44 Farming of Wapiti and Wapiti Hybrids in New Zealand

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Abstract

The New Zealand deer farming industry has now reached the stage where production of young lean animals for venison over an extended period of the year is becoming the cornerstone of deer farming profitability. There are worthwhile incentives for producers who can finish stags to market weights of 55 to 65 kg at 10 to 13 months of age. In addition, some exporters offer premiums for lean heavyweight carcasses which are targeted at well-grown but lean 1.5- to 2.5-year-old red deer (*Cervus elaphus*) or the younger wapiti (*C. canadensis*) x red hybrids. Consequently, with declining emphasis on live sales of breeding females and increasing emphasis on venison production from male and female deer, many farmers are now actively pursuing the strategic use of larger strains of deer as sires. It is in these situations that the wapiti and its hybrids are finding a niche. There are also considerable potential advantages for the wapiti in terms of velvet antler production. In contrast to red deer, wapiti do have some special management needs. These are particularly evident in terms of their animal health requirements and in the management of red hinds mated to these larger sires.

Key words: Deer farming, management, production, red deer, velvet, venison, wapiti

Introduction

Deer farming in New Zealand (NZ) is based predominantly on red deer (*Cervus elaphus*) and in particular on the production of venison at carcass weights of 55–60 kg, which are reached by young stags at 12–18 months of age. Because of the strong seasonality of growth patterns in stags and to a lesser extent hinds (Suttie 1987), optimum carcass weights for efficient slaughter systems are not easily achieved in red deer before 12 months of age. Venison exporters offer attractive schedule prices based on carcass quality, weight, and leanness (as expressed by the GR, or tissue depth measurement), and these vary according to the season. Markets for farm-raised venison are dependent largely on September–December demand in the northern hemisphere, although an all-year-round supply of chilled product into other markets has become desirable. This requirement is somewhat out of phase with the growth characteristics of young red stags in the southern hemisphere. Typical seasonal financial incentives offered by exporters to attract product are contrasted with a normal red deer growth curve in Fig. 44.1 (Wilson 1989). The growth curve of a wapiti x red hybrid is shown for comparison. The mismatch between the growth pattern of young red deer and the demand reflected in price per kg of carcass is clearly evident.

Research work and on-farm production systems have been developed to improve the early growth rates of red deer. A number of systems are being developed to increase live weights of red deer; these include early calving systems involv-

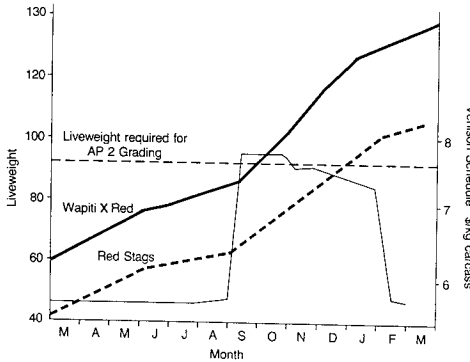

FIGURE 44.1. Venison schedule fluctuations (1989–90) and a typical weight gain curve for red deer stags and F1 stags (wapiti × red) to 15 months of age.

ing wintering in sheltered or indoor pens, developing new pasture species which might provide a better match between feed supply and demand, and selection of genetically superior animals in terms of growth rate and early maturity. Hybridization of red deer females with males from various wapiti or wapiti hybrid strains in order to improve performance and the efficiency of production have also proven highly successful for venison production. The genus *Cervus* shows an incredible diversity in body size, and many species are able to interbreed and produce fertile hybrids offering commercial advantages in live weight gain and velvet antler production (Fennessy and Dratch 1986). Consequently, NZ researchers and farmers have been evaluating the role of the wapiti and their hybrids with red deer.

Hybridization

Venison Production

In productive terms, wapiti or their hybrids are larger, faster growing, and leaner at the same age than their red counterparts (Drew and Hogg 1990). In terms of relative antler yield per unit live weight, wapiti are comparatively superior antler producers (based on velvet antler weight and grading quality) at an earlier age and maintain that advantage in maturity. This versatility offers a number of options for the farmer. The potential advantages in growth rate due to the larger mature size can lead to advantages in terms of the body weight of offspring and hence age at slaughter or carcass weight at slaughter. The potential profitability can be estimated by using concepts of biological efficiency (Fennessy and Thompson 1989) when biological efficiency is defined as the output (kg of carcass produced) relative to input (MJ of feed eaten). Changes in economic efficiency can be expected to follow changes in biological efficiency. The most efficient approach involves mating a genetically large male to a genetically small female as long as there is little effect on calving rate and the survival of the progeny.

