Proc. 8th AAABG, 1990
N.Z.

COMPARATIVE CARCASS PRODUCTION FROM RED, WAPITI AND FALLOW DEER

K.R. DREW[1] and B.W. HOGG[2]

[1] MAF Technology - Invermay Agriculture Centre, P.B. Mosgiel, New Zealand
[2] MAF Technology - Ruakura Agriculture Centre, P.B. Hamilton, New Zealand

SUMMARY

Growth rate and carcass composition information has been compared from fallow, red, NZ wapiti and some hybrids (NZ wapiti/red and imported elk/red). NZ wapiti had a slightly lower dressing percentage (DP) than the other breeds but all the deer were at least 10% higher in DP than sheep. Although young deer (up to 2 yrs of age) are much leaner than traditional livestock older animals across breeds are very fat at the end of summer. The hybrid elk/red deer when young (rising 1 year) and fallow deer have a particularly high proportion in the highly priced saddle and hind leg components. Castration decreases growth rate and increases fatness in comparison with entire males.

INTRODUCTION

The farming of deer is now a practical reality in New Zealand and much has been written about the size, scope and development of the industry (Yerex & Spiers 1987). The product of venison, velvet antler, skins and other minor components are all valuable but in the long term the production of venison is likely to be the main feature of deer farming. The production of meat from deer has been reviewed by Drew (1985) and the essential feature is that male deer are very seasonally growing animals which gain weight rapidly in the spring/summer and lose most of their fat during the autumn/winter period.

While considerable information is now available about red and fallow deer carcass production very little has yet been written about the wapiti and hybrids with red deer. The North American Elk or wapiti was introduced into New Zealand early in the 20th century and established in the south west of New Zealand. Being of the same species as red deer, which had been introduced at an earlier date, the wapiti interbred with red deer and today the feral Fiordland herd can best be called New Zealand wapiti. The animals are a wide genetic mix of pure wapiti and red deer. The Invermay Agriculture Centre acquired a small herd of captured Fiordland New Zealand wapiti (NZW) and these animals have been interbred for a number of years. A blood test has shown that the Invermay NZW herd has on average 56% of pure wapiti blood. Bulls from the Invermay herd were mated to red deer and the progeny evaluated for growth rate and carcass characteristics (Drew 1986). This paper considers carcass information from red, NZW, hybrids and fallow deer. More recently Invermay imported some pure bred Canadian wapiti (elk) (Cervus elaphus manitobensis) and has a research programme which mates bulls to red deer. The progeny are 50:50 elk/red animals.

CARCASS AS A PROPORTION OF LIVEWEIGHT

The dressing percentage (DP) (hot carcass weight as a percentage of farm liveweight) in sheep and cattle ranges from 40-50% (Fennessy and Drew, unpubl.). Red and fallow deer have DP's in the range of 55-57 (Drew 1985). Table 1 show DP at several different ages of fallow, red, wapiti and hybrids. The NZW animals have a lower DP than red deer at 2 years and mature while the hybrids are very similar to red deer. The elk/red animals had a high DP as rising yearlings and the figures would be expected to increase with age. For various health and management reasons the carcass weights for the NZW at 4-5 years of age are about 20% lighter than expectation.

All the deer breeds show a significantly higher DP than sheep and cattle.

CARCASS GRADING

A GR system, similar to that used in sheep defines overfatness in deer. The tissue depth is measured over the 12th rib 16 cm from the mid line. Although venison companies do show some variation an overfatness penalty payment is incurred in the following way:

Carc. wt. (kg)	Allowable GR (mm) before penalty
<50	10
50-70	12
>70	14

There is a wide variation in GR at different ages and between breeds (Table 2). The mature red deer are grossly overfat showing 29 mm GR for summer slaughter. Since most of the fat is mobilised during the rut winter slaughter of mature stags never produces any overfat animals. NZW have much lower GR figures than red deer of the same age. This is understandable at 2 years of age because the NZW is a later maturing breed than red deer. At 4 and 5 years of age the NZW had a GR of 15.6 mm compared with 5 years old red deer of 29 mm. The difference is likely to be due to the NZW not achieving their potential weight (and fatness) when age 4 and 5 yrs. The hybrid (NZW/red) is fatter than NZW and close to the same weight at both 2 and 4-5 yrs of age. The fact that GR is a "tissue" and not fat measurement is well illustrated with the winter death of an elk bull with a GR of 11 mm yet no visible fat. The hybrid (elk/red) animals have a very superior carcass at a very young age. The 68 kg carcasses at 11 months of age had a GR of just 4.7 mm.

