populations. The effect of population structure (as influenced by sire testing procedures, number of sires tested and AI used) on relative numbers of expressions of traits was very slight, but the effect of relative sizes of commercial and nucleus populations was very important in terminal crossing. Discount rates and time of accumulation of expressions were important in determining relative numbers of expressions. For the inclusion of relative numbers of expression of traits in selection indexes, information is needed on the role of selected animals in crossbreeding programs, relative size of commercial and nucleus populations if a terminal crossing program is followed, and appropriate discounting rates and length of time of accumulation of expressions.

3. — *L'Élan* (Alces alces) *comme producteur de viande*

Simulation of optimum population structure (population dynamics)

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The example 1 simulation runs illustrate the effects of changes in hunting pressure from adults towards calves and the effects of moderate changes in the sex ratio towards an excess of females, two developments that have probably occurred in some areas of Sweden during recent years.

In Figure 2 the number of animals harvested and the population size after the hunting season are illustrated for the five different alternatives run in Example 1. Alternative 1 gives a constant number of animals harvested each year.

In comparison with alternative 1, the small change in sex ratio of 0.01 units per generation made for alternative 2 increases the yield by about 20 animals per year when the final sex ratio of 0.80 is reached.

In alternative 3 increasing the calf percentage in the harvest leads to a considerable increase in the number of animals harvested. The peak after 4 years in this alternative is explained by the fact that the change in hunting pressure towards calves does not give an immediate response in the number of calves produced. This allows the proportion of adult females in the winter population to be greater than in the stabilized population where the calves constitute 50 p. 100 of the hunting yield. The yield has stabilized after about 8 yeats of constant hunting policy.

Alternative 4, which is a combination of 2 and 3, merely gives their combined effects, but alternative 5 illustrates the consequences of a hunting pressure which does not follow the annual production of calves. In this example the number of animals harvested and the population size both increase in an almost exponential way. This is the practical result of a single population census the first year after the changing of hunting policy, a census the result of which has no bearing on the population development during subsequent years. This is probably part of the explanation for the sudden, almost explosive increase in the moose population over large areas in Sweden. In this alternative, calf production per animal in the winter population is 0.45 calves the first, 0.47 the second, and 0.49-0.50 in subsequent years.

In example 2 the meat yield is the trait of interest. Within each population, different percentages of calves in the harvest have been included in the simulation runs. Fig. 3 gives the optimum calf percentages within each population when meat yield constitutes the only trait of interest.

The percentage increases with increasing fertility. It ought to be mentioned here, however, that the meat yield in each population only varies 1 to 2 p. 100 despite the widely varying calf percentage of harvest at the low adult sex ratio used here. The actual sex ratios in our natural populations are higher. These would give a lower proportion of calves in harvest at optimum meat yield than is found here, as the effect of saving one calf per year — slightly simplified — depends on the expected calf production from that average adult animal which the spared calf has to replace in a winter population of constant size. With a high sex ratio, as in our natural population, the spared calf will thus stand a good chance of replacing an average adult with low calf producing capacity. A more detailed study of this and other problems was published recently by Aspers *et al.* (1978).

In conclusion, it must be emphasized that the successful use of simulation programs in game management is *entirely dependent on true estimates of population parameters.*

For short periods, perhaps as long as 5 years, such a program could well be an effective tool in management, but then it must be fed with new estimates of population parameters. These estimates will probably have to be elaborated with the help of air censuses in the initial stages of moose management, but experience from other fields of statistical application favours the possibility of using more indirect methods of counting, for example collection and evaluation of the observations of hunters.

Hopefully, a firm application of the results of population dynamics simulation will help to control our more or less exploding moose population, to the advantage of both moose and man.

Meat production from moose

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This investigation was undertaken in order to present actual data about the distribution of different tissues in moose carcasses of both sexes and of varying age.

The carcass weight of the half-year-old calves averaged nearly 80 kg, indicating a high daily gain during the first grazing season. Carcass weight of old male moose exceeded 200 kg. Most of the carcasses were lacking in depot fat and had little trim fat and tendons. The calves had a ligh proportion of bone compared with other animals. The proportion of lean meat reached 80 p. 100 for adult moose. There was more lean and less bone in the forequarter than in the hind quarter, the fat content being the same. The high proportion of retail cuts, compared with beef, was mainly explained by the fact that *M. quadriceps femoris* is more developed in moose.

The consequences of an increased moose population and moose meat production are briefly discussed.

Studies on blood protein and enzyme polymorphisms in the European moose (*Alces Alces*)

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108 plasma samples and 50 hemolysate samples of European moose from different areas of Sweden, Norway and Finland were analysed by horizontal polyacrylamide gel electrophoresis in a discontinuous buffer system (Tris-citrate-borate, pH 9.0). Acid starch gel electrophoresis was conducted for the resolution of plasma albumin. No variation was observed for albumin, postalbumin and transferrin. Two non-hemoglobin proteins in the hemolysate samples showed variant forms in five samples. Hemolysate samples were also analysed by starch gel electrophoresis for the typing of acid phosphatase (AcP), phosphoglucomutase (PGM), phosphohexose isomerase (PHI) and 6-phosphogluconate dehydrogenase (6-PGD). There was no variation observed for these enzymes except that one sample showed a PGM variant. The lack of blood protein variation in moose observed in this study was in accordance with the results of some earlier studies. Further studies are needed to investigate the causes of the homogeneity observed in the European moose.