DEER NUTRITION: Feed Demands and How to Meet Them

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Introduction

In spite of many views to the contrary, deer, once enclosed on farms, respond to nutrition in exactly the same way as other domesticated ruminants. They respond to plenty of feed of high quality and 'do' poorly and are more susceptible to disease if faced with low amounts of poor quality feed. The essential ingredient in feeding management is to allocate feed correctly so that deer eat the amount required both by themselves and the manager.

The aim of this paper is to define feeding levels and discuss management procedures designed to achieve required feed intakes.

Feed requirements

Feed requirements for Red deer are shown in Table 1 (Fennessy 1981). These requirements are for hinds reaching a mature liveweight of 90kg and for stags a mature liveweight of 150kg. Obviously feed requirements will differ from Table 1 for lighter breeds (Fallow) and heavier breeds (Wapiti).

Table 1. Metabolisable energy requirements of Red deer (MJME/day)

Stags	Autumn	Winter	Spring	Summer
3-15 months	16	19	27	26
15-27 months	24	28	31	30
Older stags	19	35	42	38
Hinds				
3-15 months	15	18	22	21
Older hinds	23	22	24	47

Maintenance requirements of deer grazing outdoors are equivalent to 0.85 MJME/kg $^{0.75}$ so for a 45kg Fallow hind and a 200kg Wapiti hind winter maintenance requirements would be 15 MJME and 45MJME per day respectively.

Feeds can also be compared in Megajoules of Metabolisable energy terms and the weight of Dry Matter of any particular feed required to meet those requirements is calculated by dividing the MJME requirement by the energy content of the diet. Allowance then needs to be made for the dry matter percentage of the diet. Table 2 shows dry matter percentages and energy contents of typical feedstuffs available to deer.

Table 2. Dry Matter (DM) and metabolisable energy contents (MJME/kg DM) of feeds

	% DM	Energy Content MJME/kg DM	Relative Energy
Leafy pasture	15	10.8	1.00
Stalky pasture	30	8.0	0.74
Good quality hay	85	9.0	0.83
Poor quality hay	85	7.5	0.69
Pea vine hay	85	9.5	0.88
Silage	30	10.5	0.97
Choumollier	15	12.5	1.16
Swedes (whole plant)	11	13.0	1.20
Barley	85	12.5	1.16
Maize	85	14.0	1.30
Oats	85	11.5	1.06
Deer nuts	86	11.0	1.02

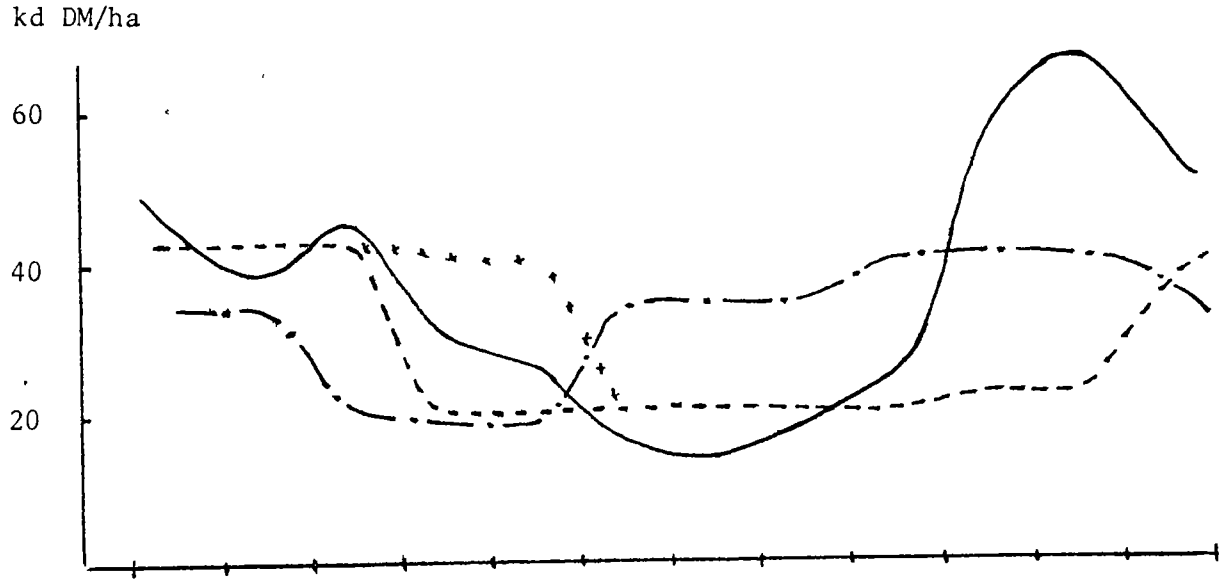
For example to feed 24 MJME/day to hinds in spring $\frac{24}{10.8} = 2.2$ kg/DM of grass is required. If the sole diet was swedes then $\frac{24}{13.0} \div 0.11 = 16.8$ kg of swedes are required.

