

## DEER NUTRITIONAL REQUIREMENTS

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### Introduction

Deer, like all other animals, require energy, protein and minerals for maintenance and growth. Proteins in New Zealand's pasture fed deer is usually provided in adequate and even surplus amounts except for winter rations and sometimes in a dry summer. Most New Zealand pastures are 12-25 % protein (about 16 % required for growth and less for maintenance) and plant proteins are 75-85 % digested (Waghorn & Barry, 1987). Mineral requirements is a complicated area, but in broad terms deer requirements are similar to those of sheep and cattle. A notable exception is copper nutrition where there is evidence that deer require more than other livestock and elk/wapiti have a greater requirement than red deer. By far the most important nutrient for deer, which are very seasonal animals, is energy and this topic is addressed in this paper. Digestible energy or metabolizable energy (ME) is very variable among feeds and meeting the ME requirements is the most important nutritional objective.

### Plant ME content

Forage plants decrease in feeding value as they mature because the proportion of variably digested plant cell wall increases and the proportion of highly digested plant cell content decreases. Table 1 (from Waghorn & Barry, 1987) indicates that Italian Ryegrass increases in stem content from 18 % to 64 % over 12 weeks after cutting and the proportion of green leaf in the dry matter decreases from 82 % to 4 % of the DM in the same period. Green leaf digestibility of the ryegrass did not change much with time but digestibility of stem declined markedly 10-14 weeks after cutting. Practical pasture plant management should clearly aim at providing green leaf rather than stem. The ME value of DM (MJ ME/kg) is shown in Table 2 (Waghorn & Barry, 1987) to drop from 12 to under 9 as the plant goes from "young leafy" to seed setting.

**Table 1. ME change as plants grow - Italian Ryegrass.**

	Weeks after cutting				
	2	4	6	10	14
<b>DM Distribution (%)</b>					
green leaf	82	63	37	15	4
stem	18	37	57	67	64
<b>DM Digestibility (%)</b>					
green leaf	64	66	65	65	58
stem	64	68	63	59	49
ME - whole plant MJ/kg DM	12.0	11.5	11.0	10.1	9.2

(From Waghorn & Barry, 1987)

**Table 2. Decline in Perennial ryegrass digestibility with stage of growth.**

	ME value (MJ/kg Dm)
Young leafy	12.0
Late leafy	10.8
Head emergence	10.9
Seed setting	8.9

(From Waghorn & Barry, 1987)

### Feed quality and milk production

High weaning weights are a function of high lactational performance which itself reflects feed quality. Scottish work (Table 3) shows that unimproved pasture when compared with heather as lactational forage 10-12 weeks after calving gave almost double the milk production and calf liveweight gain (Loudon & Milne, 1985). Differences were much less in early lactation. In summer dry areas of New Zealand poor lactation will be common unless high quality supplements such as maize are fed.

**Table 3. Feed Quality & Deer Milk Production.**

Stage of lactation (d)	Milk Yield (kg/d)		Calf Growth Rate (g/d)	
	Heather	Improved pasture	Heather	Improved pasture
0-20	1.6	1.9	370	400
40-60	1.3	1.9	260	360
80-100	0.7	1.2	185	350

(From Loudon & Milne, 1985)

### Seasonal feed requirements - red deer

The requirements in Table 4 show that older stags have a high feed requirement except during the rut and that hinds need double the feed in summer than in the other three seasons. The feed requirements for maintenance and growth in stags are shown in Table 5 and for hinds in Table 6. To maintain body weight the feed required goes up by 70% when the weight is doubled.

**Table 4. Seasonal Feed Requirements - Red Deer.**

	<u>MJ ME/day</u>				Av. Stock Units
	Autumn	Winter	Spring	Summer	
<b><u>Stags</u></b>					
Rising Yrl	16	21	27	26	1.5
Rising 2 y	24	28	31	30	1.8
Rising 3 y	24	33	38	36	2.1
<b><u>Hinds</u></b>					
Rising yrl	15	17	22	21	1.2
Rising 2 y	20	23	23	45	1.8
> 2 years	23	22	24	47	1.9
Ewes	13	10	28	11	1.0

(From Fennessy & Corson, 1981)

**Table 5. Feed Requirements for Maintenance and Growth.**

Stags	MJ ME/day				
	Liveweight (kg)				
Gain (g/d)	40	60	80	100	160
0	13	18	23	27	38
100	17	22	26	30	42
200	20	25	30	34	46
400	28	33	38	41	53

**Table 6. Feed Requirements for Maintenance and Growth.**

Hinds	MJ ME/day				
	Liveweight (kg)				
Gain (g/d)	40	60	80	100	160
0	13	18	23	27	38
100	19	24	29	33	44
200	24	29	34	38	49
300	30	35	40	44	55

**Seasonal requirements of different genotypes**

Comparative seasonal requirements for mature Elk/Wapiti and hybrid deer by season are shown in Table 7. Careful feed budgeting must be done for the very large animals to see that standards are met. Feed requirements for late pregnancy and velvet antler growth occur during the spring flush, but it might be necessary to restrict available feed to hinds in late pregnancy because of the possibility of birth difficulties due to the calves being very large. In many parts of New Zealand, older stags cast their antler buttons a month before the spring feed can readily meet their feed requirements. It is therefore important to provide high quality supplements such as grain from the date of button cast until there is adequate spring feed or suffer a significant reduction in velvet antler growth.

**Table 7. Feed Requirements for Mature Deer.**

	MJ ME/day			
	Autumn	Winter	Spring	Summer
<b>Stags</b>				
NZ Red (NZR)	19	35	42	38
1/2 Wapiti/1/2 NZR	25	47	56	51
Canadian Wapiti/Elk	34	62	71	66
<b>Hinds</b>				
NZ Red	27	26	28	49
1/2 Wapiti/1/2 NZR	48	46	50	85
Canadian Wapiti/Elk	64	61	67	120

Tables 8 and 9 summarise target weights, autumn feed requirements and growth for weaner stags

and yearling stags of several different genotypes. The ¼ Père David stag seems to grow out to a large muscular animal as a yearling producing a 70 kg carcass at that time. The data for ¼ German animals is rather limited and needs amplification.

**Table 8. Feed Requirements x Deer Genotype (weaner males).**

	Liveweights (kg)	Autumn Growth Rate (g/d)	MJ ME/d	Relative Feed Requirement
<b>Weaning (pre-rut)</b>				
Typical NZ Red (NZR)	49	150	21	100
½ Wapiti/½ NZR	74	200	29	138
¼ Wapiti/¼ NZR	57	175	25	119
Elk/Wapiti in Canada	120	250	40	190
¼ German/¾ NZR	58	170	24	114
¼ Père David/¾ NZR	54	190	24	114

**Table 9. Feed Requirements x Deer Genotype (yearling males).**

	Liveweights (kg)	Autumn Growth Rate (g/d)	MJ ME/d	Relative Feed Requirement
<b>Yearling (15 Mo)</b>				
Typical NZ Red	107	140	32	100
½ Wapiti/½ NZR	150	175	42	131
¼ Wapiti/¼ NZR	124	150	37	116
Elk/Wapiti in Canada	260	220	50	156
¼ German/¾ NZR	110	150	34	106
¼ Père David /¾ NZR	128	160	39	122

### Conclusions

Farm raised venison is now promoted as a year round quality product (Cervena™) and it will become increasingly important for farmers to supply quality deer for most of the year. This can only be achieved if producers understand seasonal feed requirements, action those requirements and use a range of genotypes to provide seasonal flexibility.

### References

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