

tips & tools

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MEAT STANDARDS AUSTRALIA

The effect of nutrition and growth on sheepmeat eating quality

Nutrition and finishing

Good nutrition and finishing are critical in defining sheepmeat eating quality in the period leading up to slaughter. Given the potential for good eating quality cuts from all sheepmeat categories (lamb, hogget and mutton), it is important those animals are well nourished and managed.

During periods of active growth, the 'turnover' of collagen in the body (the structural protein that dominates connective tissue) increases. For this reason, the hardening of connective tissue is slower and the background toughness in meat will be reduced.

Growth and weight gain

For best eating quality, animals should be gaining weight up until slaughter. The growth rate in the two weeks prior to slaughter should be a minimum of 100g per day and aiming for 150g per day for Merino sheep and lambs. Good nutrition is particularly important in the two weeks prior to slaughter.

Good finishing optimises the amount of muscle and intramuscular fat leading to more tender meat and resulting in increased flavour and juiciness. Muscle tissue comprises soft muscle fibres surrounded by stronger connective tissue fibres, which increase in toughness as the animal ages. Poorly nourished animals that are losing weight will use muscle fibres and intramuscular fat to nourish the rest of the body, but the connective tissue fibres remain unchanged. Consequently, poorly finished sheep are likely to produce tougher meat.

Selection for more muscular and leaner animals has been shown to reduce eating quality and highlights the need for careful monitoring of breeding programs to maintain high lamb eating quality.

Key points

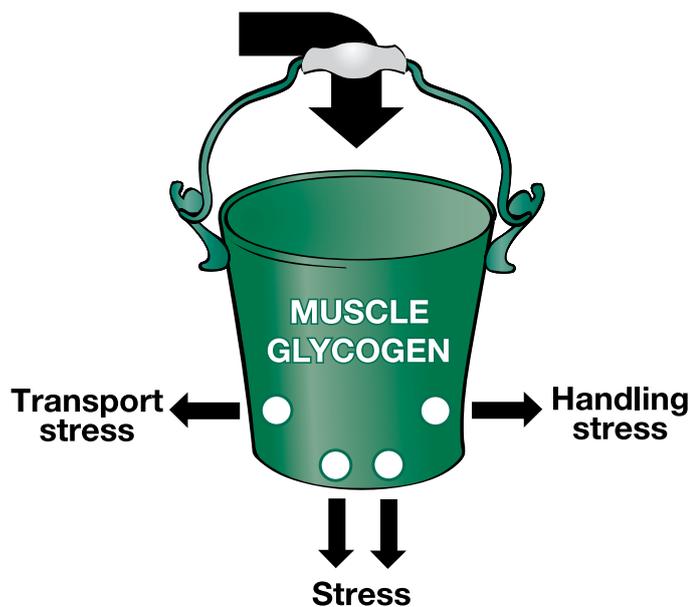
- For optimum eating quality results, lambs should be gaining at least 100–150g/day 2 weeks prior to consignment.
- Lamb and sheep should be finished to a minimum fat score of 2.
- The type of finishing system has little effect on eating quality, provided that sheep are gaining weight before slaughter.
- Diets that result in weight loss in the weeks before slaughter cause meat quality problems.
- Stress prior to slaughter can reduce levels of muscle glycogen.
- Reduced glycogen will increase muscle pH and cause dark cutting meat.

Good finishing optimises muscle glycogen

Glycogen is blood sugar and is held in reserve for vigorous muscular activity. Optimising glycogen is a combination of good pre-slaughter nutrition and reducing stress in the immediate pre-slaughter period.

Every animal has a certain amount of energy contained in its muscles in the form of glycogen. Once the animal is dead, the muscle glycogen is converted to lactic acid, which causes pH to fall. The glycogen bucket diagram in figure 1 shows this relationship.

Figure 1: Glycogen bucket



Nutrition provided for the animal is the energy that goes into the bucket. The holes in the bucket represent the factors that use up energy, such as exercise or stress. These factors will always be present in some form, but it is important to minimise their impact. That is, to keep the 'holes' in the bucket as small as possible.

Low levels of muscle glycogen in the live animal cause high pH meat (above 5.70), which has an unattractive dark colour, is tougher, takes longer to cook, and has a reduced shelf life.

Good nutrition reduces the risk of slaughter animals developing high pH. Nutrition, sufficient to reduce the risk of the high pH condition in sheep, can be defined as a weight gain of at least 100g per day (150g per day for Merinos) and results in a high and normal concentration of glycogen in lean muscle tissue. The normal and ideal concentration in sheep is around 1.5g/100g of lean muscle weight.

If the concentration of glycogen in lean muscle tissue falls below a threshold concentration (around 0.8g/100g), the pH of the resulting meat becomes higher than normal.

Poor nutrition and stress as a result of poor handling during mustering, yarding and transport will increase the rate of glycogen loss.

The effect of finishing on eating quality

Research has shown that the type of finishing system has little effect on eating quality, provided sheep are gaining weight before slaughter and they are finished to a fat score of 2 or above. This will ensure adequate intramuscular fat (IMF) for effective juiciness and flavour.

Animals with higher IMF% levels will produce meat that is more acceptable for consumers. The preferred range in lamb is between 4% and 6%.

IMF% is a strong driver of consumer sensory scores of all attributes. The highest impact is on juiciness.

Good quality pasture is just as effective as concentrate-based diets for producing high quality meat. Diets that are very high in cereal grains, fed for prolonged periods, may cause eating quality problems such as off flavours and soft fat.

Using genetics to optimise eating quality

Eating quality breeding values allow for selection of traits that cannot be visually selected in a live animal. They can be used in a breeding program to improve the performance of future generation, or to purchase stock that are likely to be more productive and have better eating quality.

Intramuscular fat (IMF) and shear force (Tenderness) are current research breeding values that are available and relate to eating quality.

IMF, often referred to as marbling, has a moderate to high heritability and high negative correlation with shear force. That is, high IMF will increase tenderness.

Shear force relates to the force required to cut through the loin muscle of lamb, an indicator of tenderness. This trait has a moderate-high heritability and a moderate correlation with tenderness in lamb. The preferred value for lamb is 3kg or less. More negative breeding values indicate genetic potential for more tender meat.

For more information

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