



## THE QUESTION OF HARD FEEDING OF DEER

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### Introduction

What is hard feeding? Hard feeding, to us, is the provision to grazing animals, of any non-pasture ration as a feedstuff. This is necessarily a very broad definition but it is intended to cover all rations a ruminant, in this case a deer, might be fed on a farm, which it would not encounter in the wild state. These rations include conserved forages silage, hay and their various intermediaries, roots, grain, protein sources and feed additives either fed alone or as a pelleted ration. In New Zealand deer can be fed the full range of available grains such as maize, oats, barley and wheat, the latter mainly in the form of bran and pollard (broll). Protein sources which have been fed successfully to deer include rapeseed meal, copra, fishmeal, soybean meal, cottonseed meal, groundnut meal, lupins, peameal and beans. Rather appropriately in view of the BSE problem, deer seem averse to consuming meatmeal. Consequently there should be no temptation for New Zealand feed manufacturers to include meat meal in a diet for deer<sup>1</sup>. Feed additives, which can be used to pellet rations or make blocks include molasses, urea, yeast extracts, sodium bentonite and protected fat. Urea is used as a source of nitrogen as a protein sparing additive. Experience with deer suggests that incorporation of greater than 5% urea in a diet will reduce food intake. Deer will also consume vegetables and fruit and will of course browse a variety of trees. In synopsis hard feeding of deer is not a problem of what they will eat, rather how much should they be fed and what nutritional advantages are there.

### Do we have to hard feed deer?

Another useful question is do we have to hard feed deer? Intuitively the deer is less domesticated than sheep or cattle and it might be thought that it is best adapted to utilising available natural forage. However, in the on-farm environment there is seldom sufficient natural forage to fully supply nutrient requirements throughout the year. It is common knowledge that the deer has a seasonal pattern of growth and food intake. But just because food intake is low in winter and the deer are not growing does not mean that deer have a low energy requirement at that time. Rather, the contrary applies, and stags in particular have very high energy requirements during the period when there is least natural food available. This is the primary requirement for hard feeding - as a winter supplementary feed. In addition in many parts of New Zealand which are subject to seasonal drought, hard feeding must take place during any nutritional shortfall when ever in the year it occurs. The possibility of using saved pasture - say autumn saved pasture - for winter is a well known concept in New Zealand and in practice forms an important part of deer farm nutritional management. However, particularly in the Southern parts of New Zealand this practice cannot fully obviate the need for hard feeding.

The concept that hard feeding equals supplementary feeding needs some qualification. A knowledge of deer feed requirements and specific nutritional qualities of feeds leads to the concept

of strategic feeding. This is the feeding of diets of specific composition and at specific times to significantly improve production. Thus hard feeding can be emancipated from the concept of 'a substitute for pasture' to 'an enhancer of production'. In terms of natural deer production there are costs and benefits of strategic feeding. There is, however, a clear client demand for the delivery of systems which can supply venison animals at prescribed dates and weights. Strategic feeding if applied correctly can provide such a system, the economic advantages of these systems are open to test. Hard feeding is clearly a concept which covers both supplementary and strategic feeding. One way or the other the deer industry has to 'hard feed'.

### **Silage for Deer**

Any hard feeding system for deer, particularly supplementary feeding, is typically based on silage or hay. However, little scientific work has been done in New Zealand on the voluntary intake of silage by deer and the effect of silage quality on intake. Likewise the effect of silage making technique on deer production is unknown. Conventionally, deer are fed silage which has been made in a way which is suitable for sheep or cattle with no regard to whether this is optimal or even suitable for deer. Young red deer of about 60 kg liveweight eat 1.5 kg DM/head/day during winter or about 2.5% of liveweight. Such animals are capable of growing under natural daylength at 150 g/d. This growth and maintenance requires 16.2 MJ ME/day for wintered animals and 22.6 MJ ME/day for deer outside. If the silage contains 50% DM and 10 MJ ME/kg, a deer can eat 3 kg/day of it, thereby consuming 15 MJ/ME. Thus a silage such as this - fairly typical for New Zealand - cannot provide sufficient energy for growth of an animal indoors. In fact as maintenance of a stag outdoors is 18.3 MJ/ME day, the animal would lose weight if fed this silage alone. A protein content of such a typical silage might be 8-11% DCP (digestible crude protein), which in itself is also likely to be limiting for growth. Consequently, typical silages in New Zealand are not of a high enough quality for deer. (We acknowledge that few farmers would feed only silage to growing deer, but the numbers serve to illustrate a feeding problem).

The Norwegians have been experimenting with silage production to maximise nutritional quality for reindeer. They have shown that growth rates and food intake are highest if the DM% of the silage is between 19-28%, with a DCP up to 19%. They have also shown that treating silage with glucose also increases silage intake by deer (Mathieson, 1995). We believe that the concept of silage production for deer requires careful consideration by the deer industry. This might provide a safe simple technique to improve growth of deer.

