

GAME PLANS 653

By ALAN TITCHALL

"The New Zealand venison industry is in a rapidly expanding phase where production is expected to increase from 3,525 tonnes in 1988 to more than 15,000 tonnes by 1995. New technologies in processing and packaging need to be developed now to cater for the future markets and consumers."

Dr Ken Drew, head of deer research, Invermay Agricultural Centre, Mosgiel.

Strengthening the inseparable link between science and economic growth in this country, MAFTech has restructured its research to select what it considers "high priority science areas". These are generally broad disciplines involving long term strategic research.

Amongst the two science areas that are industry aligned, deer research is recognised by MAFTech of vital importance (Dairying is the second). The dramatic change in the status of deer over 20 years from a ubiquitous pest marked for destruction to a valuable export earner has been largely influenced by the results of deer research.

Invermay is one of MAFTech's larger agricultural centres. Attractively sited out at Mosgiel (near Dunedin), Invermay has been the headquarters for deer research in New Zealand since 1973; establishing to date an international reputation and profile as the leader in deer research and consultancy. Over one thousand animals are involved in their present research, which is headed by Dr Ken Drew and covers an extensive range of applied and basic research on management, health, nutrition, physiology, product evaluation and breeding techniques. Although internally funded from MAFTech's own contestable R&D pool, the Game Industry Board has also provided financial assistance for product research.

Shelf life and presentation

Also working on deer research at Invermay is Joanne Stevenson, who joined the deer research programme two years ago as a meat scientist after obtaining her honours degree in biotechnology from Massey University.

An area of concern for the industry is the shelf life and presentation of frozen and chilled products. Frozen venison shipped from New Zealand packers has been expected to remain at an acceptable quality at -12°C for periods up to two years says Joanne. "This practice does not conform to generally recognised standards for other frozen red meats, and has been criticised as being misleading and misrepresenting the product to intended consumers."

Her studies relative to recognising a standard for the shelf-life span of frozen and chilled venison products are still in progress. Samples are up to their 20th month of freezer storage at -12°C and -18°C .

Based on two presentation methods: whole muscle cuts and retail ready portions (much in demand in the USA where consumers have less time for kitchen preparation) research has already indicated that freezer storage time and tem-



perature have no effect on microbiological quality or tenderness but have a deteriorating effect on colour and perhaps flavour. These effects appear more pronounced in the retail-ready portions (rather than whole muscle cuts) and packing that uses oxygen permeable materials.

Areas such as 'meat colour' might not be important to markets such as restaurants where the final product is seen by the consumer in a cooked form, but selling through retail outlets, domestic and international, colour is an important consideration and an area where packaging technology is of vital importance.

Prolonged meat storage, whether chilled or frozen, leads to poor colour stability. Even venison chilled for 18 weeks takes only 1-2 days after the packaging is open to become unacceptable in colour.

Dr Drew in his paper "Technologies to Improve Shelf Life and Presentation of Fresh Venison" points out that most chilled venison leaves New Zealand for export markets in vacuum packs.

The high iron content (3 times that found in lamb for instance) already makes venison a very dark meat. Any air leakage through the package film ("leakers"), results in unappealing discolouring and rapid deterioration.

Dr Drew suggests that advances made in controlled atmosphere packaging (CAP), adapted recently in packaging lamb products, could be the answer. This system vacuum packs meat in a gas-permeable film which is then re-packed in an impermeable masterpac flushed with CO₂ and sealed, extending the shelf life of chilled lamb to 16 weeks or more at -1°C .

At the point of sale, the outer bag is broken, and the meat is retained in the inner bag for dis-

play, but the permeable wall allows oxygen to penetrate and the meat colour "blooms" up for sale presentation.

Transport and storage.

On the subject of transportation and storage of chilled venison, Dr Drew found that chilled meat should be held on the point of freezing (-1°C) with minimal variation and "the shortest possible time" in transit. A problem with rapid air transport is the risk of air freight containers sitting at airports unplugged into refrigeration gear. Dr Drew cautions that this is a particular area of concern in transporting venison products and one needing "urgent attention in quality management".

Dr Drew also stresses the need for venison technology to be positioned to take advantage of changes in consumer requirements. "Partial cooking in a bag," he uses as an example, "means that control of the cooking process is largely retained by the seller with obvious advantages through to the consumer in consistency of eating quality. The technology also resolves the problem of colour perception and deterioration."

From the beginning

Packaging aside, extended shelf life in chilled or frozen form really starts at slaughtering and dressing for meat life is very much influenced by the amount of the contamination or reduced bacterial contamination at this stage. The meat must be of good microbiological quality to start with — it must be clean.

Hair from the skin of deer is a major source of contamination during the dressing of the animal. A machine has been developed at Invermay by AWA Milmech for efficiently removing

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ing the skin so that no hand or knife comes in contact with the valuable saddle/hind leg of the carcass.

Joanne's research on a contract basis for The Game Industry Board also includes the influence of season, sex and age on animal meat quality. Studies have been done to determine the relationship between animal age and sex in reference to meat quality, colour, tenderness and flavour.

It is an area particularly relevant to venison farming where animals can have an average breeding life of 12 years or more. Some of Invermay's own stock are still breeding at 20 years of age and older. As stock numbers on farms increase, only the best breeding animals are kept and older stock is culled out for slaughter.

Conclusive research will determine wherever an age classification needs to be introduced in the grading system. Already results have been interesting; "We found generally," says Joanne, "there was evidence of increasing toughness in stags with animal age but not in females." This was an unexpected finding.



Joanne Stevenson

Joanne's department has produced a remarkable venison salami sausage with a very low fat content of 10 per cent as compared with the usual salami fat content of between 30 - 50 per cent. Still at the 'science' stage and waiting for production, the product has been "tested" at public venues proving "exceptionally popular". Invermay's Science Business Group (marketing) is investigating avenues for production.

Future trends

Electrical stimulation of carcasses within three minutes of slaughtering is standard in sheep and lamb processing to reduce toughness caused by quick chilling and thawing. Experiments have proved "that in both yearling and two-year-old stags, the penalty in meat toughness is severe if electrical stimulation is not used when carcasses are placed in low-temperature chillers within a few hours of slaughter. "A 50 per cent reduction in toughness has been achieved through the use of electrical stimulation.

Dr Drew foresees a system of "accelerated meat processing" — a mixture of electrical stimulation and hot boning — as one of the most important developments for the future. This works on a continuing batch process from the stunning box to the packaging of meat from deer carcasses which are boned while still "hot" on the slaughter line.

Such systems used overseas have proved to increase yields of primal and retail cuts, reduce cooking shrinkage, improve colour and increase productivity because staff prefer hot boning. Says Dr Drew, "In the next five years the New Zealand venison industry must plan for major expansion in killing and processing facilities. It would be wise to carefully consider accelerated-processing technology as a means of improving efficiency, reducing costs and developing new consumer venison packs."