The Palatability of Farmed and Feral Red Deer

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For many years venison from feral (wild) red deer *(Cervus elaphus)* has been exported from New Zealand in variable quantities reaching a peak of 4400 tonnes in 1972. Most of this meat was sold in West Germany.

Since the introduction of deer farming in the early 1970s there has been rapid growth in the industry. However, as yet there has been almost no meat available to supplement or compete with the diminished feral market.

The two main reasons for this are probably the buoyant velvet antler market and the relatively high prices obtained for live animals. Consequently no licenced farmed deer slaughter plants were established until late 1981.

Ultimately, meat production will probably become a more important aspect of deer farming than velvet antler production. It is therefore important that knowledge of this new product is gained as soon as possible.

Flavour variables

At Invermay, we started a series of flavour tests between 1974 and 1978 to find out how the farmed meat compares with the existing feral venison which has been the basis of our export market. Initially, animals aged 6, 12, 18 and 27 months of age raised in three environments — grassfield, feedlot and feral — were compared. Feral carcasses were purchased from a game packing house and all the farmed animals were reared at Invermay.

Deer exhibit a seasonal growth pattern with maximum body weights occurring in February to March. They have a depressed appetite during winter (even when excess feed is on offer) but increase their food intake with the onset of spring with a consequent rapid growth rate.

As the maximum body weights obtained in late summer also correspond to the highest carcass fatness values, it may be advantageous to slaughter deer at other times of the year. For instance, with stags this could be just after the removal of velvet antler in November or December, or possibly even during winter.

The main part of our venison flavour programme evaluated animals at 15 and 27 months of age when they were at peak body weights, as we believed that these would be likely commercial slaughter times.

Testing programme

Before starting our flavour tests we were led to believe that venison was probably a somewhat tough, gamy flavoured meat and that these characteristics could be lost when animals were raised in a less rugged climate with superior nutrition. Our flavour testing programme was therefore aimed both at establishing the palatability of an existing product and determining if differences existed between venison from young farmed and feral deer.

Initially, the evaluations seemed very straightforward, using a method known as the "triangle difference test" in which panels of people selected from Invermay staff (usually about 20) were given three pieces of meat indentified by random numbers. Two pieces of meat were from the same animal. Tasters were asked to match the pair of meats and thus pick the odd sample.

While this test appears very simple, panelists soon became very astute at picking minute differences between pieces of meat, using visual clues such as colour or thickness, both of which have little influence on the palatability of the meat. Moreover, in our earliest tests we did not compare variability between animals on the same diet, which we later found to be of a similar magnitude to that between animals on different diets, i.e. venison from two grassfed animals could be as different as venison from a grassfed and a feral animal.

Even the apparently simple task of cooking mince patties proved to be a factor influencing results as we initially used two large frypans — one for feral venison and the other for grassfed. The frypans had different cooking characteristics as thermostat settings and heat distribution within pans varied considerably. Even monitoring internal temperature of the patties with a thermocouple did not entirely overcome the problem of different and non-uniform cooking rates in the two frypans.

Modifications

We eventually managed to overcome most of these difficulties with changes to experimental design and cooking equipment. The purchase of a large griddle with uniform heating characteristics solved the cooking problem as all patties were prepared on the same surface.

In addition, a modified triangle test procedure was used in which panelists were given four specimens of meat, three of which were reference specimens and one a test specimen. The reference specimens were veal, grassfed venison and feral venison and the test specimen also came

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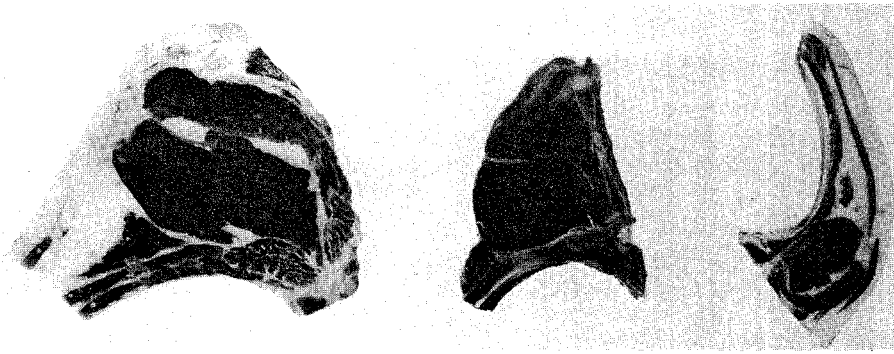

Untrimmed chops from 15-month-old cattle, deer, and sheep.

from one of these three sources, but from a different animal.

