Identifying Beef Carcasses

How to distinguish cows from bulls, steers and heifers and identify age and conformation by studying the carcase.
Introduction

Beef is produced from a wide range of breeds and different types of cattle from either the dairy or suckler herd. Each of these has their own specific characteristics and qualities. This publication will try and explain how to identify different types, age and sex of cattle by examining the carcase.

Different types of cattle

Cows
Cows are female cattle that have produced a calf. Cows are generally referred to as dairy cows or suckler cows.
Over 60% of cows are slaughtered at 8 years or less with a further 20% by 10 years. Only 10% of cows are over 12 years of age at slaughter which will typically be suckler cows.

Heifer
A female that has never calved and is primarily used for beef production.

Bull
An intact (testicles present and not removed) male used for beef or breeding purposes.

Steer
A male that has been castrated before reaching sexual maturity and is used for beef.
Dairy herd

Dairy cow
Used for milk production.

Dairy bull
Used for breeding and at the end of its breeding life will be used for meat production.

Dairy calf
Bred so the cow can produce milk and the calf can be used as a replacement for the dairy herd or for meat production. The bulls can be used for breeding or meat production.

Dairy continental cross

Dairy cow
Used for milk production.

Continental bull
Used for breeding and at the end of its breeding life will be used for meat production.

Dairy continental cross calf
Bred so the cow can produce milk and the calf can be used for meat production.
Dairy cows

• Breeds of cow, in particular the Holstein Friesian, which produce high milk yields rather than being bred to produce meat yield. They generally produce a carcase with poorer shape or conformation (conformation class -O/P) and are relatively lean (fat class 1-3).

• Dairy cows produce calves in order to maintain the ability to produce milk and will have, on average, one calf per year.

• Are generally put in calf to a dairy bred sire to produce replacement females for the dairy herd, although sometimes put in calf to a beef bred bull.

• Dairy cows will be slaughtered as cull cows, either straight from the dairy herd or following a period of intensive finishing at the end of their productive life. This is, typically, after three lactations although some cows can remain productive for five or more lactations. Most dairy bred cull cows will be six years of age or less at slaughter.

Suckler herd

Suckler cows

• Suckler cows are typically beef breeds or cross breeds which produce calves for meat production.

• Cows will produce on average one calf per year which will remain with and suckle from the cow until it is weaned (typically between 7-10 months).

• At the end of their productive life, suckler cows will be finished and slaughtered as cull cows. On average, suckler cows will be older than dairy cows at slaughter. Approximately 10% of cows are slaughtered at 12 years or older and, typically, these will all be suckler cows.

• Suckler cows generally produce a carcase with a better shape or conformation than a dairy cow (conformation class R/O+) and generally have a higher level of fat cover (fat class 3-4).

Usage of cow beef

Because cow beef is generally less tender than prime beef, it is suited to longer and slower cooking methods. Cow beef is particularly suited to pot roasting and slow cooking although is often used for mince, burgers and dice products. In addition, some of the primal cuts are particularly sought after for export markets due to the various cooking methods, usage and palate found in different countries. For example, the rib eye of cow beef is often braised in European countries.

Suckler cows – produces calves for beef production

Suckler calf – the calf can be used for meat production or as a replacement for the breeding herd

Continental bull – used because of better conformation to increase meat yield
Bulls and steers

**Holstein Friesian**

Almost 45% of pure dairy males (Holstein Friesian) are slaughtered under 15 months of age, with approximately 50% of these slaughtered under 12 months of age. These will be largely young bulls finished on intensive cereal-based systems. Pure dairy steers are, on average, around 24-30 months of age at slaughter. Pure dairy males tend to produce a carcase with poorer conformation so only the better shaped ones will be eligible to carry the Quality Standard Mark.

**Continental breeds**

Are, on average, slaughtered as steers between 21-27 months of age and will generally have had a season out at grass before being finished for slaughter. However, over 10% of continental males are finished under 15 months of age which will include a proportion of young bulls as well as some faster finishing steers, which will have been intensively finished on a cereal-based ration. Continental breeds tend to produce a carcase with improved conformation, particularly suckler breeds and, therefore, depending on fulfilling age and maturation criteria will generally be eligible for the Quality Standard Mark.

**Native male cattle**

(such as Aberdeen Angus, Hereford and Shorthorn)

These make up a relatively small proportion of the kill in comparison to pure dairy and continental males. The majority of these cattle will be finished as steers after either one or two seasons at grass, with the average age at slaughter between 21 and 27 months. These breeds tend to have an average conformation and will largely be eligible for the Quality Standard Mark in terms of carcase conformation.
Identifying the sex of the animal by looking at the carcase

Typical differences between cow, heifer, steer and bull in carcase shapes, especially looking at the neck area and crest muscle (Rhomboideus). With cow beef, the chest tends to be larger/wider and you will notice evidence of udder removal.