### **Grain Feeding**

Wild ruminants typically do not encounter grain, but cereals such as barley form an important part of hard feeding in New Zealand. Grain feeding has a few problems which are described below. Considerable care must be taken to ensure that ruminants are fully adapted to a grain diet. Typically at Invermay as we transfer deer from pasture to grain/concentrate rations we introduce hay first and then progressively increase the grain to the required daily amount. Changes take place at five-daily intervals and up to five changes (25 days) might be needed to fully adapt deer from pasture to a high level of grain intake, say greater than 50% of the weight of total diet, as fed. Failure to gradually adapt ruminants to grain will result in a condition

known as grain overload which is potentially fatal. Farmers who have not been feeding out grain can lose stock by overfeeding suddenly at the start of a cold snap. Grain overload can also kill individual deer who overfeed on grain during the adaptation phase.

Grain may be fed loose, in pellets, in troughs, on the ground or forked through silage. We follow the school of thought that grain should not be crushed as the deer crush it themselves with their teeth. Crushed grain can readily ferment on the outside in the rumen and may thereafter be less digestible as an insoluble 'coat' can form

The Chinese feed roughage and concentrates to deer daily but always feed the roughage first because they feel it maximises food intake Food for thought?

### **Possible Strategic Feeding Applications**

Having distinguished supplementary feeding from strategic feeding, where are the possible areas where appropriate strategic feeding could make an economic impact in the deer industry in New Zealand?

#### *Hinds*

Peak energy demand for hinds is in early-mid lactation. There is considerable pressure on the hind to grow her calf as fast as possible. Where red hinds have carried and are suckling a hybrid calf this pressure is magnified. As the weaning weight of the calf is critical to a breeder as he/she is paid on a per kg live weight basis, strategic supplementation of lactating hinds could well become economic as increased calf growth could result from increased milk production.

The immediate post-weaning period for a hind is a short respite before a subsequent pregnancy. Strategic feeding of energy/protein at this time and during the rut could possibly improve reproductive efficiency by increasing the number of hinds conceiving at the first oestrus as has been shown in beef cattle (Archem Trading. Personal Communication).

#### *Stags*

Strategic feeding of calves for venison and stags for velvet have been discussed previously in these proceedings. The identity of the strategic supplements for stags might become important. The Chinese feed a wide range of roughage sources to stags (Table 1). Some of this is based simply on availability but some of the feeding is based on known, natural preferences of stags. There may be an opportunity to select strategic feeds which stags actually prefer to eat during periods such as the rut and post-rut periods when intakes are very low and behavioural problems make management difficult. Nutritional improvements at that time could improve winter survival in stags and possibly improve subsequent velvet antler growth performance. The Russian deer farmers feed out maize silage during antler growth. This can have up to 30% DCP, substantially higher than the best New Zealand pasture.

**Table 1: Roughage rations for Chinese Wapiti (kg) (Liang *et al* 1993)**

	<b>Fermented Feed</b>	<b>Soybean Pods</b>	<b>Silage</b>	<b>Green Chop</b>	<b>Roots/Stems/ Melons</b>	<b>Total</b>
January	3.6	2.1			0.9	6.6
February	3.6	2.1			0.9	6.6
March	3.6		6			9.6
April	2.7		9			11.7
May	2.7		9	6		17.7
June		2.1		6	18	26.1
July				18		18
August				12		12
September				9	4.5	13.5
October			4.5		4.5	9
November	1.2	2.1	4.5		1.5	9.3
December	1.8	2.1	4.5		0.9	9.3

The concept of strategic feeding of stags is to target nutrients to times of the year when they can be most effectively utilised to maximise production. The mould of hard feeding = maintenance feeding must be broken but this can only take place if economic benefits take place.

### **Towards Strategies for Improved Feeding**

This paper has covered the concept of targeting specific feeds to specific nutritional requirements. In many cases the identity of these strategic feeds has not been described because they are conceptual rather than fully known and understood. In most cases the strategic feeds will contain protected protein, and may contain protected fat, specific mineral/vitamin combinations and other ingredients, for example, yeasts. Research on these foods for deer is in its earliest stages. We are becoming familiar with the concept of functional foods (nutriceuticals) for humans. The future may bring functional foods for ruminants which modify production characters or animal health status.

Increasing velvet quality is the call of the deer industry. By this they do not mean 'more, thin velvet from more stags' but rather 'more thick, heavy velvet from fewer stags' Strategic feeding may have the potential to improve velvet quality and intriguingly possibly velvet composition. If the functional qualities of velvet lipids for example, could be altered by feeding, the potential for specific products emerges

Is strategic feeding natural and fitting the New Zealand clean green image? Firstly we must hard feed in periods of pasture deficit, so it is inevitable. Secondly we believe that it is ethically responsible to target feeds to meet the animals precise nutritional requirements and preferences

In the 'wild' deer eat a huge range of feeds and by varying diets perhaps we can move more closely to the nutrient variety, if not strictly the feed variety

Hard feeding has become a tool Effectively used it is a powerful production tool

### **References**

Liang Fengxi Wang Quankai and Wen Tiefeg (1993) Deer Farming for velvet production The 4th ARRC International Symposium 115-122

Mathieson S (1995) Silage for reindeer Proceedings 2nd Arctic Ungulate Symposium, Fairbanks AK (in press)