FACTORS INFLUENCING NEW ZEALAND RAM BREEDERS' SELECTION DECISIONS

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SUMMARY

Effective use of performance records as major selection criterion is influenced by: availability of recording services appropriate to individual and industry needs, with associated advisory resources; attitudes of sheep industry, particularly breed societies and commercial ram buyers, to performance recording; demonstration that applying selection theory does work in practice.

Sheeplan, the New Zealand National Flock Recording Scheme, is structured and organised to meet these requirements. It is a comprehensive, flexible, fully integrated scheme where choice of characters recorded and output listings depend on breeder's objectives. Its specialist advisory team covers full range of extension activities for its members (practical recording techniques, within-flock selection efficiencies, breeding plans) and actively promotes Sheeplan.

Involvement of all sectors in policy decisions, through elected Sheeplan Council, enhances Sheeplan's acceptance to a diverse industry. Outputs are designed to meet breed societies' pedigree registration requirements as well as facilitating effective use of breeding values in selection decisions.

Successful government sheep breeding programmes and research, and emphasis on performance by non-traditional sectors (group-breeding schemes, non-registered breeders and Coopworth Society) have focussed attention on Sheeplan.

INTRODUCTION

Breeding achievements depend not so much on the need for new knowledge, as on the stimulus to put known technology into practice. The factors providing this stimulus to the New Zealand ram breeder, in particular the role of Sheeplan (New Zealand's National Flock Recording Scheme), are discussed in this paper.

Effective use of performance records in selection decisions is influenced by: the availability of an appropriate recording service, including both data processing and advisory facilities; the attitudes of the industry in which the breeder operates; and the breeder's level of conviction that applying selection theory will result in genetic improvement.

THE RECORDING SERVICE

The first sheep recording scheme to operate on a national scale in New Zealand was started in 1967 by the Department of Agriculture, now Ministry of Agriculture and Fisheries (MAF) (Rae, 1976). At its peak in 1974, about 170,000 ewes from 630 flocks were entered in the National Flock Recording scheme (NFRS). This represented about 30% of the stud ewes in the country and about 15% of the flocks. Experience with the procedures in practice, comment and criticism from breeders along with further information from research suggested that: (i) The scheme did not have sufficient flexibility to cope with the variety of needs of the different breeds and breeders; (ii) There appeared to be a need for a simple limited option; (iii) There was a strong demand for sire summaries; (iv) Research had indicated the need to include a wider range of traits (particularly live weights at various ages).

The steps which were taken to initiate a re-examination of the scheme have been detailed by Wallace (1974) and Dalton and Callow (1975). Technical recommendations were made to establish and promote a modified and expanded recording service which

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was soundly based on past experience with NFRS and current local research knowledge, including that available from the NFRS data. As a consequence, many individual breeders, breeding organisations, and research, university and advisory personnel contributed to a revised national scheme called Sheeplan which was initiated in 1976 under the control of the MAF (Dalton and Callow, 1976).

Sheeplan caters for a wide range of programmes designed for within-flock genetic improvement in characters of economic importance. Sheeplan is based on the following measurements of productivity. (i) Number of lambs born or reared. (ii) Lamb weaning weight. (iii) Hogget live weight taken in the autumn at 4 to 8 months, winter at 8 to 12 months, or spring at 12 to 15 months. (iv) Hogget fleece weight at 10 to 15 months. (v) Hogget fleece yield and fibre diameter (from laboratory testing). Ample opportunity exists for breeders to record other characteristics against a particular animal, but these are not included in the breeding value computations. Number of lambs must be recorded by all members of Sheeplan. The remaining measurements are optional and the breeder can choose the combination of traits which suits his particular breed and objectives of improvement in his flock (Dalton and Callow, 1976).

Sheeplan records allow emphasis to be concentrated on fertility, survival, mothering ability, growth rate, or wool production, or a combination of these characters, depending on the breeder’s improvement plans (Clarke and Rae, 1977). A special feature of Sheeplan is the presentation of the important information as breeding values - predictions of the breeding merit of offspring of the animals under consideration.

THE ADVISER

When NFRS was introduced in 1967, the practice of performance recording as an aid to ram breeding was new. Not only was the industry inexperienced in the field but so were advisers. In the initial years, therefore, there was emphasis on data collection and processing to the detriment of emphasis on interpretation of processed records and putting those records to use in decision making.

