


MEAT INSPECTION AND VENISON QUALITY

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Introduction



Deer farming in New Zealand has developed into an important agricultural industry, with 123 000 farmed deer being slaughtered in the 1990 calendar year. Current market prices reflect the special market niche that venison (and associated products) enjoy, and farmers, processors and the Game Industry Board recognise the need to promote and maintain a quality-based production and processing system. A future market may be more competitive and more demanding, and a commitment to quality will ensure better survival of this "sunrise" industry.

"Quality" has many definitions, and the promoters of most quality systems state that it is a product feature that can only be defined by the customer. A wide view of a quality product would consider it to be predictable, uniform, dependable, suited to the market, and of low cost. In the farmed deer industry, yarding, transport, slaughter, dressing and processing demand special attention if venison is to be marketed as a high-quality product.

The traditional function of government meat inspection programmes has been restricted to ensuring safety and wholesomeness rather than commercial components of quality. However the activities of regulatory authorities increasingly impact on product quality, and several countries are developing more integrated roles for meat inspection programmes (1,2). Cost-efficiency, sharing responsibility for safety and wholesomeness, and ensuring a positive contribution to product quality whenever possible, are features of this new approach to meat inspection. These features are in the early stages of development in the New Zealand venison industry.

Regulatory compliance

Traditional meat inspection activities that ensure product safety and market access can be considered to be part of total quality assurance. In the international marketplace, the requirements of the importing country may dictate additional activities to those of the domestic market.

Regulatory responsibilities begin when the deer intended for slaughter arrive at a licensed deer slaughter premises. As well as ensuring that the slaughterhouse facilities are up to standard, inspection staff monitor all aspects of animal welfare. Evidence of poor yarding on the farm, transport vehicles with inadequate footing or poor ventilation, mixing of wide ranges of animals during transport or at the slaughterhouse, severe wounds and untreated fractures, and excessive feet wear associated with poor handling are all examples of welfare issues that will be acted upon by inspection staff.

While satisfying regulatory concerns, monitoring of animals intended for slaughter also impacts on the quality of raw material. Maintenance of high animal welfare standards limits wounding, bruising, fractures and other pre-slaughter stressors that can lead to increased pH, high cortisol levels and dark-cutting meat (3). Prosecutions are sometimes required to enforce animal welfare standards.

Assessment of live deer for cleanliness is a responsibility of the processor, however the regulatory authority must ensure the maintenance of hygienic dressing of the carcass. Cleanliness of the live animal has a direct bearing on carcass contamination rates during dressing, and therefore it is important that regulatory and company staff carry out an integrated pre-slaughter inspection programme. Excessive trimming for contamination impacts directly on quality; it is time-consuming, wasteful of product, and may result in the downgrading of a whole carcass if primal cuts are affected.

Ante mortem inspection for diseases and defects is mandatory for all deer intended for slaughter.

The maintenance of hygienic slaughter and dressing standards is a primary function of the regulatory authority, and facilities, equipment and hygienic practice are the subject of detailed regulations. Some level of unseen microbiological contamination of the carcass is inevitable in the slaughterhouse environment, however inspection staff must ensure that good hygienic practice keeps this to a minimum. The outcome is a safe and wholesome product with an acceptable shelf life.

Post mortem inspection procedures ensure the removal of diseases and defects of public health, animal health and aesthetic importance. Removal of minor contamination and minor wounds and bruises is the responsibility of the processor, but this function is audited by the regulatory authority

An inspector must be on the premises at all times in a licensed deer slaughter premises (DSP) or packhouse (PH), and maximum rates of processing are specified. If adequate hygiene, standards of processing or standards of post mortem meat inspection cannot be maintained, the inspector can alter the method of work, rate of work or temporarily prohibit work. Regulatory responsibilities extend to carcass handling, cutting, branding, packing and labelling and in most situations during operations temperatures must not exceed 10° C. Freezing regimes and storage are also the subject of regulation. Although the primary purpose of refrigeration standards is to preserve safety and wholesomeness, these standards also impact on venison quality. Final certification of product is a veterinary responsibility.

Disease and defect status

All food production systems have some variability in raw material, but a large variability is an indicator of a low quality process. Any decrease in variability will result in a decrease in quality-related costs. A regulatory authority can make an important contribution in this area by collecting and distributing disease and defect statistics generated during routine meat inspection. Data categories can be extended to include those conditions that do not relate directly to downgrading of product intended for human consumption, but are indicators of sub-optimal animal health on the farm. Examples are liver fluke (*Fasciola hepatica*) and facial eczema.

Unlike for cattle and sheep, there is little information on the disease and defect status of slaughtered farmed deer. It is generally considered that the prevalence of diseases and defects in slaughtered deer is less than in cattle, but infection with *Mycobacterium bovis* occurs at a higher rate (4). A recent study undertaken in a large New Zealand deer slaughterhouse reinforces this opinion. All diseases and defects of possible public health, animal health or aesthetic importance (other than minor wounds and bruises) that affected the carcass and that were detectable by meat inspection were recorded. The data was collected from a total of 13 060 red deer (*Cervus elaphus*) slaughtered between March 1990 and February 1991.

Fractures, a defect category not collected for cattle, dominated the cervine statistics (Table 1). Major wounds and bruises added to the trauma-related defects, but the prevalence was lower than that for cattle slaughtered in New Zealand. Apart from tuberculosis, infectious conditions occurred at a lower prevalence than in cattle. Two of the four carcass condemnations for septicaemia or toxæmia were caused by a metritis and a macerated foetus respectively.

