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Chapter IX. Applicational perspectives (p 131-136)

IX

Applicational perspectives

1. Introduction

The applicational perspectives of the techniques discussed in this thesis cover at least the following three areas:

1) *Research*. The models may be used as tools in the identification of traits which must be considered in the replacement decision. Furthermore the influence of prices and other conditions on the optimal policies may be studied.

2) *Development of methods to be used in practice*. At present the Markov decision programming techniques are too time- and memory-consuming to be used in practice in connection with a commercial animal herd. However, the models may be used in the development of more simple operational methods.

3) *Direct application in commercial herds*. Within the foreseeable future direct application of the techniques may become realistic.

2. Application in research

Most of the studies mentioned in the previous chapters have only been used for research purpose. In dairy cows results have been obtained concerning the influence of prices and herd level of milk yield on the optimal policies (Kristensen and Østergaard, 1982; van Arendonk, 1985). The influence of changes in reproduction have been studied by van Arendonk and Dijkhuizen (1985), and the influence of seasonal variation in prices and performance has been studied by van Arendonk (1986). Kristensen (1987) studied the influence of the genetic class (defined from the breeding value of the father) on the length of the herd life time of a cow. The effect of a milk quota was studied by Kristensen (1989). The effect of clinical mastitis has been studied by Stott and Kennedy (1990) and at present by Houben et al. (1992).

In sows, similar studies were carried out by Huirne et al. (1988) in order to determine the influence of prices, herd level of litter size and time interval from weaning to conception.

Another kind of studies have had the objective of studying the economic value of culling information. An example in dairy cows is Kristensen and Thysen (1991a) (Chapter X), who studied the problem in the presence and absence of a milk quota. Other examples in dairy cows are Dijkhuizen and Stelwagen (1988) and Marsh et al. (1987). In sows a study was carried out by Dijkhuizen et al. (1989).

3. Development of methods to be used in practice

As long as direct application of the techniques in commercial herds is prohibitive, they may be used indirectly. One possibility is to determine an optimal policy under a set of standard conditions and apply that policy in other herds ignoring the individual deviations from the standard conditions. Thus results from Kristensen and Østergaard (1982) show that the *ranking* of animals is very stable towards changes in prices. The consequences of using a ranking determined under standard conditions under other conditions may be determined by comparing the results under the standard ranking to results under optimal ranking under the conditions of the individual herd. The work of Kristensen and Thysen (1991b) (Chapter XI) studies this problem in the presence and absence of a milk quota. Also van Arendonk (1988) has suggested this method.

The optimal ranking determined by the Markov decision programming techniques may also be compared to other more operational ranking criteria as it was done by Kristensen and Thysen (1991b).

No similar studies known to the author have been carried out in sows.

4. Direct application in commercial herds

Even though the techniques presented in this thesis are *at present* prohibitive for direct application the situation may very well change in the future. Powerful personal computers may very soon become standard equipment of commercial herds. Furthermore, the operating systems develop, and multi-tasking systems have already been introduced in the personal computer environment. In such systems the time spent on a single job is not so crucial, because the computer may simultaneously be used for other purposes. In Figure 1, relative performances of personal computers used in the research behind this thesis have been compared. The development over these few years clearly illustrates that what is prohibitive today may very well be possible tomorrow.

If the relative performance of personal computers will continue to improve over the following years, the time is not far ahead when a direct application of the techniques of this thesis is *technically* possible. However, this does not necessarily imply that it is also appropriate. It is in no way impossible that the applicational scope of the techniques also in the future will be limited to the areas mentioned in Sections 2 and 3 of this chapter.

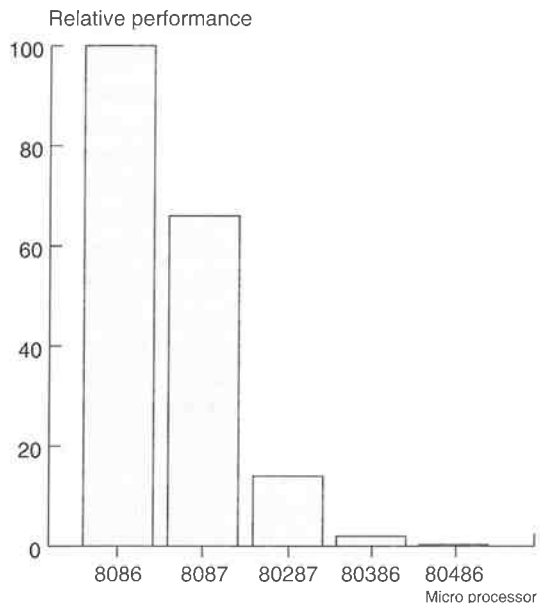

Figure 1. The approximate relative performance of selected personal computers in the determination of an optimal replacement policy for the model described by Kristensen (1989). The computer with a 8086 micro processor was purchased in 1984, and the 80486 computer was purchased in 1991.

5. Conclusion

We may conclude that *at present* the applicational scope of the techniques is limited to studies of the traits and conditions that influence the optimal replacement policies and to comparative studies in the development of operational methods to be used in commercial herds. *In the future* it will probably be technically possible to use the techniques directly in commercial herds. Whether it is appropriate or not will depend on the results of the comparative studies, and no final conclusion can be drawn from the results of this thesis.

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