With the introduction of Sheeplan some eight years later, the scene had changed significantly. Advisers and many breeders were now familiar with performance recording. Furthermore, Sheeplan now offered a variety of recording options and this perhaps more than anything else placed pressure on breeders and their advisers to clearly define their breeding objectives and then choose the most suitable breeding plan and associated combination of inputs and processing to give records appropriate to their objective. Through this there is now a clearer realisation that the recording scheme is simply a tool to assist the decision-making process, and that unless the records are actually used (rather than just collected) nothing has been achieved.

There are currently 30 specialist MAF advisers with animal breeding as their main sphere of activity. They are the principle people involved with Sheeplan advice, and its counterpart for the beef industry - Beefplan. They are also responsible for breeding advice to commercial farmers. Their training and skills are not only in the technical field of animal breeding but also in extension.

Choice of the best combination of inputs and processing to suit a particular objective is best explained by an example. In meat breeds (for use as terminal sires over dual-purpose breed ewes) the breeder has a choice between selecting for high live weight gain to either early or late maturity. Sheeplan processes the breeders records to allow either objective to be pursued by analysing and presenting the data as breeding value for weaning weight (for the objective of early maturity) and breeding value for autumn live weight (for the objective of late maturity). The breeder and adviser must choose the most suitable input data for predicting the breeding value they have chosen. Table 1 shows the accuracy of estimating both breeding values for the alternative combinations of liveweight inputs (Clarke and Rae, 1976). The accuracy figures given are those that would pertain in the absence of any culling before data had been collected on all animals. In New Zealand this
is rarely the case where data is to be gathered beyond weaning. Animals that are obviously not going to be suitable for use as sires are culled before winter to save costs of wintering and to sell them as lambs while the carcass price is still acceptable. The breeder and adviser must therefore evaluate the relative accuracy in light of time and extent of any culling and also when the records are to be used.

**TABLE 1: ACCURACY OF ESTIMATION OF BREEDING VALUES (BV) FOR WEANING WEIGHT (WWT) AND AUTUMN LIVE WEIGHT (ALW)**

<table>
<thead>
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<th>Combination of Weights</th>
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<tr>
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1 Accuracy is measured as the correlation between the estimated and true breeding values of the character in question.

2 Winter live weight.

3 Spring live weight.

Similar but more complicated choices of options pertain to dual-purpose breeders.

Advisers have changed the emphasis of their activity from ensuring data are accurately collected and prepared for processing to also encouraging the effective use of the processed records in well-designed breeding programmes. They commonly calculate the selection differential in the appropriate breeding value of the rams chosen for use as stud sires. Secondly, advisers are calculating the actual selection differential for 1½ year old female replacements and comparing this with the potential selection differential that would have been realised if selection had been carried out by selecting entirely on records. And thirdly, the same exercise is often done to evaluate the scope of ewe culling with respect to Sheepplan records. These exercises have been assisted by the development of programmes for microcomputers which most advisers have access to. The results comparing actual and potential selection differentials are discussed with breeders to encourage as high a proportion of the potential to be realised as is possible within the constraints of preserving structural soundness and merit in desirable non-performance characteristics.

**INDUSTRY ATTITUDES**

Historically, breeders' selection decisions were largely governed by breed society attitudes and those of the breeders' commission stock selling agents with the commercial ram buyers basically taking what was offered. Emphasis was on pedigree and sheep meeting breed type standards.
With membership of NFRS breeders had to consult with a MAF adviser to learn skills of data gathering in the first instance and as time progressed, in data interpretation. This represented a fairly major change and therefore incurred varying degrees of resistance. The introduction of Sheepplan, with its ability to cater for a greater variety of situations, together with the growing demand for performance-backed stock from commercial ram buyers, has accelerated the rate of acceptance of and adoption by breeders of performance records as an integral part of ram breeding programmes.

The Breed Society umbrella covers 80% (3,500 flocks) of the ram breeders in New Zealand. The Federation of Livestock Breeding Groups represents the interests of a further 10%, with the majority of the remainder, breeding rams only for their own use. Breed societies therefore continue to have a major influence on breeders' attitudes. Three breeds (Coopworth, Booroola, Borderdale) have made performance recording (more specifically membership of Sheepplan) mandatory for breed society registration. The other breeds do now recognise the impact of Sheepplan to their mutual benefit. Sheepplan's development of recording services for breed societies will further enhance this co-operation. The significant breed society forces are represented on the New Zealand Sheepplan Council (NZSC). The NZSC, comprising Sheepplan members representatives and sheep industry representatives advises the Minister of Agriculture on policy matters relating to Sheepplan and sheep improvement programmes. The broad spectrum representation further enhances Sheepplan's acceptance to a diverse industry. NZSC has been instrumental in affecting attitudes, particularly at breed society level.

