Beef	Silverside steak	Silverside	Wet	Coarser texture and silvery appearance. Large flat cut. Looks like the heel and toe of a shoe.	
Beef	Chuck steak	Chuck	Wet	Looks the 'messiest' cut on display with many muscles and a lot of connective tissue	
Beef	Shin beef bone in	Shin	Wet	Coarse texture and exhibits a lot of connective tissue. The bone is round and in the centre of cut taking up approx 50% of the display.	
Lamb	Leg chop	Leg	Wet	Cut across the legs muscles and includes the bones associated with the leg. Will exhibit a thick bone in the centre and is one of the larger chops derived from the lamb carcase.	
Lamb	Chump chop	Dry	Dry	Will have external fat coverage with a bone at the bottom of a large area of lean.	

Lamb	Round roast	Leg	Dry	Will be trimmed to silverskin. Looks like the knuckle in beef but a lot smaller. Very round in appearance	
Lamb	Round steak	Leg	Dry	Looks like a miniature beef round steak. All muscles are round in appearance.	
Lamb	Topside roast	Leg	Dry	Often confused with lamb round roast. Look for external fat and flatter shape.	
Lamb	Topside steak	Leg	Dry	Cap removed and cut across the face of the muscle. Long flat shape, very lean and often dark colour.	No image available
Lamb	Shank	Leg	Wet	Will be an obvious leg bone covered with meat and prominent silverskin. Both cut ends will show bone. May be displayed frenched where meat has been trimmed away from end of the shank bone.	
Lamb	Midloin chop	Loin	Dry	Must have the fillet attached. Will exhibit external fat coverage and a tail. Will look like a mini T-bone.	
Lamb	Ribloin cutlet	Ribloin	Dry	Will include the rib eye and look like a small eye of meat on a long narrow bone	

Lamb	Fore-quarter chop	Fore-quarter	Wet	Will be made up of several muscles within the chop. Also a large lamb chop	
Lamb	Eye of loin	Loin	Dry	Is the M.longissimus dorsi or eye muscle. Will have silver skin removed. Will be smooth and long.	
Lamb	Butterfly steak	Eye of loin	Dry	The symmetry and cut line give this cut away. Meat colour will generally be darker than that of a pork butterfly steak.	
Pork	Spare ribs	Belly	Wet	Strip of fat along top. Made up of many muscles. Looks like a thick bacon rasher.	
Pork	Loin chop	Loin	Dry	Has a T shaped bone. Will usually have a tail	
Pork	Loin cutlet	Loin	Dry	Will have a bone at one end.	
Pork	Loin steak	Loin	Dry	Very lean. May have a rim of fat on one side	
Pork	Butterfly steak	Loin	Dry	Will have a butterfly shape from where one steak has been split in half and folded. May have a rim of fat on one side.	

Pork	Rolled loin roast	Loin	Dry	Will have a fat covering and be visibly rolled and usually strung to hold in place	
Pork	Fillet	Tenderloin	Dry	Long, thin single piece of meat.	
Pork	Leg roast	Leg	Dry	May not be rolled and strung like other roasts. Will exhibit a leg bone in the centre of the face. Will taper off to a hock.	
Pork	Shoulder roast	Fore-quarter	Dry	Will generally be rolled and strung. Will look to have many muscles in the face. May taper off at the end. Boneless