# BREEDING AND MANAGEMENT PROGRAMMES FOR IMPROVED VENISON AND VELVET PRODUCTION

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This paper is concerned with briefly outlining possible approaches to improving venison and velvet production and will concentrate mainly on the options provided by selective breeding within species of deer or hybridisation between species within the red deer family.

The red deer family is very diverse covering a six to seven fold range in mature body size from the small Japanese sika to the largest of the Canadian wapiti. Theoretically these species will interbreed to produce fertile offspring but at times the mechanics may be a little difficult.

## EFFICIENCY AND MEAT PRODUCTION

The most sensible aim of any breeding and management programme is to improve the economic efficiency and returns from the deer enterprise. Therefore we are currently in the process of developing a simple computer model to look at the impact of various options on biological efficiency of various red deer enterprises (Fennessy and Thompson 1988). The next stage will incorporate economic factors. However, the model is still being developed but the same principles have been used in devising the estimates presented in Table 1.

TABLE 1 - Factors affecting the efficiency of meat production in a herd of red deer; the expected response in biological efficiency (units of carcass meat/unit of feed consumed) or economic efficiency (gross margins) to changes in the factor and the possible breeding or managerial approaches for changing the factor (Fennessy 1982 and Fennessy unpublished).

| Change in the Factor | % Change in Efficiency | | Means of changing the factor |
|---|---|---|---|
| | Biological | Economic | |
| 10% in weight for age of the whole herd | 2 | 9 | Selection for weight within a herd or strain; change of strain/sub-species (eg, red deer to wapiti). |
| 10% in weight of slaughter stock only, with no change in age at slaughter | 5 | 10 | Hybridisation (eg wapiti X red deer females); selection; management-altering calving season. |
| 10% units in herd weaning rate (calves weaned per 100 hinds to stag) | 6 | 19 | Management-nutrition, survival; selection for twinning; management to increase twinning. |
| 1% units in herd death rate | 2 | - | Management and disease control; selection; hybridisation. |

From the Table, it is apparent that there are numerous possible approaches to improving efficiency. In some cases, simple changes in management practice will be far more effective than any grandiose scheme of genetic improvement or hybridisation between species. For example, a better quality fence around a calving paddock can produce more dramatic effects on efficiency and profitability by reducing death rates than several years of selection and breeding; that is, the basics of management must be in place.

In a meat production system, the most efficient approach for improving efficiency will involve mating a genetically large male to a genetically small female, so long as these is little effect on the calving rate and the survival of progeny. Consequently this is the place for the wapiti or wapiti x red hybrid male over the red deer female in New Zealand deer farming.

VELVET ANTLER PRODUCTION

Selection within the red deer, hybridisation between wapiti and red deer or changing to wapiti are all potential avenues for a farmer to increase velvet production per animal. The Korean market, which New Zealand supplies, is also very interested in antler size, the larger size generally being perceived as being of better quality, albeit at the same stage of antler development.

The prospects for selection within a red deer herd for velvet antler production are good, with heritability estimates of about 0.35 (Zhou and Wu 1979) and a phenotypic standard deviation of about 0.35 - 0.40 kg at a yield of 1.2 - 2.0 kg in two and three year old stags (Fennessy unpublished). However, the rate of progress in improving velvet antler yields on some New Zealand farms is considerably greater than could be expected based on such data (P.F. Fennessy and N.S. Beatson, unpublished). Improvements in animal management and in particular early growth of stags are likely to be involved, although possible genetic effects cannot be overlooked.

Antler size increases at a relatively faster rate than bodyweight. Consequently a doubling in bodyweight from a red deer at about 200 kg to a wapiti at 400 kg could be expected to result in a three-fold increase in hard antler weight (Huxley 1931). In practice on New Zealand farms, it is probably true that these expected increases have not been achieved although it is also clear that the larger European red deer (which may also have been selected for antler size) and Canadian wapiti do have substantially heavier antlers than the NZ red deer.

The prospects for improving velvet antler quality by selection are unknown. However, in one respect, it appears that some farmers have had some success in breeding animals which either lack or have a smaller bez time (the

presence of a bez tine may have a negative effect on grading). That there is genetic variability in this character is apparent from a comparison of sika and red deer in that sika deer lack a bez time, while it is very common in the closely related red deer. Quality assessment in respect of the antler's pharmacological properties will be impossible until adequate objective definitions of these properties are available. It may be that the degree of calification at a prescribed stage of growth will prove an adequate quality indicator, although devising a simple method for measurement may then be a problem.

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