IMPLEMENTATION AND MAINTENANCE OF SELECTION

PROGRAMS FOR MEAT SHEEP

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In discussing this topic I shall relate my talk to dual-purpose sheep, because this is the subject I know best.

I do not intend to give any figures or facts relating to improvements that may have been made in breeding programs with which I am associated. Instead I shall offer opinions on many aspects of the topic.

BREEDING OBJECTIVES

Money is the main objective, with the aim being to produce quantity of saleable goods on a per animal or per hectare basis with the least labour input. (The ram breeder must convince his client of this potential before he gets his money).

BREEDING METHODS

Foundation Stock

I believe all good commercial stock are potential breeders of improved sires. In a grazing situation, the animals, which are already acclimatized and thriving on the country for which they were bred, are the best seedstock for improving the particular breed or strain. Usually there are large numbers of animals available.

Well tried techniques now exist for screening- for the highest producers - large flocks of sheep under most grazing situations. For lamb production, ewes at their first lambing can be screened for those rearing twins. This can be done by shedding off the ewes with twin or triplet lambs at foot while on horse back, or a motorcycle, or by colour marking these ewes and their lambs to be drafted off later. There are many variations on these themes in use on farms and stations where this kind of screeing is being carried out.

Once identified, the twin rearing two-tooth ewe forms a good starting point for selection for greater lamb production. It is, however, merely the beginning of a long and skilled operation.

The Computer

Once the successfully producing young ewe has been isolated from the commercial flock she can be individually identified with a variety of tagging and identification methods. From here the breeding program can be greatly assisted by the use of a computerized recording

system such as New Zealand's "Sheeplan". With such a system very
large numbers of individually identified animals can be intensively
recorded for a number of productive traits. The traits recorded can
be evaluated according to their monetary return to the breeder,
and after heritability of the traits have been taken into account,
selection lists can be compiled which will rank male and female
offspring according to their best predicted breeding merit for these
traits. The scheme can also produce detailed sire summaries, identi-
fying the sires which have produced the most successful offspring.

IMPLEMENTATION OF THE SELECTION PROGRAM

Computerized recording opens up possibilities for setting up
a breeding program with very large numbers of animals, thus making
the best possible use of the variation which exists in all populations.
Few individual breeders, however, own such large numbers of stock,
and those that do may not have the inclination or dedication required
to carry out a planned program of animal improvement.

THE OPEN NUCLEUS SYSTEM

A group of likeminded and enthusiastic animal breeders working
together offers the best avenue for utilizing this potential. At
some stage in the program the recorded animals must come together under
one environment if the comparative recording of their performance is
to be effective. The breeding plan which is now being used in a number
of countries, and which is known as the "open nucleus system" requires
the highest-performing animals from several contributing flocks to be
brought together in a central flock or nucleus, where they are bred
and compared in one environment. The contributing flocks draw sires
from this nucleus.

MAINTENANCE OF THE SELECTION PROGRAM

A breeding group, as described above, is made up of people
and therefore is prone to human failings. Initially care must be
taken that the people joining the group are compatible with each
other, understand the breeding program and are dedicated to the
improvement of their stock along the lines decided upon by the group.
The person managing the nucleus must be very well rewarded for his
efforts. A great deal of the success of the venture depends on this
person.

The contributors must be kept involved in the operation of
the nucleus. This helps consolidate breeding objectives among members,
and also gives the nucleus manager the benefit of the combined knowledge
and experience of his contributors.

Selection of Sires

In discussing this topic I am assuming that the breeding
program is leading in its field and is big enough numerically to
be self sustaining in the production of sires. No outside sires
are being purchased. The program is working with a base of commercial

ewes perhaps somewhere in excess of 100,000.

Avoidance of Inbreeding

Even in a large scale program it is surprising how quickly one or two sire lines can become dominant. This can happen in the nucleus flock if a number of rams are kept from one sire. The result is a loss of flexibility in the breeding program. Care should be taken that a reasonable number of sire lines are maintained in the nucleus.