New Zealand red hinds mated to large wapiti males have successfully reared their hybrid calves (Moore and Littlejohn 1989). At Invermay the larger red hinds (100–110 kg) are generally used to produce the hybrid. Such red hinds have been routinely mated by natural mating or artificial insemination to the largest Canadian wapiti bulls available. Table 44.1 compares the carcass production data from yearling Canadian wapiti × red crosses (F_1) and 2-year-old red deer and

TABLE 44.1. Comparison of slaughter data for 2-year-old red deer stags with data for 11-month-old wapiti x red hybrids slaughtered in October (from Drew and Hogg 1990)

	Red deer	Hybrids
Number	53	8
Live weight (kg)	110	116
Hot carcass weight (kg)	63	68
Dressing (%)	57	59
Carcass compositon (% cold carcass weight)		
Saddle	15	18
Hindquarters	39	40
Forequarters	19	20
Neck	16	14
Ribs	11	8
Fatness (GR in mm)	10	4.7

demonstrates the substantial advantage in carcass growth gained by hybridization (Drew and Hogg 1990; Drew Chapter 56, this volume). As indicated, calving rate is important in considering the total system. Over 3 years, Moore and Littlejohn (1989) reported a 72% calving rate for 106 red hinds mated to wapiti, with 89% of these hinds rearing calves to weaning. The overall weaning rate is lower than that achieved with red hinds mated to red stags, due mainly to the lower proportion of hinds mated to wapiti actually producing calves.

The wapiti x red hybrid, however, is considered to be at the extremes of practical management. Hinds must be managed to shed surplus fat during winter and kept fit in late pregnancy to avoid dystocia problems. Growth rates of around 550 g/day have been recorded for Canadian wapiti x red calves during lactation in contrast to 380–400 g per day in a typical red x red mating (Moore and Littlejohn 1989). This nutritional load can cause loss of condition during lactation and may result in a lowered conception rate in the following mating season.

Natural mating of red hinds with wapiti bulls also presents management problems. Bulls appear to require previous mating experience and be 5 or 6 years of age. Young bulls are timid, especially if in audial or visual competition with more aggressive red deer stags, even in single sire mating groups. Mating ratios of 1:30 are the maximum recommended (Moore 1988). In commercial deer farming where cost-effective management and profitable venison production are the objectives, it is the wapiti x red (F_1) stag that is finding an increased demand as a sire. Special mating and calving management requirements are reduced with apparently little or no effect on calving percentage. This quarter-bred hybrid has produced carcass weights of 56–58 kg in October/November, or 66–68 kg at 15 months of age (i.e., about 25% heavier than red deer of the same age) and satisfies all the existing market requirements for weight, leanness, and quality.

Velvet Production

There is a strong relationship between antler size and live weight (Fennessy 1989) with a 10 kg increase in body weight associated with a 0.1–0.2 kg increase in velvet antler weight in red deer (Moore et al. 1988; P. Fennessy, unpublished data). Analysis of the work of Huxley (1931) shows that hard antler weight increases at a relatively faster rate than body size in European red deer. Velvet antler production from mature wapiti a known in NZ is in the range of 5.6–7.8 kg with some markedly higher weights (NZ Wapiti Society Velvet Pool data) and supports this live weight/antler weight relationship. If increased velvet antler production is the primary objective, then the two alternative strategies of selection within a strain, and hybridizing across strains can be considered to improve performance. Fennessy (1989) showed comparisons of the gains likely to be achieved through these selection procedures (Table 44.2), assuming a heritability coefficient for velvet antler weight of 0.4 (Zhou and Wu 1979). Data for velvet antler production of red deer, wapiti, and their hybrids are presented in Table 44.3.

