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A red steak, please!

By Eva Wiklund

Colour is one of the first attributes that meets the eye of the consumer when they look over a meat retail counter.

That visual impression is of great importance for the consumer's judgment of the overall meat quality and their purchase decision.

The colour of meat is dependent on myoglobin content. Myoglobin is a protein that transports oxygen in the muscle, in the same way that haemoglobin does in the blood.

The concentration of myoglobin in the muscles varies between animal species. Pork, with its light-red colour, contains much less myoglobin (approximately 1 mg myoglobin/g meat) compared with the darker beef (5 mg/g meat). Red deer venison and meat from other deer species like Moose and Reindeer has even more myoglobin (7 mg/g meat).

Packaging and storage change the colour of meat. That's because myoglobin is affected by oxygen concentration. A vacuum-packaged steak or roast often has a dark-red, almost purple colour. If the meat is removed from the vacuum pack and left out in the air for a couple of hours it will turn bright red. That red colour will eventually disappear and be replaced with a brownish colour after prolonged exposure to air.

The browning of meat occurs at different rates depending on species; generally dark coloured meat containing more myoglobin will brown faster. The brownish colour is therefore not a sign of "bad" quality; it's just a result of the meat being exposed to more or less oxygen.

The colour can actually be both brownish and red on the same piece of meat. For example within a tray of steaks, the steak on top may look brownish, but if it's removed, the steak underneath may be both red and brown depending how much of the surface was covered by the steak on top and therefore how much oxygen reached the meat surface. In a bigger cut of meat, the colour can vary in the same way from the surface to the centre when a slice is cut through the whole piece of raw meat.

The rate of which the meat browning process happens is often referred to as colour stability or display life. Of course this is an important attribute in the retail meat counter both for the consumer and for the butchery manager at the supermarket.

The high concentration of myoglobin in venison makes it look darker than beef but also speeds up the browning process so that venison has less colour stability compared with beef.

Other factors that affect venison colour and display life are the content of iron and copper. A high level of both these trace elements contributes to the dark appearance and fast browning of venison.

Antioxidants such as vitamin E added to feed are an effective – but expensive – treatment to extend colour display life in meat, and several international studies have confirmed this for beef, pork and venison.

Different types of pastures are naturally rich in antioxidants and can therefore improve meat colour stability in comparison with grain-based feed mixtures. These results are valid for various types of meat like beef, lamb and venison. Recent parallel studies in Scandinavia (Reindeer), New Zealand (Red deer) and Australia (Fallow deer) demonstrated a clear positive effect of pasture compared with grain/grain-based feed mixtures on venison colour stability.

It is important to realise that the lesser colour stability of venison compared with beef indicates the need to develop a different strategy for retailing venison, for example through new packaging technologies in combination with consumer information at the point of purchase. A more thorough understanding of venison colour stability is also needed to develop this strategy and to extend venison display life, so there is lot of interesting research still to do in this area.

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