Artificial Insemination

The use of A.I. will compound the problem mentioned above and I do not see any place for A.I. in the type of breeding program being discussed.

Sires Bred in the Nucleus

The computerized selection list for two-tooth rams is the best guide for the selection of sires bred within the nucleus. New Zealand Sheeplan produces two types of two-tooth ram selection list, one for dual purpose and one for meat sheep. Sires should be selected that have the highest possible ranking on this list provided they meet the physical standards of soundness to be discussed later in this paper. Some rams will be used as hoggets, but less is known of their predicted breeding value. For instance, they will not yet have had their fleece weights or winter live weights recorded. For this reason, hoggets should probably be test mated in contributing flocks rather than in the nucleus.

Sires Tested in Contributing Flocks

To augment sires bred in the nucleus, sires being used in contributing flocks, whether bred in the nucleus or in these flocks, should constantly be evaluated. Sire summary information, such as that provided by New Zealand Sheeplan is the best guide. These summaries give within flock comparisons of the progeny of sires for productive traits such as weaning weight, hogget body weight, fleece weight and lambing performance of two-tooth daughters. Those sires showing significant improvement in these traits can be considered for use in the nucleus.

Age Groups of Sires

Using the plan described, approximately two-thirds of the sires used in the nucleus would be two-tooth rams bred in the nucleus and one third would be older rams tested and breeding successfully either in the nucleus or in contributing flocks. The tested rams would be 4 or 5 years old, and although their use will increase the generation interval, they can be relied upon to improve performance with greater certainty, and will also increase the number of sire lines in the nucleus.

In contributing flocks, sires could include hoggets on test from the nucleus, two-tooths from the nucleus, homebred two-tooths and a small proportion of tested sires. Some of the tested sires may be rams originally used as two-tooths in the nucleus.

Selection of Ewes

To provide sufficient replacement ewes in the breeding program, a large proportion of the young ewes available must be retained, thus reducing the scope for selection on performance background. It may, therefore, be better to mate most of the young ewes available and then cull them after their first or second lambing. Repeatability for twinning is high and the ewe's own performance is probably a better indication of her genetic merit than her background would be.

In a group-breeding scheme the nucleus will also receive ewes from its contributing flocks, but usually only a small number, perhaps 4 or 5, will be sent from each flock each year. The scope for selection here is very great. The group of ewes from which they will be selected is usually large enough numerically to enable sheep to be found whose lambs are above average weaning weight, and in the case of the first set, above average fleece weight as hoggets. The ewe herself will be out of a high-performing dam and will also have had an above average fleece weight as a hogget. The ewe will be carefully inspected for "soundness" and only those which are up to standard in all respects will enter the nucleus.

Age Groups of Ewes

If the pattern described above is followed, the number of two-tooth and four-tooth ewes will be high. There will be a drop to the six-tooth and five -year age group, but a number of very high-performing ewes will probably be kept to 8 or 9 years of age. Contributed ewes entering the nucleus will usually be in the six-tooth age group.

Although the rate of generation turnover may be reduced by the retention of the older sheep, again their performance can be predicted with greater certainty, and as longevity is important, some sires, from ewes that have given high performance to an advance age, should be used in the program.

Mating

Once the large-scale breeding program, is fully operational, it should be possible for the ewes to be mated to each sire to be randomly selected. At any early stage in the program it may be necessary to "correctively" mate, to establish certain required phyical characteristics or to eliminate faults: however, once this phase is over, all sires used will have similar physical characteristics and levels of performance background. In a large program the number of matings of close relatives will be so few, that they will be of no importance.

Ewe/Ram/Ratio

Active rams can successfully mate in excess of 300 ewes in a

season. Even on steep hill country, 200 ewes can be mated successfully
by one ram. However, a suitable number of ewes is probably between
100 and 150 per ram. Two-tooth ewes need special consideration. They
should be mated at half the number per ram, and should mated separately
from older ewes.

