

# DEER FARMING

*Dr K.R. Drew Invermay Agricultural Research Centre*

The farming of deer in New Zealand has recently become a reality and it is useful at this time to review developments, animal performance, and some industry problems. In March 1975 there were about 4500 red deer and 2500 fallow deer held on registered farms. About 80% of the red deer are held in the South Island while almost all the fallow deer are in the North Island.



*One and 2-year-old stags on grazing trials at Invermay. The group on the right showing branched antlers are 2 year olds.*



*The master stag showing well developed antlers and a 2 year old with antlers still in the early growth stage.*

Until 1975 almost all the packed venison exported mainly to West Germany has been feral venison. Much of this meat comes from animals shot and recovered from helicopters. The empty carcasses are skinned, cut and packaged in licensed game packing houses where the Meat Division of the Ministry of Agriculture and Fisheries has an inspector permanently located on each premise. From 1966 to 1969 the deer kill was fairly stable at about 90 000 animals/year. Table 1 shows the changes in kill rate and export earnings since 1970. Peak slaughtering occurred in 1972 and there has been a progressive decline since that time due largely to the drastic reduction in deer numbers in many areas after the intense pressure from helicopter gun ships. In spite of falling numbers the earnings from venison have held at between 6 and 7 million dollars/year due to the high recent returns for venison.



*Dr K.R. Drew*

**Table 1:** Numbers of Shot Deer and their Value as Exported Venison

	Number	Value (\$ million)
1970/1	112 000	4.7
1971/2	111 000	5.6
1972/3	117 000	6.6
1973/4	90 000	6.9
1974/5	64 000	6.0

The June 1975 game meat regulations recognised two classes of venison. The first was from animals in which no pre-slaughter inspection was done and these animals are called "kill" deer. Feral deer fall into this category. The second classification is given to animals having a pre and post slaughter inspection and these are called "slaughter" deer. Farmed deer, if killed in an approved and supervised facility will fall into this category. The importance of these distinctions lies in the potential markets for the meat. Many countries e.g. Australia and U.S.A. have little or no history of imported game meat because their regulations require pre and post mortem inspection of animals. On the other hand West Germany will accept "kill" deer provided certain standards of carcass processing are met. "Slaughter" deer will, in theory, have a wide potential world market although to date there have been only a few hundred such deer killed and these during early 1976. It is probable that in future years the "kill" deer industry will regress or at best stabilise while the "slaughter" deer industry will expand at a rapid and progressive rate.

Early investigational work with captive deer was done at Lincoln College where Coop and Lamming (1976) reported a good reproductive performance, high rates of stocking and estimated that at least as much venison meat/ha could be produced as beef or lamb/ha. The greatest problem appeared to be the management and handling of the animals.

In 1973 the Invermay Agricultural Research Centre embarked on a major project by obtaining 90 red deer hinds from a commercial property. These have subsequently been farmed at the Centre and the following sections deal with several aspects of the Invermay experiments.

### Behaviour and Reproduction

Initial handling experiences with the breeding herd, which had been trucked 240 km without problems from a deer farm of undeveloped native grassland, were very unsatisfactory. The animals were nervous, damaged fences, and refused to be herded into a central raceway running through the farm. Within 6 months however, the deer were amenable to shifting by both men and dogs. This was partly due to the animals becoming familiar with the new environment and partly due to persistence in working the deer (Drew and Kelly, 1975). Once into the solid-sided yards the animals could be readily handled providing they could not see out onto the farm.

The red deer hind mates from mid April and calving commences in late November or early December. Table 2 shows the calving performance at Invermay over 3 years.

Table 2: Invermay Red Deer – Reproduction

	1973	1974	1975
Start of calving	29 Nov.	5 Dec.	4 Dec.
Duration of calving (days)	25	25	26
Calving (%)	76	88	92
Calf deaths (%) (birth to weaning)	27	21	5
Birth weight (Kg)	6.5	7.4	—

