Fleece measurements in selecting merino sheep.

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DURING recent months a number of well-attended fleece measurement demonstrations have been held in various districts. The object of the demonstrations was to make stud-breeders familiar with the technique under shearing-shed conditions and, during discussion, gain a clearer understanding of fleece measurement and its application to stud-breeding.

From a small group of sheep, the stud-breeders selected those they considered carried the heaviest and lightest fleeces. The whole group was then shorn and the fleeces weighed, classed and valued.

The demonstrations have shown definitely that selecting for fleece weight by eye and touch is inefficient compared with the scales.

Fleece measurement used in conjunction with present methods of classing increases the accuracy of selection of Merino sheep. It has grown from your desire as flockowners to have a better assessment of your sheep as producers and breeders.

The purpose is to determine by objective, or real measurements those animals which are going to be the best commercial producers during their lifetime and by using the best as breeders to secure the greatest genetic advantage for flock improvement.

Scientific observation has shown that in classing sheep by eye appraisal we are subject to error in picking the best (and the worst) producers. Undue emphasis is often placed on points which have little effect on productivity. Also, in eye-classing it can be difficult to maintain constant standards from the beginning to the end of classing time and from day to day.

Fleece measurement aims to overcome these difficulties by—

(a) Weighing and recording the shorn or greasy fleece weight (G.F.W.) of individual sheep.
(b) Determining the yield of clean wool from the fleece by scouring a typical sample from it to get the clean wool weight (C.W.W.).
(c) Measuring the average diameter of the fibres in fleece. This is a true indication of what is termed the count of the wool.
(d) Measuring the average staple length.
(e) Noting and recording the classers' comments.

In practice, the use of these measurements is modified according to the importance of the sheep. Stud rams, for instance, should be measured in great detail, whereas flock ewes only warrant greasy fleece weight measurements.

Selection by fleece measurement need only be applied once in the sheep's lifetime. It is only useful when sheep of the same age raised in similar environments are compared. The two-tooth shearing is the ideal time to make measurements.
Fig. 1.—Numbered alligator ear-clips used for temporarily identifying individual sheep.

Any further selection during the sheep's lifetime should be based on age and breeding ability.

To be a useful and practical aid, fleece measurement must "fit in" with normal shearing shed routine. Experience has shown that this is possible. Once the procedure is understood by shearers and shed hands, one extra man can easily do the fleece measurement work, necessary in the shed, for three shearers.

**HOW IS FLEECE MEASUREMENT APPLIED?**

First, you must decide on what type of sheep to aim for. As a Merino breeder you will probably want sheep that are able to survive and produce the maximum quantity of wool of a specified type. They must also have the ability to reproduce and rear as many lambs as possible of this type.

Then you must decide on what percentage you wish to cull.

**Primary Culling.**

You, or your classer, then cull on obvious faults, some of which are:

- Faulty testicles or udders;
- Very badly over or undershot jaws;
- Poor style wool, poor frames etc.

This culling should be kept to a minimum so that as many as possible can be selected on measured production. The more characters considered, the less chance there is for advancement in any one, and the one you are interested in is wool production.

In the Shearing Shed.

The sheep that are left are then identified in some way. A numbered ear tag is often used. A temporary alligator ear tag is suitable and can be affixed to and removed from ear very quickly. The wool on the midside is then clearly marked with a raddle. (This is the point on the third last rib half way between the mid-line of the back and the mid-line of the belly which is most typical of the whole of the fleece.)

As the sheep is shorn its number is noted on a card. Fleece and belly weights and classers' comments are recorded against this number.

A four-ounce sample is taken from the midside, placed in clearly labelled container and forwarded to the laboratory.

At the Laboratory.

From this typical four-ounce sample, staple length, fibre diameter (quality) crimps per inch and amount of clean wool (after scouring) are determined.

**Results.**

Results are tabulated and a list showing you the number of the sheep, its greasy fleece weight, clean wool weight, staple length, fibre diameter, number of crimps per inch and fleece type is available to assist in the final selection of your top sheep.

In the Shearing Shed.
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<table>
<thead>
<tr>
<th>Crop</th>
<th>Planting Rate per Acre</th>
<th>Inoculation Cost per Acre (incl. labour at 7/6 an hr.)</th>
<th>Benefits Needed to Pay Inoculation Costs</th>
<th>Average Quantity of Nitrogen Fixed per ac.</th>
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<tbody>
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<td>lb. per Acre</td>
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<td>Extra Seed</td>
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<tr>
<td>White Clover</td>
<td>1 1/2 lb.</td>
<td>10d.</td>
<td>1/10th lb.</td>
<td>102 lb.</td>
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<tr>
<td>Red Clover</td>
<td>4 lb.</td>
<td>1/2d.</td>
<td>1/5th lb.</td>
<td>114 lb.</td>
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<tr>
<td>Lucerne</td>
<td>15 lb.</td>
<td>4/4d.</td>
<td>1/2 lb.</td>
<td>114 lb.</td>
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<tr>
<td>Field Peas</td>
<td>4 lb.</td>
<td>1/2d.</td>
<td>2/3rd lb.</td>
<td>194 lb.</td>
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<td>Vetch</td>
<td>60 lb.</td>
<td>8/9d.</td>
<td>1/4 lb.</td>
<td>194 lb.</td>
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<td>Sub. Clover</td>
<td>60 lb.</td>
<td>8/9d.</td>
<td>2/3rd lb.</td>
<td>194 lb.</td>
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<td>Lupins</td>
<td>60 lb.</td>
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**HOW IS THE IMPROVEMENT ACHIEVED?**

Selection in animals is for two main purposes.