COMMERCIAL CUTS

The NZ venison industry has developed a cutting procedure for export product with five major components. In recent years the hind leg is frequently boned out into boneless vacuum packed "denver" leg cuts. Table 3 shows information about the proportions of the carcass in the 5 primal cuts. Fallow deer show little difference between one and two year old animals. Saddle (high value) proportion is high in fallow when compared with red deer. Red deer however, show a significant increase in the neck component and proportional reduction in ribs during the second year of growth. Mature red stags increase greatly in the neck as the rut commences and this is reflected in a proportional reduction in both hind leg and shoulder. The mature NZW seems to show minimal

increase in neck development as the rut approaches and has a small proportion of the carcass in the saddle. The hybrid (NZW/red) has a high yield in saddle and shows clear neck hypertrophy at 4 and 5 years of age. Like the mature red stag, the hind leg cut in this hybrid is proportionately reduced with increasing age. The young elk/red hybrid has a very high proportion of the carcass in the high value saddle/leg cuts (58%) and a small fraction (22.3%) in the neck and ribs which must be boned out to give low value meat.

CARCASS COMPOSITION

Separation of carcasses in lean, fat and bone is one way of measuring composition. Table 4 compares and contrasts several deer breeds with some data from Angus cattle (bulls). It is clear that young deer of all breeds are high in lean and low in fat compared with cattle. The ratio of lean/fat is 8-10 in young (up to 2 yrs) fallow and red deer, 14-17 in young NZW and hybrids and 3-5 in mature red, wapiti and hybrid. The cattle at 2.9 were similar to the mature deer. Because fallow deer have a low proportion of bone their lean/bone ratio of 5.4 is higher than any other group. The lowest ratio of lean/bone is in the 2 year NZW and mature NZW/red but for different reasons. The young NZW is low in fat (therefore high in lean) yet has a high proportion of bone. The NZW/red mature hybrid is very high in fat (therefore low in lean) yet has a smaller proportion of bone. Data from the yearling elk/red confirms the early stage of maturity at slaughter and the consequent 3.9 lean/bone ratio. The cattle show a high lean/bone ratio because of the relatively small amount of bone.

Table 1 Carcass as a proportion of liveweight in stags (%)

Breed		Animal age (yrs) One	Two	Mature[1]
Fallow	carc. wt (kg)	24.5	30.6	-
	DP[2]	55	55	-
Red deer	carc. wt (kg)	54.9	76.0	112.0
	DP	57.9	56.4	57.1
NZ wapiti (NZW)	carc. wt (kg)	-	87.9	115.3
	DP	-	52.5	56.4
Hybrid (NZW/red)	carc. wt (kg)	-	85.4	115.5
	DP	-	56.0	58.0
Hybrid (elk/red)	carc. wt (kg)	67.6	-	-
	DP	58.1	-	-

[1] Red deer = 8 yrs of age
Hybrids & NZW = 4 and 5 yrs of age
[2] Dressing percentage

Table 2 Carcass grading for fatness in deer (Gr mm) (summer slaughter)

Species	Age	(n)	Carcass weight kg	GR (mm)	(SD)
Fallow	16 mo	(9)	33.9	12	(4.0)
Red	15 mo	(28)	56.0	8.6	(2.7)
	27 mo	(38)	59.5	7.1	(3.5)
	5 yrs	(4)	106.1	29	(0.5)
NZ Wapiti	27 mo	(4)	87.9	6.4	(2.9)
	4 & 5 yrs	(5)	115.3	15.6	(6.4)
Hybrid NZW/red	27 mo	(4)	85.4	8.5	(1.4)
	4 & 5 yrs	(10)	115.5	22.9	(6.5)
Elk (Canadian)[1]	Mature	(1)	175.2	11	
Hybrid	11 mo	(8)	68.0	4.7	(1.4)

