1-1-1983

More lambs : and profit through breeding

L G. Butler

Follow this and additional works at: https://researchlibrary.agric.wa.gov.au/journal_agriculture4

Recommended Citation
Available at: https://researchlibrary.agric.wa.gov.au/journal_agriculture4/vol24/iss3/10

This article is brought to you for free and open access by Research Library. It has been accepted for inclusion in Journal of the Department of Agriculture, Western Australia, Series 4 by an authorized administrator of Research Library. For more information, please contact jennifer.heathcote@agric.wa.gov.au, sandra.papenfus@agric.wa.gov.au.
IMPORTANT DISCLAIMER

This document has been obtained from DAFWA's research library website (researchlibrary.agric.wa.gov.au) which hosts DAFWA's archival research publications. Although reasonable care was taken to make the information in the document accurate at the time it was first published, DAFWA does not make any representations or warranties about its accuracy, reliability, currency, completeness or suitability for any particular purpose. It may be out of date, inaccurate or misleading or conflict with current laws, polices or practices. DAFWA has not reviewed or revised the information before making the document available from its research library website. Before using the information, you should carefully evaluate its accuracy, currency, completeness and relevance for your purposes. We recommend you also search for more recent information on DAFWA's research library website, DAFWA's main website (https://www.agric.wa.gov.au) and other appropriate websites and sources.

Information in, or referred to in, documents on DAFWA's research library website is not tailored to the circumstances of individual farms, people or businesses, and does not constitute legal, business, scientific, agricultural or farm management advice. We recommend before making any significant decisions, you obtain advice from appropriate professionals who have taken into account your individual circumstances and objectives.

The Chief Executive Officer of the Department of Agriculture and Food and the State of Western Australia and their employees and agents (collectively and individually referred to below as DAFWA) accept no liability whatsoever, by reason of negligence or otherwise, arising from any use or release of information in, or referred to in, this document, or any error, inaccuracy or omission in the information.
The changing objectives of the Western Australian sheep industry are causing flock owners to reevaluate the importance of their sheep's reproductive rate.

Rapid and spectacular increases in lamb marking percentages can be gained from improving management and nutrition. However, such improved lamb production can only be maintained by continuing the higher level of inputs. Improved management is a necessary part of this sheep improvement plan.

Increases made by genetic improvement of the reproductive rate are permanent. They can be built on year by year, and result in increased productivity and economic returns. The methods for gaining higher reproductive rates through breeding include culling of dry ewes, indirect selection for reproductive rate and crossbreeding, but the effectiveness of these methods varies. This paper reviews the steps sheep breeders can take and describes a scheme which is designed to improve the reproductive rate of the State's Merino flock through the co-operation of Western Australia's stud Merino breeders.

Reproductive rate in perspective

Under today's economic conditions, flockowners are becoming more conscious of the benefits of increasing lamb production... that is, sheep reproductive rate. This is particularly so for the Merino sheep industry, which is responding to the influence of the Middle East live shipping trade. The proportion of ewes in the State sheep flock has increased from the steady level of 38 to 42 per cent before 1976 to the present level of 48 per cent.

This change in attitude is being reflected in a number of ways, including:

- Although stud Merino breeders have not been concerned traditionally with breeding for improved lambing, more than 15 per cent are now participating with the Department of Agriculture in a scheme to improve the reproductive rate of the Merino.
- Corriedale stud breeders are now considering the possibilities of further improving the reproductive rate of their breed by genetic means.
- The highly fertile character of the Poll Dorset has been emphasised in a recent advertising campaign.

By L. C. Butler and R. P. Lewer, Animal Breeding and Research Institute, Katanning
Advantages of improving reproductive rate

There are advantages in improving the reproductive rate both directly in an economic sense and indirectly in a genetic sense.

Increased income—Given a stable flock structure, a similar number of two-tooth ewes would be required each year as replacements. The higher the effective reproductive rate, the more surplus sheep will be available for sale (Figure 1). The number of surplus ewes rises steadily with increasing lambing percentage. The point A marks the cut-off above which the flock number could be maintained. Below this lambing percentage, replacement ewes would have to be purchased to maintain flock size. The benefit would double when the wether sales were taken into account.