Management

The first wapiti-type animals used in the NZ farmed situation were themselves a hybrid type sourced from the original liberation of *C. elaphus nelsoni* in the Fiordland region of southern New Zealand. On blood type (based on protein polymorphisms) the average wapiti component is estimated at 56% (Tate and Rummel 1989). These animals have readily adapted to a pasture graz-

TABLE 44.2. Comparison of various breeding options to improve velvet antler production (comparisons as 4-year-olds; from Fennessy 1989)

Breed option	Velvet antler production (kg) as 4-year- olds			
	Breeding animals Stags × red hinds		Genetic progress per generation	Yield of progeny
Selection within strain				
Average stags	2.5	2.5[c]	0.0	2.50
Top 3% of stags	3.6[b]	2.5	0.22	2.72
Hybridization between strains[a]				
A) Average stags	3.6	2.5	0.55	3.05
Top 3% of stags	5.2	2.5	0.87	3.37
B) Average stags	5.2	2.5	1.35	3.85
Top 3% of stags	7.5	2.5	1.81	4.31

[a] Calculations assume no hybrid vigor (i.e., progeny of average superior strain and average red hinds are midway between the parents).
[b] Assuming S.D. = 0.5 kg, C.V. = 20%, and a heritability of 0.40.
[c] Hinds are average red hinds that in their male progeny from mating with average red stags would be expected to produce 2.5 kg of velvet antler.

TABLE 44.3. Typical velvet antler yields (kg; days of growth) NZR, CW × NZR hybrids, and CW at Invermay, and the expected velvet antler weight for CW[a] assuming no hybrid vigor and the ratio of actual to expected velvet antler weight for CW (Fennessy and Pearse 1990)

Age (years)	Actual velvet antler weights			Expected velvet antler weight of CW	Actual/expected velvet weight
	NZR	CW × NZR	CW		
2	1.01 (55)	2.05 (64)	1.99 (68)	3.09	0.64
3	1.60 (58)	2.63 (64)	2.50 (71)	3.66	0.68

[a] Expected velvet antler weight of CW = 2(CW × NZR) − NZR

ing regime, although they usually require roughage supplementation in autumn and spring to avoid a diarrhea of unknown origin in times of lush feed growth. Wapiti have the reputation of quietness and docility in the paddock situation, but often find yarding and intensive handling confrontational.

Overcrowding in yards and prolonged periods of confinement are the major stress factors. Wapiti must be drafted into small groups as soon as possible to minimize aggression and handling problems. Unlike red deer, wapiti will kick savagely with both hind and fore legs if provoked, or else become stubborn and difficult to move. Handlers often provoke aggression in the animals through impatience or frustration. Handling systems that utilize raceways exploiting the natural desire to run are effective particularly if the handler is working outside the raceway and is not threatening. Open boarded yards that give good visibility from pen to pen have proved successful in settling groups of animals. Above all, ample time and space allow the largest wapiti to be handled easily and with confidence. Prolonged and unnecessary yarding only increases handling difficulty.

Poor performance of wapiti and their hybrids has been reported in many situations in NZ (Mackintosh et al. 1982, 1986), with the problems being particularly apparent in the purebred wapiti. Data for the comparative weight performance of wapiti, red deer, and their hybrids at

TABLE 44.4. Typical live weights (kg)[a] by age for New Zealand red deer (NZR, *Cervus elaphus scoticus*), Canadian wapiti (CW, *C.e. manitobensis*) × NZR hybrids and CW at Invermay with the expected live weights[b] for CW (assuming, A, no hybrid vigor and, B, 10% hybrid vigor in CW × NZR progeny) and the ratio of actual to expected live weights for CW (Fennessy and Pearse 1990)

Age	Actual live weights			Expected live weight to CW[b]		Actual/expected live weights of CW	
	NZR	CW × NZR	CW	A	B	A	B
Males							
Birth	9.6	14.1	18.1	18.6	16.0	0.97	1.13
3 months	48	74	73	100	86	0.73	0.85
1.3 years	110	155	155	200	172	0.78	0.90
2.2 years	150	210	210	270	232	0.78	0.91
3.2 years	188	264	265	340	292	0.78	0.91
4.2 years	210	(295)[c]	305	380	326	0.80	0.94
5.2 years	220	(310)[c]	330	400	344	0.83	0.96
Females							
Birth	8.8	13.3	17.2	17.8	15.3	0.97	1.12
3 months	43	71	70	99	85	0.71	0.82
1.3 years	85	129	140	173	149	0.81	0.94
2.3 years	96	158	180	220	189	0.82	0.95
3.2 years	105	167	215	229	197	0.94	1.09
4.2 years	110	170	240	230	198	1.04	1.21

[a]Moore 1982, 1983, 1984; Moore et al. 1988a, b; Moore and Littlejohn 1989; A.J. Pearse, unpublished data

[b]Expected live weight of CW: A-2(CW × NZR)-NZR, and B = 0.909(CW × NZR)-NZR.

