

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 (the structural protein that dominates connective tissue) increases. For this reason, the hardening of connective tissue is slower. With reduced hardening, 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. Good feeding is particularly important for Merino meat production and in the two weeks prior to slaughter, Merino sheep and lambs should be growing at a minimum of 150g per day.

Good finishing optimises the amount of muscle, leading to tender meat. 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 to nourish the rest of the body, but the connective tissue fibres remain unchanged. Consequently, poorly finished sheep are likely to produce tougher meat.

The effect of finishing on sheepmeat 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. The exception is diets that are very high in cereal grains fed for long periods (eight weeks), which may cause eating quality problems.

Key points

- For optimum eating quality results, lambs should be gaining at least 100g/day for crossbreds and 150g/day for Merinos.
- 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.

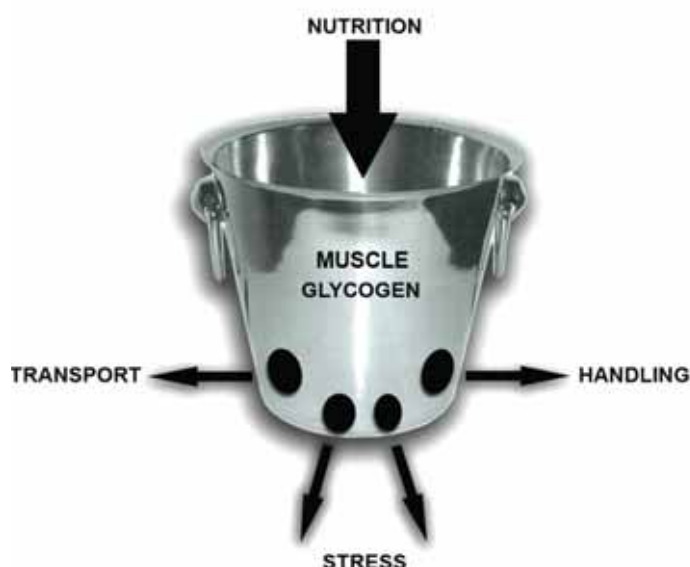
Good finishing guarantees adequate intramuscular fat levels. If intramuscular fat falls below 3%, consumers will rate meat as dry and lacking flavour. Typically, the loin of a prime lamb finished to a fat score of 2 or 3 has around 4–5% intramuscular fat, which is considered a balanced level.

Good finishing optimises muscle glycogen

Glycogen is animal starch or sugar and is held in reserve for vigorous muscular activity. Good finishing optimises muscle glycogen levels at slaughter leading to better colour, flavour and shelf life. 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



How is glycogen lost?

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.

This will result in dark cutting meat, which is unattractively dark in appearance, has variable eating quality, and does not keep well when stored chilled. The importance of good nutrition is that it keeps the glycogen 'bucket' topped up (figure 1) and therefore reduces the chance of low concentrations at the time of slaughter. This acts as a buffer against losses that occur through 'holes' in the bucket (namely stress related factors) around the time of slaughter.

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, which lacks flavour, is visually unattractive, tougher, takes longer to cook, and does not keep as well as low pH meat.

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.

For more information

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