VELVET FEATURE

Feeding and breeding

They're the key factors in velvet antler production **192**

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THE POTENTIAL maximum size of antlers is determined by the genetic make-up of the stag — and so for improved antler production, the objective must be to breed better stags and then feed them such that they can realise their genetic capabilities.

Improved velvet antler simply means an increased weight of velvet cut at the stage of growth appropriate for market requirements.

No information is available as to the effects of either nutrition or breeding on the quality of the product. However there are many opinions as to what constitutes quality; for example, the absence of bez tines.

All are facets which probably have a genetic component and therefore could be incorporated into a breeding programme. It is also possible that nutritional factors could influence such quality characters, but again such work must await an objective criterion for quality.

Performance

VELVET ANTLER production increases with the age of the stag; there is some evidence that it plateaus at around 5 to 8 years of age, then falls later.

Table 1 presents data for three herds of Red stags as the animals age from 2 to 5 years (velvet antlers cut at the A grade stage). Since the data represents the same stags throughout and there was only a limited amount of culling, they provide a good indication of the effect of age on velvet antler production.

Table 2 presents data for cumulative velvet antler production (2 to 5 years) for a group of 90 stags ranked according to their 2 year old velvet antler weight. The top one sixth of stags were 0.70 kg above the mean as 2 year olds and were about 2.3 kg

TABLE 1: *Velvet Antler Production (kg) by age in herds of Red stags*

	HERD	A	B	C
Age (years)				
2		1.44	1.42	1.01
3		2.05	2.03	1.60
4		2.60	2.50	1.93
5		2.96	2.85	2.32
Number[1]		301	49	36

[1] *Approximately 30 per cent of stags sold as yearlings or 2 year olds in herd A; no sales in herds B & C (Herd c: Moore et al., 1988)*

TABLE 2: *Cumulative velvet antler production from 2 to 5 years of age for a group of 90 stags categorised according to their 2 year old velvet antler production.*

Ranked on 2 yr old velvet antler	2 yr old velvet antler weight (kg)	Cumulative (2 to 5 yrs) velvet antler production (kg)
Top 1/6	2.18	11.37
Next 1/3	1.55	9.35
Next 1/3	1.29	8.47
Bottom 1/6	1.02	7.69
Overall mean	1.48	9.11
+/- Standard Deviation	0.43	1.60

TABLE 3: *Expected hard antler weights for stags of different live weights based on data on Huxley (1931)*

Live Weight (kg)	Herd Antler Weight (kg)
100	1.6
150	3.1
200	4.9
300	9.4
400	14.9
500	21.3

TABLE 4: *Cumulative velvet antler production from 2 to 5 years of age for a group of 90 Red stags categorised according to their yearling liveweights.*

Rank on yearling liveweight	Yearling liveweight (kg)	Cumulative (2 to 5 yrs) velvet antler production (kg)
Top 1/6	119.6	10.06
1/3	107.5	9.14
1/3	101.6	8.88
Bottom 1/6	94.1	8.57
Overall mean	105.3	9.11
+/- Standard Deviation	9.57	1.60

TABLE 5: *Effect of level of nutrition at different stages of the antler cycle on velvet antler production of Red stags*[1]

Period (trials)	Post-rut May-June (1)	Winter June-Sept (4)	Late Winter July-Sept (4)	Spring Casting (1)
Days	50	60	50	65
Velvet Antler yield (kg/stag)				
Restricted	2.45	1.66	1.94	1.87
Ad lib	2.70	1.80	2.06	2.20
Relative Increase with ad lib feeding (%)	10	8	6	17
Extra feed required to feed ad lib[2]				
Grain (kg/day)	0.65	1.0	1.0	0.65
Cost (30c/kg)	$10	$24	$15	$13
Minimum price per kg for velvet antler which is required to pay for extra feed[3] $/kg for velvet antler	$50	$150	$125	$38

[1] Data from Invermay and published trials (both indoors and field trials)

[2] 1 kg grain/day can be expected to increase liveweight gain by 1-2 kg/week

[3] Based on a yield of 2 kf/stag for restricted stags; 1988 velvet antler price for A grade was substantially higher than any of these medium prices (in excess of $200/kg)

above the mean in total cumulative production from 2 to 5 years.

With 2 year olds, velvet antler is often harvested at variable stages of growth, unlike the situation with older stags where there are very good criteria for optimising the stage of growth at harvest.

Therefore it is advisable to record both hard antler casting and velvet antler harvest dates for 2 year olds. The velvet antler weight can then be adjusted for days of growth and consequently the predictive value of 2 year old velvet antler weight is improved.

There is a strong relationship between antler size and body size (Huxley 1931); hard antler weight increases about three times faster than that of body weight. The expected hard antler weights for stags of different body weights (effectively different strains or subspecies), based on the Huxley data, are presented in Table 3.

There is also a strong relationship between velvet antler weight and bodyweight within a herd of Red deer, with a 10 kg increase in bodyweight associated with a 0.1 to 0.2 kg increase in velvet antler weight (Moore et al., 1988; Fennessy unpublished data).

Table 4 presents data for cumulative velvet antler production (2 to 5 years) for the group of 90 Red stags ranked according to their yearling liveweight. The top one sixth of stags were 14 per cent heavier than the mean on yearling liveweight, and produced 11 per cent more velvet antler than average while from 2 to 5 years of age.