The condensed calving period of about 25 days indicates that most hinds conceive at their first breeding cycle. In 1973 the high mortality rate was largely attributed to death from injuries inflicted by hinds during the first 6 days of the calf's life (Kelly and Whateley, 1975). The reason for this behaviour would seem to be primarily because of unfamiliarity by the hinds with their surroundings and secondly because we disturbed all calves within 24 hours of birth to tag and weigh them. This procedure meant disturbing the calf so that it frequently ran off after release when it would naturally be 'hiding' in cover during daylight hours. In 1974 the 21% mortality rate was not due to calf beating but mis-mothering. We again disturbed all calves soon after birth but handled half the animals with gloves and the other half without gloves. Mortality seemed to be more severe when calves were handled without gloves. In 1975 several groups were not disturbed at all during calving and where tagging at birth was done the calves were not weighed. In almost all cases our interference did not send the disturbed calf out of its hiding place. The high 1975 calving rate and low mortality is a clear indication of the high reproductive efficiency in well fed, farmed deer.

### Animal Growth

Figure 1 clearly portrays the seasonal nature of growth in red deer even when feed on offer is abundant and of high quality.

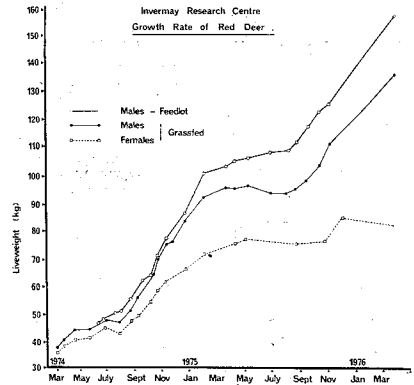


Fig. 1

The growth period starts in early spring and continues for about 6 months after which the approaching breeding season in the male means a fall in appetite and growth rate. Winter appetite seems to be low right through the winter months. The yearling hind shows a similar pattern of growth to the stag but at a lower level. Interrupted growth patterns have also been documented in Scotland (Blaxter *et al.* 1974). One group of Invermay deer was kept in a pen from 6 to 27 months-of-age and fed a pelleted diet comprising 55% barley, 35% lucerne, and 10% linseed meal. It is interesting to observe that onset and rate of spring growth was almost identical to that measured in deer grazing improved pasture. Growth and feed intake in the feedlot is more clearly shown in Figure 2. Feed consumption falls during the autumn/winter but there is a spectacular compensating increase in the spring as the stags approach 2 years-of-age.

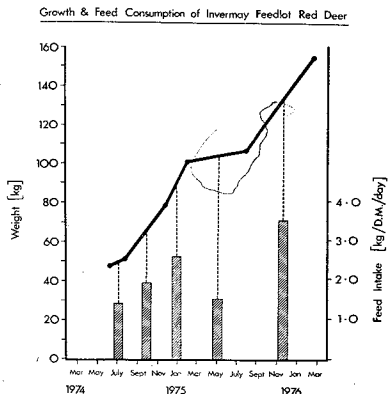


Fig. 2

## Carcass weight and composition

Groups of 5 stags were slaughtered at Invermay either off grass or out of the feedlot at 6, 12, 18, and 27 months-of-age. In addition carcasses from feral animals matching these ages were purchased from a game packing house. Table 3 gives carcass weights together with those from some ram lambs and a Wapiti bull. Although there are only five animals per group there is an indication that 12-month-old feral deer weigh no more than they did at 6 months. This is not unreasonable given the extended severe winter in much of the New Zealand high country.

**Table 3:** Carcass Weight in Several Animal Species (kg)

	Age (months)			
	5-6	12-13	19-20	25-27
Feral deer	28.7	28.0	36.3	43.1
Farmed deer	24.3	40.8	51.9	75.7
Feedlot deer	—	44.4	58.4	96.8
Ram lambs <sup>1</sup>	8.3	14.6	—	16.6
Bull elk <sup>2</sup> (age unknown)	—	—	—	150

<sup>1</sup> Everitt and Jury (1966)

<sup>2</sup> Field *et al.* (1973)

Farmed deer at 27 months-of-age have carcasses that are almost twice the weight of those from feral animals of similar age while the feedlot stag carcasses were 20 kg heavier at 27 months-of-age than grass fed stags of the same age. Very favourable dressing percentages of 60% were found in animals 18 months and over and the figure is about 5 units better than slaughter cattle and 15 units better than in slaughter lambs. The carcass fat percentage figures (Table 4) show clearly just how lean the deer carcasses are when compared with ram lambs and that a large feral Wapiti bull carcass can be extremely lean. Fat mobilisation in the 6-month-old feral calf seems to have occurred during the winter, judging by the extremely low carcass fat percentage in the 12-month-old feral deer.