These modifications retained the sensitivity of a simple triangle test but provided veal as a "marker meat". We were thus able to get some indication of the discriminating ability of the panelists and the use of a test specimen from a different animal allowed for variation between animals on the same diet.

Two types of cooking were also used. One was a simple casserole, which allowed meat attributes such as toughness and juiciness to be tested, and the other was a mince patty, which provided a homogeneous meat sample but limited the number of meat attributes which could be evaluated.

While the modified triangle test provides a sensitive measure of differences between meats, little information is gained on meat quality and acceptability in the meal situation when a variety of cooking methods may be utilised.

To extend our investigation, a series of meal tests was carried out at the Catering Department of the Otago Polytechnic. Venison from various sources, and other meats such as beef, lamb and goat, were compared to assess whether the panel could detect differences between sources of meat and whether they were able to identify the meat being eaten. A variety of cooking methods including roasting, grilling and casseroles were used. The simplest cooking methods such as grilling were preferred, as less of the unique meat flavour is lost by being disguised under gravy or a flavoured sauce.

Results and discussion

With the young animals used in the laboratory type tests there was little evidence of the strong gamy flavour or meat toughness which was anticipated. In fact, the veal used in our later experiments tended to be tougher and less juicy than either grassfed or feral venison.

One of the most striking attributes of the venison evaluated was the low percentage of fat in comparison with lamb or beef from animals of a similar age. Figure 1 compares typical chops from 15 month age animals and highlights the negligible fat content of the venison.

The young animals evaluated in our tests were all very lean, and most tasters found it difficult to detect which meat they were eating. Panelists were, however, able to match veal specimens about 50% of the time, whereas the venisons were matched abut 25% of the time. Despite this seemingly large difference, the variation in matching specimens was too large for there to be a significant difference in panelists' ability to match veal and venison.

Even when tasters were able to match pairs of test and reference specimens they were only able to identify all the meats about 25% of the time. When panelists were truly able to detect that they were tasting venison and not veal they had an appreciable chance of being able to detect which type of venison was being tasted, "Appreciable chance" is estimated as a probability of 40% but this estimate cannot be pinned down to limits that are narrow.

It is probable that differences between farmed and feral venison would be detected only under very sensitive laboratory-type tasting procedures such as we have described, particularly with samples from young animals. After completing our earliest series of triangle tests it was concluded that although there were certain tendencies towards differences between farmed and feral deer, these could easily be swamped by differences between individual carcasses.

Meal tests at Otago Polytechnic also confirmed our laboratory findings. Panelists found it even more difficult to identify the source of a meat when presented with a plate containing meat, vegetables and sometimes a sauce or gravy.

With the lean meats used this is perhaps not surprising and supports the findings of Dr Douglas Rhodes of the British Meat Research Institute. He showed that most people are not able to identify lean meats such as lamb or young beef or pork.

The overall results from laboratory-type tests and meal evaluations indicate that diet does not seem to play a major role in venison flavour. In the young animals studied the meat nearly always had a mild, pleasant flavour and was usually very tender.

All the carcasses used in these studies were aged for 7 days at 4°C before being deep frozen, except for the six-month-old deer, which were aged for 14 days. This was certainly too long, as the meat had lost much of its firmness and texture and was almost liver-like in consistency.

Optimum conditioning and ageing times have yet to be established for venison but, as this area of processing can have an effect on the final quality of the product, this should be determined before large scale commercial production and marketing starts.

These tests were designed primarily to determine whether farming of deer would alter the taste or palatibility of the venison.

Even after evaluating venisons of various ages over a four-year period a number of questions remain unanswered. For instance, how will the older and inevitably fatter cull animals compare with the lean feral product and what influences will commercial slaughter operations have on meat quality? It is hoped that future research will cover these areas to add to our knowledge of this new product.