There is some discussion at present regarding the accuracy of these feed requirement figures. If there is an error it is one of overestimation rather than underestimation.

On an annual basis a Red hind is equivalent to 1.9 Stock Units and eats about 1100kg DM/year. However care must be taken in any comparison on a stock unit basis since in the spring a hind requires about 86% of that required by a ewe and her lamb but over the summer the hind's feed requirement is 4.27 times that of a ewe. Many people use the stock unit as a basis for economic comparisions between deer and other species of livestock but in the author's view that form of comparison is quite erroneous since it does not take into account the relationships between feed demand and pasture growth at different times of the year.

(N.B. Fig. 1 is on next page).

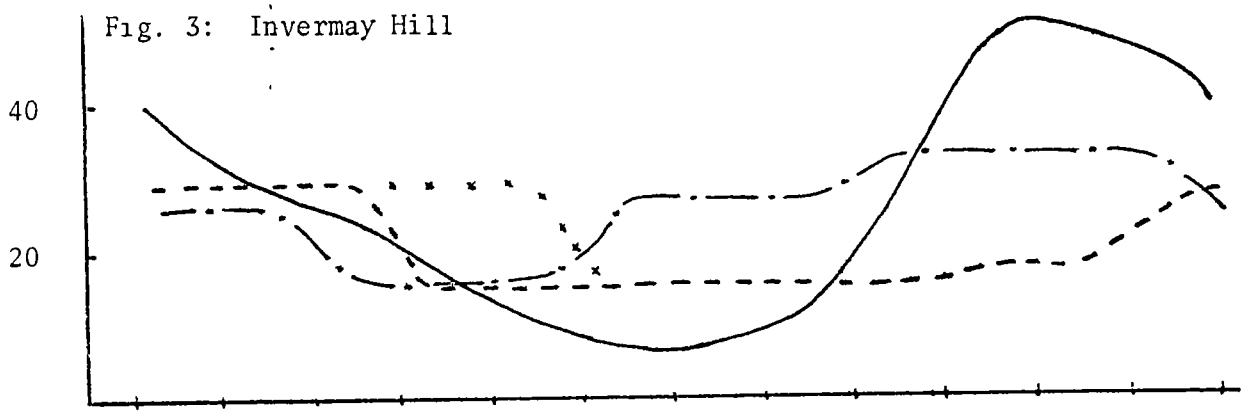