10.5 year old Cow  2 year old Heifer  2.25 year old Steer  1.5 year old Bull  5.5 year old Mature Bull

= Rhomboideus
Identifying bulls and steers

- Bulls have a well-developed erector muscle and the erector muscle of a steer is slightly less developed.

- Fat colour of young bulls is often white due to the high cereal content of the diet in intensive bull finishing.

**Steer (castrated male)**

**2.25-year-old Steer** – Evidence of a pizzle root and a less-developed erector muscle.

**Bull (entire male)**

**1.5-year-old Bull** – Evidence of a pizzle root and a well-developed erector muscle.

**5.5-year-old Mature Bull** – Evidence of a pizzle root and a well-developed erector muscle.

*Also note colour change from white to cream*

= Erector muscle  = Evidence of pizzle root
Identifying the age of the animal

To establish the age of the animal by looking at a carcase is not an exact science as we need to consider the changes in bone structure and the form of the skeleton.

However, this might establish the physical age rather than the actual age of the animal and, therefore, the pictures of the carcases shown in this publication are very typical and could slightly differ between animals of similar age and sex.

When we are looking at the changes in bone structure of a split carcase we study the following:

- Aitch Bone (Ischium).
- Sacrum (Sacral vertebrae 1-5).
- Backbones (thoracic and lumbar vertebrae).
- Feather bones (spinous processes) including the buttons (cartilage of the spinous processes).
- Breastbone (Sternum).
Aitch bone (looking at where the carcase is separated)

- The line of cartilage around the thickest part of the aitch bone disappears as the animal gets older.
- Within female cattle, the shape changes with age from an arched shape towards a flatter shape.
- The ball of the aitch bone becomes flatter in cows. The depth of channel is also typically wider in cows than heifers.
- With age, the aitchbone becomes harder and more brittle and also changes colour from reddish to yellow.
- Cattle on predominantly forage diets will have a creamy fat colour, cows tend to have a yellower fat.

**Female cattle**

- 2-year-old
- 4-year-old
- 6.5-year-old
- 10.5-year-old

= Aitch bone
Aitch bone (looking at where the carcase is separated)

Bulls

1.5-year-old

2.5-year-old

5.5-year-old

= Aitch bone
Sacrum

• Young animals have cartilage between the individual bones.
• 12-18 months you can still detect some cartilage between the bones.
• As the animal gets older the bones become fused.
• With age, the bone colour also changes from reddish to yellow and becomes harder and more brittle.
Backbones

- As the animal gets older, the colour of the backbones changes from red to yellow. It starts at the back (lumbar sections) and gradually moves forward to the front (thoracic section).
- It will become more difficult to separate the individual backbones while de-boning as the cartilage in between the bones becomes harder.

Buttons (cartilage) on top of the feather bones

- The colour of the buttons on top of the feather bones changes as the animal gets older from white to yellow.
- With age, the buttons on the lumbar section start to calcify while the buttons of the thoracic region are still soft.
- In time, the cartilage of the buttons on the thoracic section also start to calcify and turn into bone.
- As the animal ages, the colour changes as ossification takes place.
Thoracic section

1.5-year-old

3-year-old

6.5-year-old

10.5-year-old
Ribs

• The shape of the ribs is slightly more rounded in young animals and generally becomes flatter, thinner and harder/more brittle as the animals gets older.
Breast bone

- The cartilage in between the segments of the breastbone calcifies as the animal gets older. It also becomes much harder to separate the rib cartilage from the breast bone section. The rib cartilage will become very hard as the animal gets older.
Other changes in carcase bones and cartilage

The colour, shape and density changes as the animal gets older and the bones become harder and more brittle. Here are a few typical examples of these changes:
Tibia joint

Breastbone cartilage (sternum) – Still soft

Tibia joint

Breastbone cartilage (sternum) – Becoming hard and brittle
With older cows (mature cattle), the meat becomes darker and the texture changes. Although cow meat is tougher than prime beef, it seems to be softer to the feel (floppy) and the fat is softer and darker than that of prime beef.
Differences in meat and fat colour

With older cows (mature cattle), the meat becomes darker and the texture changes. Although cow meat is tougher than prime beef, it seems to be softer to the feel (floppy) and the fat is softer and darker than that of prime beef.
Beef carcase classification

Carcase assessment addresses conformation and fat. Fat cover is scored on a 1-5 scale. Conformation is assessed from E to P. Combining scores for conformation and fat determines the markets which cattle suit.

Most cow beef is of conformation class R to P.
Beef carcase classification

Carcase assessment addresses conformation and fat. Conformation is assessed from E to P. Fat cover is scored on a 1-5 scale. Combining scores for conformation and fat determines the markets which cattle suit.

