



TARGET PORK QUALITY

Ageing and the impact on meat quality



Ageing is the natural process of meat tenderisation after rigor mortis. This is due to the action of muscle enzymes which break down some of the protein structures that “hold the meat together”. Ageing has been demonstrated to improve pork tenderness, flavour, colour and juiciness, ie ageing can enhance pork eating quality.

Effects of ageing on pork quality attributes

Ageing is one of the main factors that affect variation in tenderness. Pork tenderness increases rapidly in the first 48 hours post-mortem. In leg nearly 100% of the ageing occurs within 4 days post slaughter. In loin, 80% of the total increase in tenderness occurs within 4 days, and 90% within 6 days. Tenderness is improved further by longer ageing for up to 12 days.

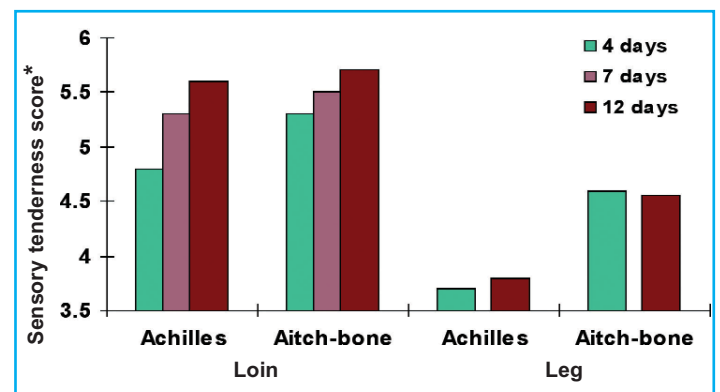


- Pork ageing enhances pork flavour and overall acceptability
- In loins pork flavour and overall liking increase with ageing and peak at about 9 days
- It improves the blooming potential of pork and increases the ability of vacuum-packed pork to bloom
- It has also been linked with improved water holding capacity and thus, juiciness
- Muscles that are rich in connective tissues, such as the silverside, do not tenderise as well as muscles low in connective tissue, such as the loin. This is because the connective tissue proteins are not broken down by the enzymes active post-slaughter

Recommendations on how to age pork

- BPEX recommends that loins (bone-in) should be aged for a minimum of 7 days, or 14 days if they are “bone-out” (see Target Pork Quality 1)
- Ageing of legs is recommended for a minimum of 4 days
- The ageing rate of meat increases at high temperatures; however to ensure meat safety, ageing is normally carried out at low temperatures (between -1.5°C and 4°C)
- Meat is normally aged in vacuum packs which helps to reduce surface drying as well as space requirements
- Ageing in vacuum packs should be carried out at, or below, 3°C to prevent *Clostridium botulinum* growth and toxin production

Figure 1 The effect of post-slaughter treatment on muscle tenderness



* Increasing sensory tenderness score indicates increased tenderness

Post slaughter treatments affecting ageing

Pelvic suspension

Pelvic (aitch bone) suspension dramatically increases tenderness, particularly of the high value leg muscles, compared to hanging carcasses from the achilles tendon (Figure 1). By hanging from the aitch bone the muscles of the leg are held in tension; this reduces any possible shortening and seems to accelerate the effect of ageing.



Hip suspension





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Cold shortening

Rapid chilling (without electrical stimulation) can result in muscle contraction during rigor mortis; this gives rise to tougher meat. Moreover, cold-shortened meat does not appear to benefit from ageing to the same degree so the meat remains tougher (see *Target Pork Quality 3: Chilling systems*).



Electrical stimulation

High voltage electrical stimulation, in combination with rapid chilling, is an effective means of enhancing tenderness (see *Target Pork Quality 3: Chilling systems*). The ageing rate is faster in electrically stimulated carcasses than in non-stimulated carcasses, resulting in optimum tenderness being achieved sooner.

Packaging options for ageing

Vacuum packs

Pork is normally aged in vacuum packs which not only controls bacterial growth but also reduces surface drying; this helps to reduce weight losses when compared to dry ageing (meat aged on the carcass or unwrapped pork). In addition, ageing in vacuum packs reduces trim losses and space requirements. Extended ageing (more than 12-15 weeks) in vacuum or modified atmosphere packaging (MAP) has been found to result in the development of unpleasant flavours and should be avoided.

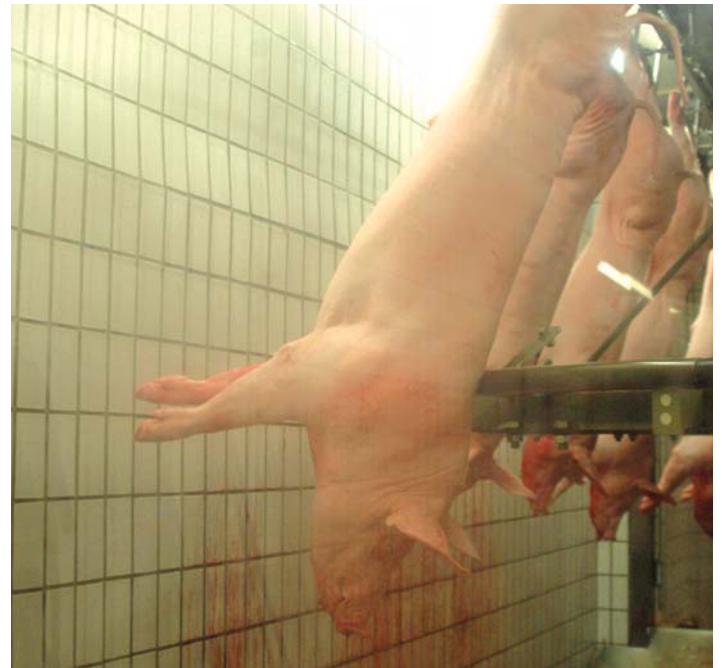
Dry ageing

This may have positive attributes, as dried aged pork seems to display enhanced flavour. However, this practice may be linked to shorter shelf-life, because of bacterial growth, and higher shrink and drying out losses.



Modified atmosphere packaging (MAP)

There is growing evidence that high oxygen packaging of meat, ie MAP, results in tougher meat with poorer flavour. It is possible that this effect is related to oxidation taking place in the high-oxygen environment. While it has not been verified in pork, it is likely that the same effect will be apparent. It is therefore recommended that ageing for enhanced quality is carried out prior to MAP and that the time in MAP is minimised as far as possible.



Electrical stimulation



Vacuum packs



Modified atmosphere packaged (MAP) pork products