VENISON PRODUCTION AND CARCASS COMPOSITION OF RED DEER

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During three consecutive years at the Invermay Agricultural Research Centre, yearling deer have been stocked at 26 to 31 per hectare from August to February and in that time have produced 860 to 1235 kg ot liveweight gain, or 520 to 740 kg carcass meat per hectare. Differences in carcass composition at several ages and carcass weights between feral and grass-fed deer are discussed. Fat in the carcass of feral deer has been measured at 1.3 to 5.8% of the weight, while in farmed deer the figures ranged from 7.3 to 11.9%. These figures are about one-third of that found in commercial lamb and beef carcasses.

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Any animal farming system that increases the leanness of the stock will be likely to increase the efficiency of carcass production per unit area of grazing land. An example of this is in the production of bull beef rather than meat from steers (Turton, 1969). In most experiments bulls showed a superiority of 5 to 20% over steers in average daily gain.

A different way to more efficient meat production is to change the species of animal farmed to one with a low propensity towards fatness and the deer appears to be just such an animal. Blaxter *et al.* (1974) observed that: "The first-class meat obtained from a lean young deer carcass is 33% of its empty body weight. In a sheep of similar size the amount of first-class meat obtained is only 18% of empty body weight." As deer farming systems of management become established in New Zealand it will obviously be important to evaluate the quantity and quality of the meat produced.

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VENISON PRODUCTION PER HECTARE

For three consecutive years, rising yearling deer have been farmed on first-class agricultural land from August to February at a stocking rate sufficient to keep pasture height between 2 and 5 cm. This objective has been achieved by using a rate of between 26 and 31 animals per hectare.

Liveweight and carcass production over three seasons is shown in Table 1. Production during the first season was restricted, partly because the stocking rate was below the optimum and partly because the animals included

TABLE 1: VENISON PRODUCTION ON FIRST-CLASS AGRICULTURAL LAND*

	1974-5	*1975-6*	*1976-7*
	Mixed Sex	*Entire and Castrate Stags*	*Entire Stags*
Stocking rate/ha	26.4	31.4	30.7
Animal weight at 15 months (kg)	79.0	77.9	81.2
Liveweight gain in 180 days (kg/ha)	860	1235	1200
Carcass gain in 180 days (kg/ha)	520	740	720

*From stocking rate experiments with yearling animals at Invermay starting in August/September and finishing in February/March of each year.

females with a relatively low growth rate. Performance in the 1976-7 season, the first time that entire stags only were used, was expected to be ahead of the previous year when castrates were included. For climatic reasons, the onset of spring growth in 1976 was very late and this impaired seasonal production. Nevertheless, 730 kg of carcass/ha compares more than favourably with 443 kg beef/ha/yr on Invermay from young Aberdeen Angus and Friesian cross cattle measured as the mean of four seasons (M. A. Monteath, unpublished). The cattle experiments were, however, done on the hill property where annual dry matter production is about 15% lower than on the flat area where the deer experiments have been done.

If it is assumed that 90% of the pasture dry matter grown is eaten by the deer, then they require about 9.5 kg feed dry matter for every 1 kg of carcass gain. This is a very favourable conversion rate as shown by lamb comparisons where about 30 kg feed dry matter was needed per 1 kg carcass gain (Rattray *et al.*, 1976).

CARCASS AND MEAT COMPOSITION

The growth and development of the Invermay farmed deer have been reviewed by Moore and Brown (1977) and the present paper looks at the carcass composition of representative animals slaughtered at 6, 12 and 27 months of age (5 per group). For comparative purposes feral carcasses of matching age were purchased from a commercial game packing house.

After 12 months of age, farmed stags are much heavier than feral stags of the same age (Table 2). At 6 months of age the feral stag calves are as heavy or heavier than their farm-reared counterparts and the 5.7% fat content of the feral deer is relatively high. During the long and often severe winter, feral calves lose weight, mobilize fat reserves, and consequently at 12 months of age the sample collected from a game packing house had carcasses that were no heavier than those at 6 months and had only 1.3% fat.

Table 2 shows that there is little difference between groups in carcass protein content and in only the 27-month-old farmed stags, whose carcasses averaged 76 kg, did the fat content rise noticeably above the 5 to 7% level. By feeding stags to high weights on high concentrate rations, it is possible to produce carcasses with fat levels as high as 15 to 25% and those figures are approaching the levels found in commercial "low fat" sheep and cattle (Blaxter *et al.*, 1974).

TABLE 2: STAG CARCASS WEIGHTS AND COMPOSITION*

Age (*months*)	*Weight*† (*kg*)	*Protein* (*% carc.*)	*Fat* (*% carc.*)
Feral:			
6	28.7	21.0	5.7
12	27.9	21.6	1.3
27	43.1	21.5	5.8
Grass-fed:			
6	24.3	21.4	7.3
12	40.8	21.8	5.7
27	75.7	20.7	11.9

*Each figure is the mean of 5 animals.
†Liveweight minus all internal soft tissues, head, feet and hide.

Three-quarters of the high-priced venison cuts in the commercial trade come from the hind legs and Table 3 shows that in the stag this component comprises 40% of the carcass weight. The proportion of leg in the carcass drops as the stag matures or reaches a high weight, although this will depend on the season of the year. In late summer when the

TABLE 3: WEIGHT AND COMPOSITION OF STAG HIND LEGS

Age (*months*)	*Hind Leg wt** (*kg*)	*Hind Legs* (*% carc.*)	*Lean in Leg Meat*† (%)	*Fat in Leg Meat*† (%)	*Fat in a Leg Muscle*‡ (%)
Feral:					
6	11.8	40.9	96.5	2.5	1.6
12	11.3	40.5	97.9	0.9	1.3
27	17.0	39.5	95.6	3.2	1.2
Grass-fed:					
6	9.9	40.3	96.4	2.4	1.5
12	16.6	40.8	95.5	3.3	1.9
27	28.4	37.6	88.0	10.9	1.9

*This is the normal game industry leg cut, haunch or hind.
†Hind legs were boned out and all the soft tissue minced for analysis.
‡Analysis of the closely trimmed semimembranosus muscle.

stag is in peak condition the neck and forequarter become relatively more heavy and in Table 3 the leg of the 27-month-old grass-fed stags comprised 37.6% of the carcass. In some 27-month-old feedlot Invermay stags whose carcasses weighed 96.8 kg, the leg comprised only 34.8% of the total. The lean meat content of minced leg meat does not vary much from 96% in deer up to 27 months of age and, although the fat content of the meat from 27-month-old farmed stags reached 10.9% (Table 3), there was no detectable increase in the intramuscular fat content.

While cutting up deer carcasses which have appreciable fat trim, it is noticeable that there is a heavy layer of subcutaneous fat and pockets of fat between muscles but little if any marbling fat.

In conclusion, it is of some interest to consider that the energy value of 100 g of a leg of lamb, rump steak and leg of venison on the meal table will be of the order of 1130, 1465 and 628 Joules/100 g, respectively (from Sawyer, 1974). There is a clear case for promoting venison as a low fat health food.

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