One of the most powerful forces driving the breeder towards objective performance selection criteria is the purchasing power of the commercial producer. Once some of the early performance recording adopters began having success, and assisted by considerable encouragement on the part of the MAF advisers, the commercial ram buyer began to accept the philosophy of performance recording. Over the years, this has developed to the point where a high proportion of ram buyers now demand that the rams they buy from performance recording flocks on the one hand and secondly that the records be made available to them to assist in their choice of rams. MAF advisers put considerable emphasis on the education of the ram buyer. Sheepplan assists advisers with this by provision of an annual membership list of Sheepplan (giving breeders details of breed, location, flock size, years on Sheepplan, and characters recorded); sophisticated field day exhibits; technical articles for written or lecture promotions. Further the design of the Sheepplan computer outputs recognises that buyers and their agents as well as breeders will be wanting to read them. For example: the important breeding values are grouped, for easy reference; and cross-reference listings in breeding value order are available. Sheepplan also has the advantage of similar national schemes, that the format of its outputs is common to all breeders.

DEMONSTRATION OF GENETIC IMPROVEMENT

That response to selection is slow, for the economically important sheep traits such as fertility, is now better appreciated and acknowledged by the industry with their increasing understanding of population genetics theory. That it exists though has been demonstrated to the satisfaction of large sectors of the sheep industry. Some of the most convincing New Zealand evidence comes from a research study at Ruakura of the effectiveness of selecting on the basis of twinning in Romney ewes (Clarke, 1972); and, more recently under commercial farming conditions, in the Waihora breeding programmes.

The New Zealand Lands and Survey Department's Waihora large scale Romney group breeding scheme started in 1968 by screening from a population of 200,000 sheep, ewes rearing twins and hoggets of high live weight that were structurally sound (Hight et al., 1975). Since then selection for performance in line with the Sheepplan objective (number of lambs born and weaned, hogget live weight and hogget fleece weight) has been carried out. The breeding flock is disseminating more than 2,200
two-tooth rams annually to Lands and Survey Department farms, and since 1979 some 20
four-tooth high genetic merit ex-nucleus sires to the private sector (restricted to
Sheeplan members only). From 1983 comparative progeny test information will be
available on the four-tooth rams released to Sheeplan members.

The merits of maintaining an open group breeding flock have been illustrated,
and the advantages over the closed flock approach to breed improvement are as high
as 10-15%. The productive advantages of the Waihora flock were outlined by
Hight (1975), Clarke (1978), and Gibson and Craig (1980). The popularity of similar
privately owned group breeding schemes bears testimony to the success of this
approach to breed improvement.

CONCLUSION

Recognition of the factors influencing the New Zealand ram breeders selection
decisions has led not only to a greater acceptance of the role of performance
recording but also highlighted Sheeplan as a powerful tool in the advancement of ram
breeding in New Zealand.

The steadily increasing membership of Sheeplan confirms that Sheeplan continues
to meet the sheep industry's demands for a dynamic effective national flock
recording service. At March 1982 some 1,300 flocks were recorded with Sheeplan.
This represents about 30% of the ram breeding flocks in the country containing 70%
of the sire-producing ewes.

RESUMEN

El reconocimiento de los factores que ejercen influencia sobre la selección en los criadores de carneros re-
productores de Nueva Zelanda y en sus decisiones, han condu-
cido no sólo a una mayor aceptación del papel de los contro-
les de producción, sino también ha llamado la atención sobre
el plan como una ayuda poderosa para el avance de la cría de
reproductores ovinos en Nueva Zelanda. El constante aumento
de afiliaciones al Shheplan confirma que éste continúa sa-
stisificando las demandas de la industria ovina a través de
un servicio dinámico, efectivo, y nacional de control de re-
baños. En Marzo de 1982 alrededor de 1,300 lotes estaban ins-
critos en Sheeplan. Esto representa alrededor del 30% de los
lotes de reproductores ovinos en el país, que contiene cerca
del 70% de los carneros carneros productores de ovino.

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