Figure 2: Te Pohue



_____ Pasture Growth --------- 9 hinds/ha (100 day weaning)

x x 9 hinds/ha (160 day weaning) ___.___ 10 stags/ha

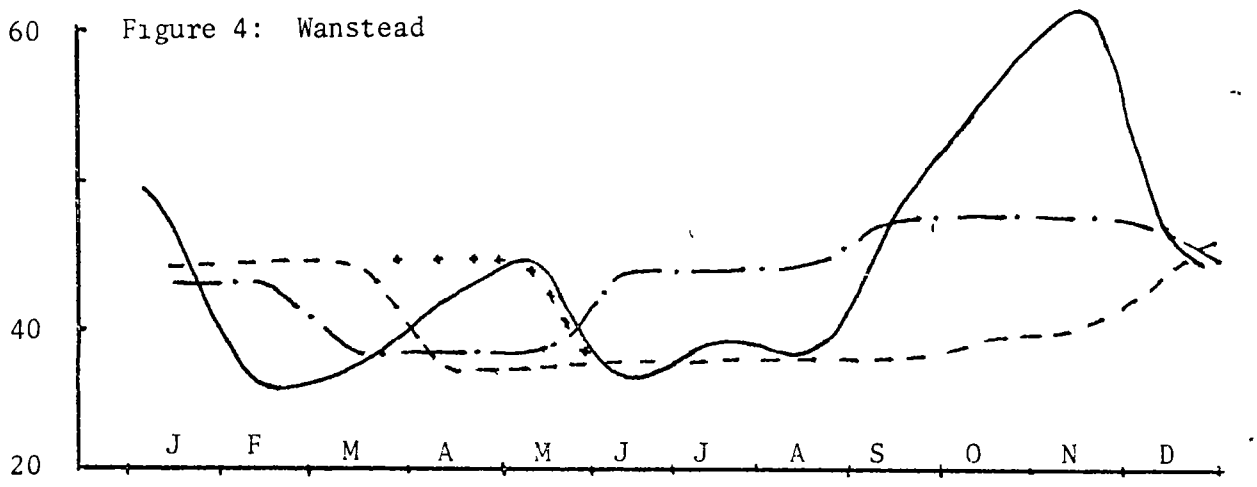
Fig. 3: Invermay Hill



_____ Pasture Growth ------- 6.3 hinds/ha (100 day weaning)

xx 6.3 hinds/ha (160 day weaning) ____.___ 8 stags/ha

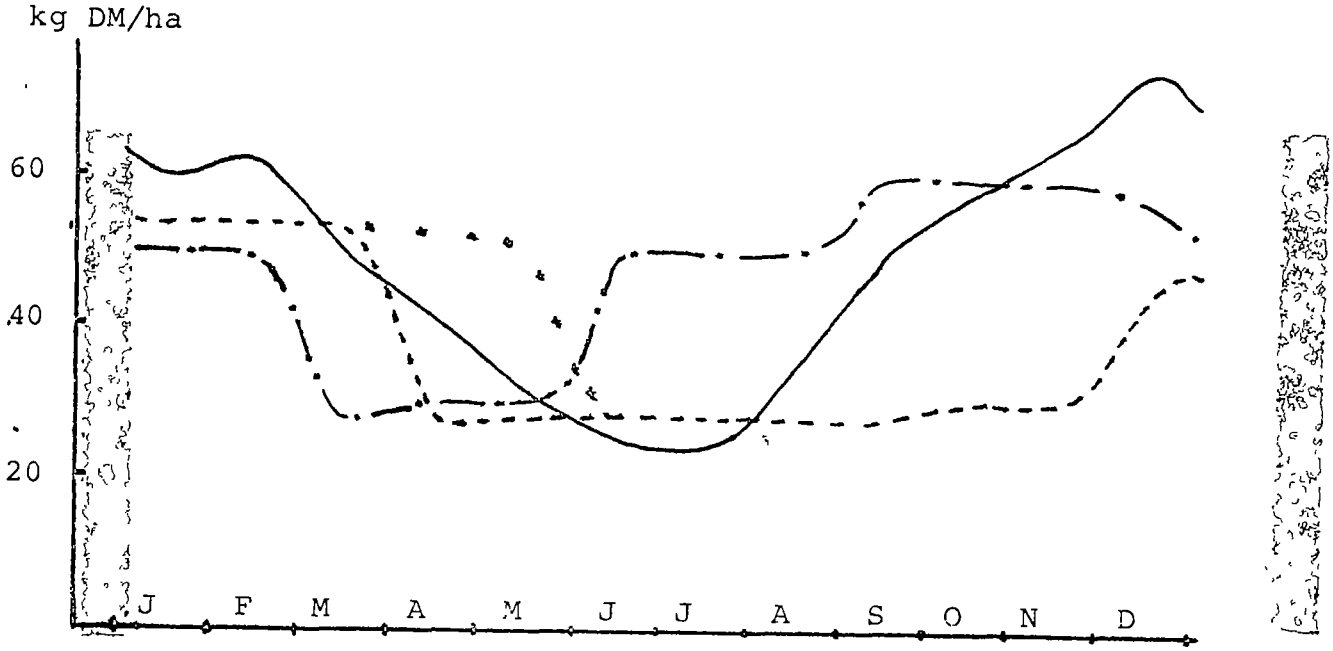
Figure 4: Wanstead



_____ Pasture Growth ---------- 6.3 hinds/ha (100 day weaning)

x x 6.3 hinds/ha (160 day weaning) _____ . ____ 8 stags/ha

Fig. 1: Dargaville



——— Pasture Growth ------ 12 hinds/ha (100 day weaning)

x x 12 hinds/ha (160 day weaning) —·— 15 stags/ha

There are several points to note about these curves:

(1) The stocking rates chosen should represent what is possible. For example if a stock unit eats about 550kg DM/year then 12 stock units at the Wanstead