**Table 4:** Carcass Fat Content (%) in Several Animal Species

	Age (months)			
	5-6	12-13	19-20	25-27
Feral deer	5.7	1.3	3.0	—
Farmed deer	7.3	5.7	6.0	—
Feedlot deer	—	7.9	8.6	—
Ram lambs <sup>1</sup>	17.3	28.0	—	29.9
Bull elk <sup>2</sup> (age unknown)	—	—	—	4.5

<sup>1</sup> Everitt and Jury (1966)

<sup>2</sup> Field *et al.* (1973)

## Stocking Rate and Meat Production

The seasonality of growth in stags means that it is unrealistic to discuss weight gain from March to August.

A stocking rate experiment from August to March was run over 2 years at Invermay and the results are shown in Table 5. Pasture management was such that the sward always had a height of between 2 and 5 cm. The yearling animals in 1974 were both sexes and the weight and carcass gains/ha were adversely affected by the yearling hinds in the group. Nevertheless the carcass weight of 520 kg/ha in 6 months was a very high figure and compares more than favourably with the best *annual* return of beef/ha achieved on Invermay of 450 kg of carcass/ha. The 1975 production was much higher but still suffered somewhat from the fact that half the males in the group were castrates and these grew almost 20% slower than the entire males.

**Table 5:** Invermay Red Deer Performance on First Class Agricultural Land

	August to February	
	1974/5	1975/6
Stocking rate/ha (yearlings)	26.4 (mixed sex)	31.4 (entire and castrate males)
March weight (kg)	79.0	77.9
Liveweight gain (kg/ha)	860	1235
Carcass gain (kg/ha)	520	740

The 740 kg of carcass meat/ha needs to be put in perspective against some other published figures. Joyce *et al.* (1969) at Ruakura measured 780 kg carcass meat/ha (net) when farming friesian steers at 6.2/ha. In a similar way, Brougham (1975) at Palmerston North measured more than 1000 kg carcass meat/ha (net) from bulls. Friesian steers have been evaluated on irrigated pasture at Winchmore Irrigation Research Station. Mean pasture DM production/ha over 4 years between August and February was 8370 kg DM/ha and during that 6-month period about 1190 kg of liveweight gain/ha was recorded from a stocking rate of 5.8/ha (from Taylor, 1975). My calculations assume that yearlings were carried for the entire period and newly weaned calves from December to February. Assuming that 55% of the liveweight is carcass then carcass production per 6 months will be about 650 kg/ha. The deer performance of 740 kg carcass/ha in 6 months is obviously very attractive and the potential on some high producing land can only be speculated with recorded stocking rates of over 60/ha. The reason for the good deer performance is almost certainly in the nature of the carcass composition where about 90% of the gain is in lean meat and very little in expensively-produced fat.

Since grazing feed intakes with deer have not yet been measured it is dangerous to place too much emphasis on the calculated conversion of pasture to carcass. Nevertheless the measured pasture production at Invermay from August to February 1975/76 was 7600 kg DM/ha. Assuming this feed is 90% consumed by the deer then feed conversion over the spring-summer is 9.5 kg DM/kg of carcass weight produced. Calculations from the Winchmore experimental data (Taylor, 1975) can be made to compute DM intake from August to February. About 8000 kg DM/ha was eaten to produce 650 kg carcass meat/ha, giving a feed conversion of 12.3 kg DM/kg carcass. From lamb experiments at Ruakura,

Ratray *et al.* (1976) calculated that approximately 30 kg DM was required per kg carcass gain and speculated that the feed requirement would be reduced to 12 kg DM/kg carcass gain only if lambs could be induced to grow from 25 to 50 kg at 300 g/d. Early evidence with growing deer farmed on high fertility soil indicates that meat production in both quantity and efficiency compares more than favourably with the best pastoral beef and lamb production systems.

### Venison Flavour

The traditional game meat shot in the mountains and exported to Germany is reputed to have a strong 'gamey' flavour when cooked. A natural question that arose when deer farming began on grassland pasture was whether or not the meat flavour would be different from feral venison. Although Invermay work is at an early stage, preliminary taste panel findings do not show clear differences in flavour between the two classes of meat (Forss, personal communication). For each ration, variation between animal carcasses in taste has been high.