[c]Actual live weights for (CW × NZR) males at 4.2 and 5.2 y are based on limited data.

Invermay are presented in Table 44.4. The weights of the hybrids are clearly superior to those expected for an intermediate animal, and point to considerable hybrid vigor and/or severe underperformance of the purebred wapiti (Fennessy and Pearse 1990).

As many farmers are upgrading the NZ wapiti-base animal with imported strains to increase the proportion of wapiti genes in their animals, these productive losses are significant. Anecdotal evidence throughout NZ suggests the problem is widespread and possibly has some genetic basis in terms of the comparative susceptibility to disease of wapiti compared with farmed red deer (Mackintosh 1990).

Animal Health

Canadian wapiti are highly susceptible to ryegrass staggers (toxicity due to the presence of an endophyte in the ryegrass). The condition is particularly marked in late summer and autumn under tight grazing conditions or drought (Orr and Mackintosh 1985). Staggers exhibit as a slight head tremor, lethargy, ataxia, and weight loss in mild cases, to an excited uncontrolled gait, collapse, and convulsion in advanced cases, particularly under herding pressure. Avoidance of such pasture is the only cure, and recovery occurs by supplementary feeding with safe feeds such as lucerne hay or silage or concentrates. Many wapiti farmers have introduced low endophyte ryegrasses or alternative pasture and herb species to overcome the problem. Hybrids are less susceptible, and the condition is rarely seen in red deer (Mackintosh Chapter 29, this volume).

Wapiti and hybrids are also more prone to the effects of copper-deficiency-induced enzootic ataxia than red deer and may have a greater absolute requirement for copper, although recommended blood serum levels have not been

well defined (Mackintosh et al. 1986). Seasonal fluctuations are recorded with deficiencies most commonly observed in spring in 2- and 3-year-old males during velvet growth. Ill-thrift, loss of condition, hind leg incoordination, and ataxia are common physical effects. Treatment is by prevention through oral dosing of copper needles (4–12 g cupric oxide wire in capsules) or injectable copper. Farm fertilizer history, including molybdenum and sulfur application and high soil pH through liming can affect normal copper uptake in the diet and should be assessed in diagnosis and treatment.

Purebred wapiti (like the hybrid wapiti mentioned previously) may develop diarrhea particularly during spring, but also in autumn. A high quality meadow hay or lucerne should be available ad lib during this period. Improved health status has been reported when wapiti have access to unimproved pastures including browse, and are run at low stocking densities.

Many wapiti farmers have experience of pure wapiti and hybrids developing a wasting condition, usually in spring or autumn and spring. Poor calving performance, infertility, massive weight loss, and a lingering death may result. The animals, often without scouring, lose weight rapidly and become depressed and lethargic. Secondary contributing symptoms are common, including parasitic worm build-up (particularly Dictyocaulus and Ostertagia), inflamed abomasal mucosa, liver damage, and on occasions low serum levels of copper and cobalt. Some evidence suggests unidentified fungal mycotoxins present in rank and dead pasture may initiate the condition which also may have a genetic basis in susceptibility (Pearse 1988). Preventative measures include offering supplementary feed such as high quality lucerne hay at these times of the year. Control of internal parasites is critical, as wapiti appear to show a lesser degree of acquired immunity to lungworm than red deer (C.G. Mackintosh, personal communication).

In general terms, wapiti respond to low stocking rates and less restriction in paddock size than red deer. Red, hybrid, and wapiti stags do not mix well as young animals where there is competition for supplementary feeds and should be yarded and handled in separate groups to reduce behavioral stress with intensive handling, particularly during velveting. Wapiti farmers have developed many different yarding and management systems for wapiti. However, successful farmers generally exhibit a high level of stockmanship.

Conclusion

If the primary role of the wapiti is to enhance the venison industry through their use in hybridization across the base herd of red deer hinds, then producers can limit the specialist management required to a small number of highly selected sire animals without additional yard alterations or wide-ranging feeding and animal health programs. With both male and female hybrids being suitable for the current venison market at an early age, the dilemma of what to breed hybrids to in the next generation is removed. The wapiti, if used as a terminal sire and a premium velvet producer, will continue to make a major contribution to the profitable development of the New Zealand deer industry.

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