Trauma-related conditions (Table 2) accounted for a minimum of 621 of 737 diseases and defects of the cervine carcass (84.26%). These conditions invariably led to condemnation of affected parts, downgrading of the whole carcass, or total condemnation. Chronic trauma-related conditions would have originated on the farm, however acute traumatic conditions (Table 2) would have occurred during yarding, transport, or holding at the slaughterhouse. Virtually all wounds and bruises and 14.76% of fractures were in this latter category.

Table 2: Trauma-related diseases and defects in the carcasses of farmed deer

	Wounds / bruises	Fractures	Arthritis*	Pleurisy	Other**
Acute	245	44	1	7	2
Chronic	6	254	36	16	10
Prevalence	1.92%	2.28%	0.28%	0.18%	0.09%

* excludes cases of unknown aetiology

** Other includes peritonitis (4), abscessation (3), herniation (3), haematuria (1), dislocation (1)

The regulatory authority can actively contribute to improving the quality of raw material by making detailed disease and defect data available to the individual producer and the processor. Acute trauma-related diseases and defects were shown to be an important cause of economic loss and these can be minimised by good handling and transport. Identification and rectification of poor practices by individual producers, transporters or slaughterhouses also leads to a greater uniformity of raw material.

A system to record specific diseases affecting the viscera (not usually saved for human consumption) can provide useful productivity-related information if supplied to individual farmers. Examples from the above study included liver fluke, chronic facial eczema, and the pregnancy rate in slaughtered hinds

Tuberculosis appears to be the only infectious disease of note in slaughtered farmed deer. The detection rate of 0.15% during routine meat inspection increases to 0.52% if reactor animals are included (5), and this rate of infection is clearly of concern to a quality-conscious industry. As well as providing public health certification, meat inspection plays a major role in tuberculosis surveillance and the national eradication programme. The cost of this programme is borne by the producer

Quality systems

The game regulations require that each processor must have a quality control programme for handling of deer, slaughter and dressing, processing, branding, refrigeration and transport of product, as well as adequate record-keeping. The regulatory authority has the responsibility to ensure that this quality control programme is effective, however there are very few guidelines detailing this responsibility.

The Game Industry Board in New Zealand is now developing a quality assurance programme for DSPs and PHs that has the long-term goal of guaranteeing quality standards from the farm to the marketplace. The first step in developing the quality system is an in-premises quality assurance programme that is documented in a premises manual. This is under internal audit by the processor. The second step is the development of industry-agreed standards (IASs) for all aspects of venison production, including regulatory requirements. Processors under external audit and who are able to demonstrate compliance with all IASs will be entitled to use the "Deermark" quality symbol that is being promoted by the Game Industry Board.

The regulatory authority has a vital interest in these developments. IASs may be well outside regulatory interest in some areas (for example, tenderness and styles of cuts), however they may be very similar in other areas (for example, packaging and labelling). Integration of regulatory and commercial goals in a total quality assurance system limits duplication of resources, and promotes co-operation between the processor and the regulator. In addition, the industry accepts "ownership" of many regulatory requirements and this reduces the potential for conflict with the regulator. A detailed quality assurance system also assists the regulatory authority in carrying out its mandated responsibility to ensure effective quality control.

In this respect, the Hazard Analysis Critical Control Point (HACCP) approach offers a scientifically-based method for process control. Unfortunately, the wide acceptance of HACCP that has developed in food processing at large has yet to be achieved in the red meat industry. However the principles of HACCP are being incorporated into the new quality assurance programme being developed by the New Zealand Game Industry Board.

HACCP identifies and ranks hazards that can arise at each operational step in a food processing system, identifies critical control points, selects monitoring and control options, establishes corrective actions and verification procedures, and maintains effective records (6). In parallel with routine examination of carcasses and offals at the meat inspection stand, HACCP systems are capable of ensuring minimal microbiological and environmental contamination on the slaughterfloor, thereby minimizing potential hazards in improperly stored or handled product. Safety and non-safety parameters can be monitored in parallel; thus ensuring that good manufacturing practice is maintained by industry as well as providing an efficient framework for regulatory control. In the wider sphere, HACCP systems can be applied from the farm through to the consumer.

Conclusion

The traditional role of government meat inspection authorities is under critical review in a number of countries, and the outcome will be a more constructive interface between inspection and production. The venison industry in New Zealand is in an ideal situation to capitalise on this modernisation process, especially with respect to promotion of product quality

Many current meat inspection activities maintain product quality, and increased meat inspection efficiency without impairing product quality is a regulatory goal. With less variability in raw material, post mortem inspection resources can be more appropriately targeted and cutting operations can be supplied with more uniform material. An increased emphasis on preventing unseen microbiological contamination is more likely to increase consumer safety and product quality than is detailed application of traditional bovine-derived meat inspection procedures

The processor is held accountable for hygienic processing standards, and the regulatory authority must audit the processing system to ensure that the specified standards are met. Integrated systems based on the HACCP approach offer the most effective tool for cost-effective quality control; for the processor and the regulatory authority alike. HACCP systems also provide regulators with a means to deregulate, yet provide an efficient risk-based inspection system monitoring IASs. A venison industry intent on maintaining a high quality product should eventually adopt HACCP-based quality systems from farm through to consumer.

References

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