### Conclusions

The grassland farming of deer in New Zealand would appear to have a very bright future providing two areas of concern can be resolved. The first is the problem of killing 'slaughter' deer and how the logistics of this can be worked out in portable or fixed slaughter houses when most farmers want to kill their stock at the same time. The seasonal nature of growth in the stag dictates that killing should be done about March (either 15- or 27-months-of-age) to take advantage of rapid spring/summer growth but not much later because of the small potential for growth during and after the breeding season. The second problem relates to the organised and deliberate development of markets both within and outside New Zealand. The industry in the past has had its fair share of price instability with high peaks and severe troughs but unlike our other primary producing industries we don't really have much idea of the possible extent of markets for high quality venison do we have any significant international competition for 'slaughter' deer.

One important feature of the 'slaughter' deer industry should be the impact on the local hotel and restaurant business. In the past a venison dish on the menu was a variable and sometimes a questionable eating experience. This is not surprising since there is no system of carcass classification and ageing and conditioning might vary from days to weeks. Control over the nutrition, slaughter, and carcass treatment of farmed deer will mean a high quality meat product with predictable cooking characteristics. An imaginative chef should be able to confidently develop first class venison dishes that will be essentially "New Zealand" in flavour and style. The impact on the consumer, especially the overseas tourist, may be one of the best ways of promoting a new and exciting meat dish.

### ACKNOWLEDGEMENT

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The co-operation from Drs. Kelly, Moore, and Fors and the assistance from the staff of the nutrition and fertility sections, as well as the farm staff in the various facets of the Invermay deer project is gratefully acknowledged.

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## QUESTIONS AND ANSWERS

- Q. Are there any mobile slaughter houses for deer in operation?
- A. Yes. One unit has been operating in the South of the South Island during the early part of 1976. I believe that 500-600 deer have so far been processed as "slaughter" deer in that facility.
- Q. What is the current price for deer meat?
- A. The price has been quoted by one exporter as about \$2.80/kg packed venison. Much of the carcass is packaged as "bone-in" and about 90-95% of the clean carcass (hide off) weight will appear as packed meat.
- Q. Do the data for carcass composition and proportion of saleable products apply to feral deer?
- A. Some data have been presented in this paper on the weight and composition of both feral and farmed deer. There is likely to be less fat in older feral stags than in farmed stags of similar age because the latter will be much heavier than the feral counterpart. The proportion of saleable products should be similar from both feral and farmed deer.
- Q. & comment: Fallow deer are in fact, farmed deer but they come into the category of killed deer.
- A. There are many fallow deer which have been fenced and would appear to be farmed. Harvesting the animals, however, poses problems because the species is very flighty and yarding does not seem possible. This means that controlled shooting from a distance is the only way of slaughtering the animals and the carcasses must be classified as "kill" deer.
- Q. Is there a preference for stag or hind meat on overseas markets?

- A. This is unknown because there is at present no venison classification system.
- Q. What is the price difference between killed and farmed deer?
- A. About a 20% premium for farmed venison. There has been so little farmed venison sold to date that the price must be speculative.
- Q. What is the value of by-products?
- A. Antlers in the velvet, tail, ligaments, teeth, and testicles will likely realise \$50-70 per stag.
- Q. Is there any information on the growth potential of Wapiti?
- A. Growth rate of Wapiti or hybrid animals where their potential for growth could be realised has yet to be measured but 6-month-old Wapiti calves in Yellowstone National Park in U.S.A. have been recorded at 100-120 kg. The New Zealand Fiordland Wapiti stock originally came from Yellowstone Park stock and yet 6-month-old Fiordland calves don't weight more than 50-60 kg. The reason for this seems to be the relatively poor feeding conditions in Fiordland particularly in the summer.
- Q. Are there any particular disease problems with farmed deer?
- A. Generally deer are very healthy animals and tolerate high stocking rates very well. The young stock through the first winter are rather susceptible to internal parasites and lung worm in particular has been seen in large numbers in post mortem examination of some calves. The subject is being investigated at Invermay this season.