[1] Winter death

Table 3 Primal commercial cuts from deer breeds

Species	Age	(n)	Carcass cuts (% carc. wt) Saddle	Hind	Shoulder	Neck	Ribs
Fallow	1 yrs	(7)	17.6	39.5	17.7	11.3	13.9
	2 yrs	(7)	17.4	40.5	17.0	12.5	11.6
Red	1 yr	(5)	15.5	39.4	19.0	10.6	15.5
	2 yrs	(53)	14.4	38.2	18.9	16.1	11.4
	9 yrs	(9)	18.6	33.1	16.5	23.7	8.1
NZ wapiti	2 yrs	(4)	16.6	39.9	19.7	12.5	11.3
(NZW)	4 & 5 yrs	(4)	13.1	39.9	18.8	14.6	13.6
Hybrids	2 yrs	(4)	16.0	39.6	20.3	13.2	10.9
(NZW/red)	4 & 5 yrs	(4)	17.8	33.5	16.1	18.6	14.0
Hybrid (elk/red)	11 mo	(8)	17.9	40.3	19.5	14.0	8.3

Table 4 Carcass composition of deer and cattle carcasses

Species	Age	Weight	Lean	Fat	Bone	Lean/fat	Lean/bone
	kg	% Carcass weight					
Fallow[1]	13-25 mo	24-40	73.9	9.1	13.6	8.1	5.4
Red	26 mo	62.6	72.7	7.0	20.3	10.4	3.6
	9 & 10 yrs	129.5	70.9	14.2	14.9	5.0	4.8
NZ wapiti (NZW)	26 mo	83.0	72.7	4.2	23.5	17.3	3.1
	4 & 5 yrs	115.3	66.8	14.7	18.5	4.5	3.6
Hybrid (NZW/red)	26 mo	78.0	73.8	5.4	22.0	13.7	3.3
	4 & 5 yrs	115.5	60.9	19.7	19.4	3.1	3.1
Hybrid (elk/red)	11 mo	67.6	76.0	4.7	19.3	16.2	3.9
Angus cattle[2] (bull)	2 yrs	250.0	62.0	21.5	14.0	2.9	4.4

[1] Gregson & Purchas 1985
[2] Maiga 1974

Table 5 Effects of castration on carcass weight and chemical composition

		Species & age			
		Fallow (n)		Red[1] (n)	
			1 Year(8)	2 Year(7)	16 mo-2/10 mo (5)
Entires	Carc. wt (kg)	24.5	30.3	43.8	67.6
	% protein	21.6	21.0	20.9	20.2
	% fat	5.6	6.0	6.9	12.5
Castrates	Carc. wt (kg)	23.3	26.5	40.6	55.8
	% protein	22.1	21.0	21.0	20.6
	% fat	6.2	3.7	8.4	11.5

[1] Drew et al. 1978

CASTRATION AND STAG GROWTH

Castration in male animals has been widely shown to reduce growth rate and increase fatness when comparisons are made with entire males (Rhodes 1969). Table 5 shows the effects of castration in fallow and red deer at one and 2 years of age. At one year of age the penalty in growth rate is small (5-7%).

Castrates were considerably fatter than entire stags and when corrected to equal carcass weight the yearling fallow bucks were 10% and the red deer 21% fatter than the entires.

Castrate fallow deer gained a small amount of weight during their second year and this appears to be reflected in carcass fatness which fell to 3.7%. In red deer there is a 17% reduction in weight and 16% increase in fatness as a penalty for castration (Drew et al. 1978).

In the management of deer for venison production there seems to be no case for castration which will decrease growth rate and increase fatness.

REFERENCES

DREW, K.R. (1985). In "Biology of Deer Production", Bull. 22, p 285, editors P.F. Fennessy and K.R. Drew, The Royal Society of New Zealand.

DREW, K.R. (1986). Proceedings Ruakura Farmers Conference, Hamilton, New Zealand.

DREW, K.R., FENNESSY, P.F. and GREER, G.J. (1978). Proceedings N.Z. Society of Animal Production. 38:142.

GREGSON, J.E. and PURCHAS, R.W. (1985). In "Biology of Deer Production", Bull. 22, p 295, editors P.F. Fennessy and K.R. Drew, The Royal Society of New Zealand.

MAIGA, A.M. (1974). PhD Thesis, Cornell University, U.S.A.

RHODES, D.N. (1969). Editor, "Meat Production from Entire Male Animals", Churchill, London.

YEREX, D. and SPIERS, I. (1987). "Modern Deer Farm Management" Ampersand Publishing Associates Ltd, Carterton, New Zealand.