The relationships between 2 year old velvet antler weight and subsequent velvet production, and between yearling bodyweight and subsequent velvet production, mean that potentially low velvet producers can be culled at the yearling or 2 year old stage.

Whereas the top one sixth on 2 year old velvet antler were 25 per cent above average on cumulative 2 to 5 year velvet production, the top one sixth on yearling liveweight were 10 per cent above average on cumulative velvet production.

This illustrates simply that to select the best velvet producers it is better to wait until they have been harvested as 2 year olds. But some culling on yearling liveweights is still very practical.

Feeding

I KNOW of no magic potions which you can feed to stags to dramatically increase velvet antler production. Rather, it is a matter of good feeding and management to ensure that, firstly, the stags are given every opportunity to express their genetic potential and secondly, the manager harvests the velvet antler at the appropriate time and without damage to ensure the highest quality.

In the last 10 years there have been nine indoor and field experiments designed to look at the effects on velvet antler production of different levels of feeding at varying times of the antler cycle. While the number of experiments is not large, they do produce a fairly consistent picture. Table 5 summarises these nine experiments.

In terms of cost effectiveness, the most important periods to ensure good nutrition for velveting stags are during the actual antler growing period in the spring and during the immediate post-rut period (early May-June).

At these times, relatively modest increases in the level of energy feeding produces good increases in velvet antler production.

In all cases the stags in the ad lib groups were fed to appetite, the extra feed being either grain or a high quality deer nut.

Ad lib feeding is particularly important for stags from immediately after the rut through winter, because their lack of body fat and relatively poor insulation make them particularly vulnerable to bad weather. As is evident from Table 5, it can also be expected to improve velvet antler yields.

Table 5 also includes a calculation which gives the minimum price for the velvet antler required to pay for the additional feed in the particular experiments. ▶

The importance of good feeding during the spring antler growing period cannot be over emphasised; this may mean continuing supplementation into early spring to compensate for lack of pasture growth.

As for specific nutrients, there have been claims that extra protein or certain minerals such as copper or vitamins such as Vitamin D stimulate antler growth. While specific deficiencies of trace minerals could be expected to reduce antler growth, there is no evidence that luxury consumption of minerals will increase it.

However, the situation with protein is less clear. There have been three winter and two spring feeding trials at Invermay where stags have been fed a high protein diet. In neither of the spring feeding trials did large quantities of extra protein have any effect on antler growth.

However, in one of the indoor winter feeding trials, there was a very marked effect of high protein feeding on hard antler weight but not on velvet antler weight (one antler was cut for velvet antler and the other for hard; Table 6).

Diets which cause changes in the amounts of certain natural growth-promoting hormones in the stag may influence antler growth. However, this aspect will require much more research. The variability between the experiments may result from the actual type of protein used, and in particular, the amount of 'protected' protein (that which is digested after bypassing the rumen).

Selection and breeding

GENETIC VARIABILITY between animals is the raw material of selection. However not all the variability between the stags in a herd is of genetic origin; much is of environmental origin (e.g. health, differences in nutrition even though all stags are run together).

Probably about 40 per cent of the variability in velvet antler weight within a herd of the same strain is of genetic origin and therefore heritable, which means that it is passed on to the progeny.

An indication of the impact of this genetic variability between stags is provided by a progeny test of five Red stags. The data are presented in Table 7 and show the range in cumulative velvet antler production from 2 to 5 years for the different progeny groups.

The difference between the best and worst stags in terms of their progeny is more than 1 kg in total over the four years' velvet production.

Table 7 also includes a calculation of the gross returns from velvet antler, assuming that each stag was mated to 50 hinds in one year and a proportion of its male progeny retained for velveting. The difference in returns is substantial, with the best stags' progeny producing 13 per cent higher gross income.

Incidentally the mean weights for the progeny of all five stags were very similar in live weight. This sort of information provides a good indication of the importance of genetics and the selection of superior stags from superior herds as sires. □

Note: This is an edited version of a paper written by Peter Fennessy.

TABLE 6: *Effect of a high protein diet during winter on hard antler weight of Red stags (n=16 stags per experiment)*

	Hard antler weight (one antler only, kg)	
	Expt.1 (2 yr olds)	Expt.2 (3 yr olds)
Low	0.49	1.09
High	0.67	0.98

TABLE 7: *Comparison of the cumulative velvet antler production and gross returns from the progeny of 5 Red stags from 2 to 5 years assuming that the stags were each used as sires for 1 year and mated to 50 hinds.*

	Velvet antler production (kg) (2,3,4,5 years old)	Gross returns from velvet antler sales per year the stag is used as a sire (relative values where herd average=100)[1]
Herd Average 9.0		$25624 (100)
Individual sires (number of progeny)		
A (29)	8.54	$24237 (94.6)
B (32)	8.55	$24267 (94.7)
C (22)	8.73	$24809 (96.8)
D (17)	9.37	$26739 (104.4)
E (35)	9.61	$27463 (107.2)

[1]*Velvet antler at $200/kg; 128 kg of velvet antler from the progeny of the average stag mated to 50 hinds in one year; the assumptions are a 92% weaning rate, 3 deaths to 5 years of age, 5 yearling culls and 1.5 two year old culls with an average cumulative production from 2 to 5 years of age of 9.0 kg per male progeny.*