Lambing

Much could be said about this part of the breeding program.
The most important aspect is the identification of lambs to their
dams. This can be done at birth by previously identifying ewes
with large plastic "flag" type eartags or necktags readable from
a distance, or by mothering up ewes and lambs at a later date such
as at docking. The lambs can be identified at this stage with
brass or nickel-plated eartags giving number, year and property
name. A well designed and rugged field notebook is essential, and
many devices are used for the filling in of this book in rainy
conditions, including the use of two-way radios so that the book
would be written up at "home base".

Weaning

The recording of weaning weights is an important aspect of
all sheep improvement programs. Many aspects of scales and systems
are used for this operation.

New Zealand Sheeplan compensates for date of birth in the
processing of weaning weights and thus the effect of a spread lamb-
ing in the recording scheme is reduced.

Hogget Weighing

New Zealand Sheeplan provides for hogget weights to be
recorded in autumn, winter or spring or, if desired, at all three
seasons. The latest of these weights is used in the compiling of
the two-tooth selection list. The same facilities as are used for
recording weaning weights, are usually used for this operation.

Fleece Weighing

For dual-purpose sheep the recording of hogget fleece weights
is an important part of the program, and again many different systems
exist for carrying out this operation.

FACILITIES

Stock Facilities

For an effective breeding program to be carried out, sheep-
proof fences are essential. Paddocks of a suitable size for in-
dividual sire matings are required, and stock lanes connecting these
with sheds and yards are a great help.

Recording Facilities

Recording should be carried out in the best possible conditions,
out of direct sunlight, and away from wind, rain or mud. Good light

is essentail and in cold climates some form of heating is a good
idea. A centrally situated office, perhaps in the woolshed works
well. If this office can be placed so that fleece weights and live
weights can be recorded directly while in the office so much the
better.

Recording Accuracy

Accuracy in the recording scheme is essential. Many tricks
and systems of cross checking have been devised for reducing errors.
The recording of information such as live weights and fleece weights
directly on to computer input sheets helps obviate errors in
transcribing. Most people can train themselves to read eartag
numbers accurately, and it usually helps if conversation is kept
to a minimum while data is being recorded.

CONSIDERATION OF COSTS

The economy of scale can be effectively applied to a sheep
breeding program. New Zealand Sheeplan for instance, is very cheap
to the larger user. In a large ram-breeding enterprise the cost
of this service is less than 1% of the gross return from the sale
of rams. With good facilities one man can handle 1500 ewes, and
accurately record 2,500 lambs at birth. Some 2000 lambs can be
weighed by 2 or 3 people in one day, and two people recording can
weigh 1000 fleeces in a day. With good facilities the records can
be entered directly on to the computer input sheets eliminating further
handling. Some people in Australia may be able to better these
figures.

STOCK SOUNDNESS

I believe this aspect is of the greatest importance in a
breeding program. There are a number of traits which are not auto-
matically included in the computerized recording scheme. These
relate mostly to the degree of shepherding required to obtain the
production levels sought, and must be evaluated visually by the
breeder, and are dependent upon his stock knowledge and experience.
These factors include characteristics such as freedom from foot
problems and footrot, sound jaws and good teeth placement, and
easy care characteristics such as freedom from lambing trouble
and casting, good mothering, good mustering characteristics and
activeness, also the ability of rams to cover large numbers of ewes
at mating. Other important characteristics not included in the
recording scheme include black fibres in the case of wool sheep,
and the growth of horns in the case of hornless sheep. Although,
none of these characteristics is included in a Sheeplan selection
list, provision is made in the system for inclusion of additional
characteristics as optional comments.

I believe that these aspects are so important that they should
come before selecting animals for productivity. If the scale of
the breeding enterprise is large enough numerically, however, I
believe selection for these characteristics can be carried out with-
out any set back to genetic gain for productive characteristics.

SUMMARY

I believe commercial sheep are the best base for a sheep improvement program, that large numbers should be screened for the highest producers, which should then be accurately recorded on a computerized recording scheme for the traits required. A number of people working together and using the open nucleus system is a way of reaching the numerical size for optimum progress. Careful attention must be paid to stock soundness and the stock knowledge and experience of participants to the scheme should be made full use of.