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What makes meat tender?

By Eva Wiklund

When people eat meat, tenderness – lack of toughness or hardness in the mouth – is the attribute that generally makes the most difference between what they consider to be a good and a not-so-good eating experience.

Meat tenderness is created by a number of factors and varies significantly between different animal species. It also varies *within* species.

For a deer carcass, the age and sex of the animal, the pre-slaughter handling routines, the chilling regimen, storage and cooking method are all aspects that can have a major impact on meat tenderness. Understanding these can help the industry organise the best quality venison eating experiences.

For example, chilling of carcasses and meat after slaughter is vital from a hygienic perspective, but if the carcasses are chilled too quickly the meat can become tough.

Even the way a carcass is hung can make a measurable difference. During the slaughter and chilling processes, the carcass is normally hung by the hind leg (Achilles tendon), but it is also possible to hang the carcass by the pelvic bone. That means the hind leg will ‘fall down’ at a 90° angle to the carcass, and several of the most valuable cuts in the hind quarter (including the striploin) will be stretched. Stretched muscles give more tender meat. There has been extensive research in the use of pelvic suspension for beef carcasses, since the variation in tenderness of beef is a major quality problem. All types of venison are generally more tender than beef, but research from Australia and Alaska has demonstrated that pelvic suspension also has the same positive effect on tenderness in Fallow deer, Red deer and Reindeer venison.

There are natural enzymes in the muscles/meat that will start to break down the meat structure very soon after the animal is slaughtered. This breakdown is termed ‘ageing’ and makes the meat more tender. These enzymes are active regardless if the meat is still attached to the carcass or if bone-less cuts are put in vacuum bags and kept chilled for ageing. The concentration and activity of these tenderising enzymes might be the answer to why venison is more tender than beef, and that some types of venison do not have to be aged at all before consumption. Studies from New Zealand and Sweden have found higher concentration and activity of these enzymes in Red deer and Reindeer venison compared with beef.

Using the right cooking method for the cut is particularly important. For example, optimal tenderness in a cut suitable for roasting (a leg cut like knuckle or silverside) will not be achieved if the cut is instead fried like a steak. Also, cooking meat to a too high temperature makes it tough and dry. It is useful to gain more information about tenderness of venison cuts so that our industry can work with chefs and retailers and ensure maximum venison tenderness.

A consumer test on Red deer venison was recently organised as a part of a collaborative project between myself – working at AgResearch MIRINZ and Geoff Asher and Jason Archer of Invermay's Deer Systems group. The project is focusing on selecting young fast-growing Red deer for venison production.

The consumer test was carried out at AgResearch's Ruakura and Invermay campuses and we took advantage of the visit by several farmers during the field day following this year's Deer Industry Conference in Hamilton to involve them in the project as well.

Two venison samples were presented to each of the 176 participants. One sample was from a fast-growing deer that had reached 100 kg at six months of age, and the other was from an animal growing at a more 'normal' rate to reach 100 kg by 10 months of age. The samples were coded with random three-digit numbers, and the participants only got the information that they were testing two different types of venison. We asked three questions: Which of these samples is most tender? Which of these samples is most juicy? Which of these samples has the best flavour?

What did the consumers tell us? Interestingly, the consumers judged meat from the older animals to be significantly more tender than meat from the fast-growing deer. There was no noted difference in the juiciness of the meat but a very clear preference for the flavour of meat from the fast growing deer. The full results from this pilot study will be presented at the 12th Arctic Ungulate Conference in Yakutsk, Russia in August.

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