1. To improve the average production of those that are retained.
2. To improve the production of future generations by using the best producers as breeders.

It should aim to make the difference between the average production of those selected and the average of the group before selection as large as possible so as to secure the maximum benefit.

Fleece measurement can help to do this.

**Current Flock Improvement.**

The repeatability of fleece weight in Merino sheep is approximately 0.7 or 70 per cent. This means that, on the average, sheep selected at the two-tooth shearing with a superiority for fleece weight of 1 lb. over the average of the flock before selection, will have a superiority of \(1 \times \frac{70}{100} = 0.7\ lb\) over the average of the unculled flock in subsequent shearings.

This is the basis for improvement of production in the current flock.

The scales will help to make the difference between those selected and the unculled flock as large as possible.

**Future or Genetic Improvement.**

Heritability measures the part of current improvement achieved by selection which is due to heredity and therefore will be passed on from parents to offspring.

The heritability of any character is given a numerical value according to the extent that it is passed on, any value of 0.3 or 30 per cent. or more being regarded as high.

Heritability of fleece weight in the Merino has been found to be 0.4 or 40 per cent. This means that by measuring production of parents, and using the superior animals, we can be certain that a big proportion of their superiority is being passed on to the offspring.

For example, parents selected with an average superiority of 1 lb. can, in general, be expected to have progeny with fleece weights 0.4 lb. above the average of the progeny from the unclassed flock.

This is genetic improvement from generation to generation and is the permanent improvement.

Since it takes about four years for one generation to replace the last the annual genetic improvement is only one quarter of this.

For instance, in the above example where we have an improvement of 0.4 lb. from one generation to the next, the annual genetic improvement would be 0.1 lb.

Thus the annual genetic improvement in the production of Merino flocks can be
Fig. 4.—Taking a sample from the raddled area. The sample is then labelled and forwarded to the fleece measurements laboratory.

quite small which further emphasises the need for accurate selection in the first place.

The scales will help you do this much more accurately than your eye.

**FLEECE MEASUREMENT AND YOU**

How many of you are thinking “Maybe this is so, but how does it affect me?”

**Studs.**

Under any system of selection the greatest scope for genetic improvement is in the studs. In selecting top rams there is much more chance to make the difference between the ones selected and the average before selection quite large. One ram can influence 50 offspring per year so that such genetic improvement can be first passed on to the rest of the stud and eventually to commercial flocks buying rams from this stud. While the stud continues to progress so do commercial flocks buying rams from it. By making accurate measurements of all factors which contribute to quantity and quality of wool produced the studmaster can gauge his progress.

While a full scale system of measurements is preferable to determine that progress is in the right direction, this need not be applied over all the sheep in the stud. Only the top ram-breeding nucleus need be measured. Advances in this group are then rapidly passed on to the rest of the stud which breeds sale rams and then to the commercial flocks.

To the stud-master, fleece measurement is a useful tool. It will enable him to select more accurately, make progress and continue to progress while he uses the best producers.

Also, as the production of parents can be directly measured and fleece weight in the Merino is highly heritable, studmasters can be confident that in using the best producing parents they are progressing genetically. The time-consuming and expensive progeny test loses many of its advantages, although it will still be useful in comparing rams raised in different environments.

**Commercial Flocks.**

Full-scale measurements in commercial flocks are hardly warranted. Usually the scope for selection on fleece weight is so small that any genetic advances resulting are of little economic significance.

Genetic advances, however, can be bought via rams from studs which are progressing.

However, basing selection of ewes on a simple system of Greasy Fleece Weight can do much to increase the current production of the ewe flock. The advances achieved may only be small per head, but when spread over a large flock they amount to a considerably quantity of wool. Such advances being highly repeatable are carried on over the lifetime of the selected ewes.

**LAMBING PERCENTAGE**

Throughout, we have been considering production as the amount of wool of a specified type that sheep produce. Another important factor in production is the number of lambs raised.

High lambing percentage gives you the chance to select more heavily and thus increase the rate at which the average immediate production of the flock progresses.

Lambing percentages warrant attention.
SUMMARY
1. To evaluate the worth of a sheep as a producer and breeder. Fleece measurement uses directly measurable characters, G.F.W., C.W.W., fibre diameter, staple length, crimps to the inch.
2. It is used in conjunction with other methods of classing and gives greater accuracy to selection.
3. It will be most useful when used in studs, as rams can be selected intensively and can more rapidly pass on genetic improvement to flocks.
4. Only animals of the same age and raised in the same environment should be compared.
5. Fleece measurement fits in with normal management and if used in conjunction with present methods of classing can double the present rate of breeding improvement.

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