dures of estimation of contemporary average, namely one where number of bulls per sire was considered and one where this was not done. The correlations in breeding values between the procedures was quite high.

However, because correlations were less than one and of anticipated increased genetic trends the model which shold be used for evaluation of performance tested bulls, should take into consideration the genetic trend in both sires and dams and should include information on half-sibs.

Schätzung phänotypischer Parameter bei zentral eigenleistungsgeprüften Fleischbullen

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Zwischen dem Alter bei Beginn der Prüfung und dem Gewicht bei bestimmtem Alter wurden geringe negative Korrelationen gefunden. Die Zunahme während der Prüfung war hiervon unabhängig. Zwischen den Zunahmen vor der Prüfung und den Zunahmen während des Tests bestanden keine Beziehungen. Es trat jedoch eine signifikant negative Korrelation auf, wenn der Einfluss der täglichen Futteraufnahme ausgeschaltet wurde.

Die Beziehungen zwischen der Zunahme während der Prüfung bzw. dem 400 Tage-Gewicht einerseits und der Futterverwertung andererseits stiegen an, wenn die Appetiteinflüsse ausgeschaltet wurden. Der Einfluss des Appetits muss berücksichtigt werden, wenn die Futterverwertung ein Selektionsmerkmal darstellt.

Die Analyse deutet darauf hin, dass die Ergebnisse der Eigenleistungsprüfungen korrigiert werden müssen, wenn entweder ein Merkmal der Verfettung oder die Futterverwertung bei der Selektion berücksichtigt werden.

Der Test weist eine erhebliche relative Variabilität für Verfettung und Futterverwertung im Vergleich zur Variabilität bei einem Gewicht im Alter von 400 Tagen auf.

Selection indexes for beef cattle

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The first phase of developing selection indexes for beef cattle is described. This phase involve the theoretical consideration of the factors that must be considered in development.

Six factors are discussed. First, the definition of the goal of selection is discussed. A monetary goal at the farm level appears suitable. Second, the goals must be expressed in such a way that selection indexes can be derived. The association between profit equations, models of aggregate genotype and selection indexes are described, including considerations of nonlinearity. Third, the association between selection goals and both commercial production programs and crossbreeding programs are discussed. Fourth, the sources of genetic parameters are briefly discussed. Fifth, the sources of economic parameters and their prediction for the future are briefly discussed. Sixth, the association between selection indexes and times of selection for both males and females are discussed.

Expression of different traits in beef crossbreeding programs

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The total and relative number of discounted expressions for various traits in beef production differed between rotational and terminal crossing and between sexes within terminal crossing. Differences between relative number of expressions of traits were most evident within nucleus

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).