site would consume approximately 6600kg DM/year which is a utilization percentage of 68%. Allowing for losses in conservation and some pasture death this is considered reasonable.

(2) In general the fit between feed supply and demand is poor. Especially for stag farming. This means:

(a) At high stocking rates during winter and in drought prone areas over summer supplementary feeding is necessary

(b) Even at high stocking rates, particularly with hind plus replacement policies, an enormous feed surplus is likely in the early spring unless it is removed by conservation or other classes of livestock.

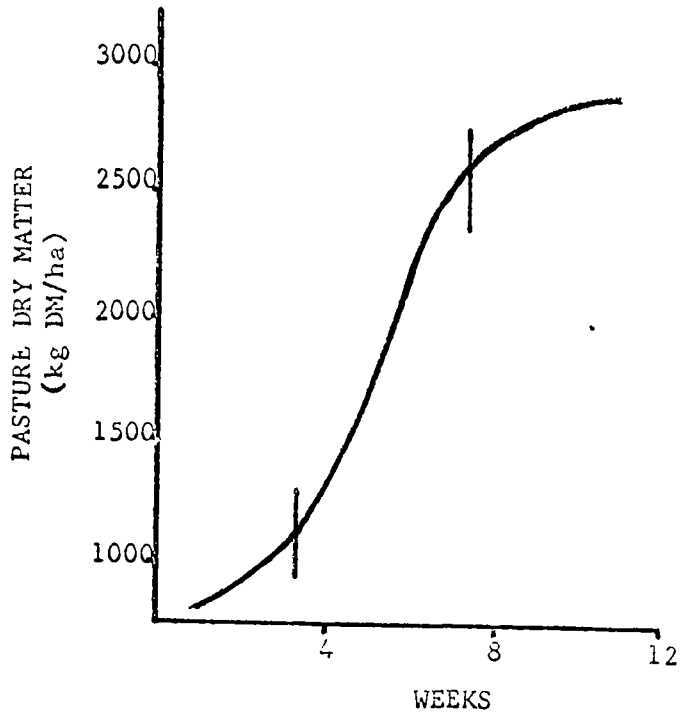
(3) Weaning prior to the roar reduces the winter feed deficit in all situations both through the sale of excess stock and through a reduced combined feed requirement of the hind and her fawn after weaning.