The Quality Standard Mark Scheme stipulates specific carcase classifications for beef. Fat Class 2-4H, Conformation E-O+, the optimum classification for better meat yield. (See right)

Fat class

<table>
<thead>
<tr>
<th>Fat class</th>
<th>increasing fatness</th>
<th>Fat is determined by visual assessment of external fat cover. There are five main classes. Classes 4 and 5 are subdivided into L (leaner) and H (fatter).</th>
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Fat Class 2-4H   Conformation E-O+, the optimum classification for better meat yield.

- Carcasses within the following parameters can carry the Quality Standard Mark.
  - Females under the age of 36 months are acceptable. They must not have been used for breeding or be in calf.
  - Steers under the age of 36 months are acceptable.
  - Carcasses must have a fat class of between 2–4H and have a conformation of E–O+.
  - For qualifying livestock 30 months or under: Maturation of 7 days is required on primals used for frying, roasting and grilling (from slaughter to the final consumer).
  - For qualifying livestock aged between 30–36 months: Maturation of 14 days is required on primals used for frying, roasting and grilling (from slaughter to the final consumer). Alternatively, one of the post-slaughter processes to enhance tenderness as outlined in ‘EBLEX Guidance to Meat Quality’ can be used, ie Hip bone suspension or electrical stimulation.
  - Bulls must be no older than 16 months at slaughter. Primals used for frying, roasting and grilling must be subject to a minimum 14 days maturation (from slaughter to the final consumer).
Examples of classification

**U+2**

Very good muscle development with all profiles being convex.

The top bit (round), shoulder and rump are rounded, along with the back being wide and thick.

The topside spreads over the pelvis.

Slight fat cover with flesh visible almost everywhere. Within the thoracic cavity the muscle is clearly visible between the ribs.

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**R2**

Profiles on the whole mainly straight with good muscle development throughout the carcase.

Well-developed top bit (round).

Thick back, less wide at the shoulder but still neat and fairly well developed.

Topside and rump are slightly rounded.

Slight fat cover with flesh visible almost everywhere. Within the thoracic cavity the muscle is clearly visible between the ribs.
Examples of classification

**R4L**

Profiles on the whole mainly straight with good muscle development throughout the carcase.

Well-developed top bit (round).

Thick back, less wide at the shoulder but still neat and fairly well developed.

Topside and rump are slightly rounded.

**R4H**

Profiles on the whole mainly straight with good muscle development throughout the carcase.

Well-developed top bit (round).

Thick back, less wide at the shoulder but still neat and fairly well developed.

Topside and rump are slightly rounded.

Most areas of flesh covered with fat, but with muscle still visible across the top bit (round) and shoulder. Some distinctive fat deposits within the thoracic cavity. Seam of fat on the top bit (round) becoming distinctive. Muscle between the ribs becoming infiltrated with some fat.

Most areas of flesh covered with a thickening layer of fat, muscle only partially visible across the top bit (round) and shoulder. Prominent seams of fat on the top bit (round). Some distinctive fat deposits in the thoracic cavity and the muscle between the ribs infiltrated with fat.
Examples of classification

**0+3**
Profiles straight to concave with overall average muscle development.
Average to lacking development over the top bit (round).
Average to lacking thickness on the back.
Shoulder flat with a straight profile over the rump.

Average fat covering, with the exception of the top bit (round) and shoulder, everywhere covered with a layer of fat. Slight deposits of fat in the thoracic cavity but with the muscle still visible between the ribs.

**0+5H**
Profiles straight to concave with overall average muscle development.
Average to lacking development over the top bit (round).
Average to lacking thickness on the back.
Shoulder flat with a straight profile over the rump.

All areas of flesh covered with a thick layer of fat. Heavy deposits in the thoracic cavity with muscle between the ribs infiltrated with fat. The top bit (round) is almost completely covered with fat so that the seams are no longer clearly visible.
Examples of classification

-O3

The odd straight profile but mainly concave.
Lacking development over the top bit (round).
Lacking thickness on the back.
Shoulder angular with a straight profile over the rump.

Average fat covering, with the exception of the top bit (round) and shoulder, everywhere covered with a layer of fat. Slight deposits of fat in the thoracic cavity but with the muscle still visible between the ribs.

-O4L

The odd straight profile but mainly concave.
Lacking development over the top bit (round).
Lacking thickness on the back.
Shoulder angular with a straight profile over the rump.

Most areas of flesh covered with fat, but with muscle still visible across the top bit (round) and shoulder. Some distinctive fat deposits within the thoracic cavity. Seam of fat on the top bit (round) becoming distinctive. Muscle between the ribs becoming infiltrated with some fat.
Examples of classification

**P+3**

All profiles concave to very concave with poor muscle development.

Poorly developed over the top bit (round), narrow back with bones visible.

Shoulder is flat, also with bones visible.

Average fat covering, with the exception of the top bit (round) and shoulder, everywhere covered with a layer of fat. Slight deposits of fat in the thoracic cavity but with the muscle still visible between the ribs.
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