

GENETIC IMPROVEMENT IN DEER

Why select?

Many deerfarmers are interested in the possibilities for improving production from deer by the use of superior animals for breeding. Evidence suggests that considerable improvements in efficiency can be achieved by selection. For example, calculations based on a knowledge of feed requirements and weight changes suggest that just increasing the weight of the deer in a herd by 10% will increase the efficiency of meat production by 2%. This is due to the fact that bigger animals tend to be more efficient just because they are bigger and because a lower proportion of their total feed intake is used in just keeping themselves going (i.e., maintenance). However animals selected on the basis of weight gain may also be heavier because they are inherently more efficient at converting additional feed into lean tissue.

Analysis of research work to date has suggested that selection and breeding from superior animals has the potential to contribute to increases in the efficiency of meat production from red deer through improvement in:

- growth rate
- weaning rate (calves weaned on hinds to stag)
- reductions in wastage and death rate

Selection to improve velvet antler yield is also possible and is likely to be worthwhile for many farmers.

This paper which summarises some aspects relevant to genetic improvement in deer, is based on the articles published in The Deer Farmer (Summer 1982-83, Autumn and Winter 1983).

The purpose of a selection programme is firstly to identify the genetically superior deer within the herd and then secondly to use these animals as breeding stock. With ongoing selection and breeding, each years crop will be, on average, genetically superior to the previous years crop for the character selected.

Variation between animals is the raw material for a selection programme. For example considering post-weaning gain (6-15 months) in a group of 100 stags, being the progeny of one sire, the average gain will be about 50 kg. Two thirds of the animals would be expected to have gains between 45 and 55. However the weight gain of best stag would be well over 60 kg. Not all of this difference would be genetic. It appears that for important economic characters in deer (velvet weight and liveweight gain) that about 1/3 to 1/2 is likely to be of genetic origin. The remainder is due to environment - for example, differences in nutrition.

A good rate of genetic progress is dependent on using the very best animals available. Since only a few stags are used in breeding it follows that stags can be much more intensively selected than hinds. Therefore it is much more important to select them accurately.

#### What to record?

There are numerous criteria a farmer could record for each of his deer - for example, the colour of the eyes, the shape of the nostrils, the number of hairs in the left ear! However these features are most unlikely to have any relationship to productive features of the animal - namely milk production for a hind, growth rate or velvet antler production for a stag.

Velvet antler yields of stags tend to increase with age from about 2 to 5 years. The limited amount of data available suggest that velvet weights reach a maximum at 5-7 years. The ranking of stags on velvet antler weight tends to stay fairly constant between years - that is the top stag in one year can be expected to be near the top of the same group in any other year. This means that selection based on one years records can be fairly accurate. However accuracy is improved if more than one years records are used.

A second important point is that in general heavier stags tend to produce higher yields of velvet antler than lighter stags of the same age. However even after accounting for weight there is still considerable variation within a group of stags.

Growth rate or weight-for-age is the obvious area in which to apply scientific principles of animal breeding in a deer farming system producing venison. The objective is to produce deer which attain the optimal slaughter weight at a younger age or which produce heavier carcasses at the same age but without the deposition of excess fat. At this stage in the development of the deer industry it appears that most stags will be slaughtered at 14-17 months or 24-27 months of age. Therefore any selection and breeding programme would have as the major objective an increase in weight for age at these ages. Although we have no direct information from controlled genetic experiments there is much circumstantial evidence that the heritability of growth rate or weight for age in red deer is high and will respond rapidly to selection.

For the deer from birth to maturity there are three periods when growth potential is high, namely

- a) the first 6 months of life, mainly the milk feeding period
- b) the yearling stage from 9 to 15 months
- c) the two year old stage from 21-27 months, which really applies to stags only.

Therefore the important criteria to record are for both hinds and stags

Sire (and dam)

Weaning weight

15 month weight

and for 2 year old stags

Weight (at 25-27 months)

Velvet weight

The milk feeding period is a critical time in the life of the young deer with the milk yield of the hind having a major impact on the weight of the calf at weaning.

Those hinds which rear the heaviest calves in one year tend to rear the best calves the following year. Therefore although one years data will provide some idea of the mothering ability of a hind, a second years data makes the identification of superior hinds much more certain.

Weaning weights can also provide valuable information on the sire.

The yearling stage is the time when very high rates of growth are attainable. By 15 months hinds have reached about 75% of their mature body weight and stags about 55%. This is the time of opportunity for the farmer when good feeding of these young stock will result in better animals at 15 months.

For many deer farmers there may be merit in retaining most of their 15 month old stags until velvetting as two-year-olds. A weight at about two years will provide further information of growth potential and also provide a velvet antler harvest.

### Breeding Programmes

The key to a successful selection programme is the capacity to screen large numbers of animals in order to select the outstanding ones for breeding. For deer this is particularly so with stags. However many farmers have only small herds and the chances of finding an exceptional stag are not very high. Therefore co-operative programmes offer much. For example a group of small farmers could each contribute about 1/3 of their weaner stags to a central co-operative where all would be run together to 15 months or 2 years of age. Then the best animals can be selected out and kept for use as sire stags on the various farmers properties. There are many variations of such schemes possible but the key is screening large numbers of animals.