Principles of Pasture Production

Because of the relatively poor fit between feed supply and demand a good understanding of the principles of pasture production and the role the manager has in influencing pasture growth is required. A lack of pasture control in the late spring in particular can reduce autumn grass growth by as much as 35% and will also produce poor quality feed.

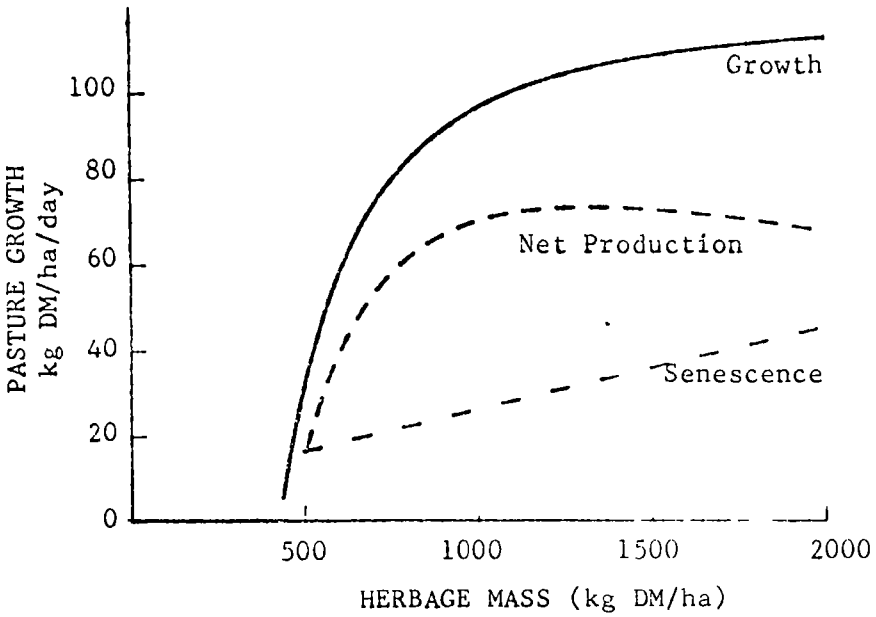
Following grazing pasture regrows with a 'S' shaped pattern (Figure 5).

Figure 5. Rate of Pasture Regrowth Following Grazing



The important features about this curve are that below about 1000kg DM/ha standing herbage, pasture mass influences pasture growth rate. Between 1000kg DM/ha and 2500kg DM/ha pasture mass has little influence on pasture growth rate but above 2500kg DM/ha death at the base of the sward has a major effect on net pasture production. These effects are summarised in Figure 6.

Figure 6. Influence of Herbage Mass on Rate of Growth, Senescence and Net Production (kg DM/ha)



The manager can manipulate pasture mass to try and optimise pasture growth rates by varying frequency and severity of grazing. Simplistically, if pastures are short (less than 1000kg DM/ha) a spell from grazing, long enough to allow pastures to get to 1500 - 2000kg DM/ha, will produce optimum pasture growth. If short pastures continue to be severely and frequently grazed (set stocked) pasture growth rate will suffer. Failure to control pastures and seedhead formation in the late spring through infrequent or lax grazing will also reduce net pasture accumulation. Severe grazing of long pasture will inhibit short term pasture recovery through the total removal of photosynthetic green leaf area.

Referring back to the feed demand vs supply graphs these facts indicate at least three pasture management problem areas.

(1) Recovery from an autumn/winter feed deficit will usually be delayed due to low herbage mass levels. This will normally mean supplementary feeding for longer than anticipated.

(2) Once pasture mass gets above 1000kg DM/ha there is an explosion in pasture growth. The combined effects of (1) and (2) explain the concern of deer farmers who go from supplementing to a pasture surplus almost overnight.

(3) Unless the huge pasture surplus is controlled early in spring feed quality and pasture growth are reduced.

Conservation

Bearing in mind that any supplement fed to hinds over the lactation period has to be of high quality there is no disputing that of the two pasture-based supplements silage has the potential to be of much higher quality than hay.

Table 5 shows the effect of stage of growth on Energy Content and the amount of dry matter required to feed a lactating hind.

Table 5. Effects of Stage of Growth on Energy Content and Feed Intake Required

Stage of growth	Energy Content (MJME/kg DM)	Feed Required per hind (kg DM)
Young leafy (early spring)	12.0	3.91
Seedhead formation (mid-December)	10.3	4.56
Rank (mid-January)	8.0	5.88

There are other advantages for silage over hay. Pasture recovery following silage harvesting is faster than that following hay making. Conservation problems associated with adverse weather conditions are reduced, it can be stored for relatively long periods and if well made is more readily accepted than hay.

Apart from these advantages there is one overwhelming reason for silage. That is the time of harvesting in relation to the onset of fawning. If silage can be made three weeks before the start of fawning, conserved areas have time to recover at a time when soil moistures do not limit pasture growth, pasture quality and silage quality are as good as they could be for lactating hinds and mis-mothering of fawns zero.

The catch is that yield of silage per hectare is low but this disadvantage is minimal compared with higher yields but mismothered (and normally dead) fawns with later harvesting. For the above reasons it is the author's view that it is better to cut a larger area of lower yield than a smaller high yielding area. Care must be taken however in determining the area of silage to be cut especially in a poor spring so that the mean pasture cover on the farm does not get too low or the deer farmer will be faced with starting supplementary feeding almost as soon as he has finished harvesting. Although as yet there are no precise measurements it is the author's view that mean pasture cover at the start of fawning should be around 1400kg DM/ha with a range of pasture covers from 900kg DM/ha (post-silage cut) to 1900kg DM/ha. If pastures are not in this range at fawning pasture yield will have an effect on milking ability and therefore fawn growth rates. Using these guidelines deer farmers can readily work out the area of silage they should be able to cut to get maximum total yield and optimum pasture control yet avoid an induced feed shortage.

Finally since feed quality is all important silage should be fine chop, wilted and well compacted. Time spent rolling the stack and providing a good cover will be amply returned by good silage and high intakes.

Pasture/animal responses

Many deer farmers regard the use of expensive supplements as an investment. At today's prices for weaner hinds money spent on expensive supplements is often recovered several times over in the sale ring. This situation is likely to continue for some years yet but the enlightened farmer is already setting an aim of feeding as much standing pasture as possible and only feeding supplements when pasture is limiting or for management reasons. They have been quick to adopt grazing management practices dairy farmers and intensive sheep farmers use. Many deer farmers routinely feedbudget through the winter and the advantages of intensive subdivision using temporary electric fences are readily appreciated.

To assist in feedbudgeting MAF has proposed a number of Residual Dry Matter and Animal Production targets (Table 6).

Table 6. Residual Dry Matter and Liveweight Gain Responses for Red Deer

		Residual Dry Matter (kg DM/ha)	Liveweight Gain (g/day)
Hinds	Winter	600	0
	Spring (early)	800-1000	50-100
	(late)	1200	100
	Summer	1200-1500	Lactn + 130
	Autumn	1000-1200	50-100
Stags	Winter	600-800	0
	Spring	1200	250-300
	Summer	800-1000	200-250
	Autumn	1200	Loss
Young Stock	Winter/early Spring	1200-1500	80-100
	Late Spring/Summer	1500	250-300
	Autumn	1200	100

While these RDM/LWG responses have not been fully tested early indications are that they are of the right order and some farmers at least are using them with confidence.

Supplementary feeding

Supplements are fed to deer to overcome pasture shortfalls or for management reasons.

(A) Reducing feed deficits

The amount of supplement required depends on three things

(1) The proportion of the diet that is available from pasture
(2) The energy content of the supplement
(3) The dry matter percentage of the supplement

The amount of pasture available is determined by the total yield per hectare minus the RDM. For example in the early spring pre-fawning the RDM for a hind has to be about 800kg DM/ha. If the total pasture yield is 1200kg DM/ha then 400kg/ha is available. Feed requirement per hind is 2.2kg DM per day so one hectare could carry 180 hinds for one day. Using this type of calculation in a Feedbudgeting exercise can quickly determine over a longer period the amount of supplement required. Reference to Table 2 shows the adjustments required to convert pasture dry matter to weight of supplement.

For the above example if 50% of the diet was from pasture then supplement would have to provide 1.1kg of pasture dry matter equivalent. If all that supplement was maize which has a relative energy value of 1.3 then the amount of maize to be fed would be 1.1kg ÷ 1.3 ÷ 0.85 = 1.0kg maize. If silage was the feed the calculations are 1.1 ÷ 0.97 ÷ 0.30 = 3.78kg silage.

Cost of supplement

This is an important factor in determining the type of supplement to feed. Comparative costs can be worked out using the data in Table 2. As an example if maize cost $200/tonne then its cost per kg of pasture equivalent dry matter is

$$\frac{20\ 000 \text{ cents}}{1000\text{kg}} \div 1.3 \div 0.85 = 18.1\text{c/kg}$$

Barley at $180/tonne

$$= \frac{18\ 000}{1000} \div 1.16 \div 0.85 = 18.3\text{c/kg}$$

Hay at $3/25kg bale

$$= \frac{300}{25} \div 0.83 \div 0.85 = 17.0\text{c/kg}$$

Silage at $40/tonne in the stack

$$= \frac{4000}{1000} \div 0.30 \div 0.97 = 13.8\text{c/kg}$$

Suitability and palatability of supplements

For lactating hinds feed quality is important. The only supplements suitable are silage, the grains, pea vine hay, deer nuts and in some cases some fodder crops such as Wairoa Brassica. Pea vine hay usually prices itself out of the market and if there is an alternative, is kept for weaners. Most farmers either supplement with grain on its own or with silage. If silage is not available pea vine is used with grain. The author prefers to see hinds obtaining at least 60% of their requirements from pasture although in drought-prone areas this is not always possible. A lactating Red hind requires about 4.4kg pasture dry matter per day. If grass provides 60% of that then supplement will need to provide 1.76kg DM grass equivalent. The type of supplement recommended in this situation is 4kg silage plus 0.55kg maize per head per day.

Complimentary with other farmed species

Although grazing of the deer unit by other species of livestock raises the possibility of disease introduction this is another option deer farmers have for controlling feed in the early to mid-spring and for reducing winter and late summer supplementary feed bills. While initially most farmers established a separate deer unit the trend now is to ring fence the whole property and use other species of livestock to even out the variations in feed supply and demand. This is done in a variety of ways. Hinds may be strip grazed in large mobs prior to fawning while ewes and lambs are spread over the fawning country to maintain pasture control and achieve good lamb growth rates. In January following lamb weaning, ewes are mobbed up and hinds and fawns spread out over a greater area. If supplements are required at this time some farmers prefer to feed ewes silage and give an even greater area to hinds. During winter replacement deer are treated like hoggets and shifted wherever there is feed which may be in front of the ewe rotation. Under these circumstances very good feed allocation decisions are required.

In general as deer numbers have increased cattle numbers, notably breeding cows, have decreased. However in some instances a change of cattle policy has better equated feed demand and supply and there are several instances of a change from breeding cows to bull beef.

These types of changes up until now have been relatively slow. This was partly due to a lack of appreciation of the poor fit of feed demand and supply curves and partly due to the disease risk. The integration of other classes of stock into deer farms will increase as experience has shown that provided feeding levels are good the disease risks are more imaginary than real.