Gross margin calculations indicate increased production and income from higher reproductive rates, partly because of more ewes lambing but mainly because of the unavoidable extra twin lambs reared. Generally every 10 per cent increase in marking percentage could be expected to improve gross returns by about five per cent or more.

Western Australian production and lamb survival data indicate that an increase in reproductive rate from about 70 per cent lambs marked...the State average...to 80 per cent lambs marked, would increase the gross returns per 1,000 ewes by about $1,450 (six per cent) in a self-replacing wool growing shipping wether enterprise. This rate of increase in returns, as marking percentage increases, is similar to that calculated at Trangie Research Station in N.S.W. There, the high fertility flock which weans 122 per cent of lambs achieved a 14 per cent increase in gross returns compared with the control flock which weans 84 per cent of lambs.

Recent gross margin calculations, given in Tables 1 and 2, show a consistent increase in gross margin as lambing rate increases, despite the associated increase in proportion of twins in the flock.

The preliminary data in Table 2 were produced in response to criticism by South Australian farmers wanting more single lambs rather than twins. This work compared Border Leicester × Merino ewes at three different stocking rates. Two groups of sheep were run at each stocking rate, one a control group averaging about 110 per cent lambs marked and one a high lambing group averaging about 140 per cent marked.

Improved efficiency—Efficiency in terms of animal production is defined as output per unit of feed input. The major cost in a breeding ewe enterprise is maintenance feed, which is related solely to body size. The better the reproductive rates, the lower the cost per unit of output, hence the more efficient the enterprise. In

Table 1

<table>
<thead>
<tr>
<th>Lambing percentage</th>
<th>GM/dse</th>
<th>GM/ha</th>
<th>Increase %</th>
</tr>
</thead>
<tbody>
<tr>
<td>70 per cent</td>
<td>7.50</td>
<td>75.00</td>
<td>12.0</td>
</tr>
<tr>
<td>80 per cent</td>
<td>8.42</td>
<td>84.00</td>
<td>26.7</td>
</tr>
<tr>
<td>90 per cent</td>
<td>9.48</td>
<td>95.00</td>
<td>36.0</td>
</tr>
<tr>
<td>100 per cent</td>
<td>10.22</td>
<td>102.00</td>
<td></td>
</tr>
</tbody>
</table>

Table 2

<table>
<thead>
<tr>
<th>Stocking rate (ewes/ha)</th>
<th>Lambing percentage</th>
<th>Total No. of lambs sold per ewe</th>
<th>Wool production (kg/ewe)</th>
<th>Net return per ewe $</th>
<th>Net return per hectare $</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.0 Control (12%)</td>
<td>1.16</td>
<td>4.9</td>
<td>20.47</td>
<td>102.35</td>
<td></td>
</tr>
<tr>
<td>6.2 High (139%)</td>
<td>1.32</td>
<td>5.1</td>
<td>23.62</td>
<td>118.10</td>
<td></td>
</tr>
<tr>
<td>6.8 Control (105%)</td>
<td>1.32</td>
<td>4.9</td>
<td>17.38</td>
<td>107.76</td>
<td></td>
</tr>
<tr>
<td>6.8 High (117%)</td>
<td>0.96</td>
<td>4.8</td>
<td>22.92</td>
<td>142.10</td>
<td></td>
</tr>
<tr>
<td>6.8 High (143%)</td>
<td>1.14</td>
<td>4.6</td>
<td>18.65</td>
<td>126.82</td>
<td></td>
</tr>
</tbody>
</table>
addition the overhead costs such as ewe shearing, drenching and vaccination are spread over more lambs. Table 3 illustrates the effect of improved reproductive rate on production efficiency.

Greater genetic gain—Figure 1 also shows that genetic gain is proportional to the selection intensity. The same number of ewes are required for replacement in a flock of given structure but more would be available at higher lambing percentages. The proportion of lambs entering the ewe flock would be lower, thus because of selection their genetic merit could be higher. The response to selection should increase as reproductive rate increases.

Flexibility—If there is a change in economic conditions, higher selection potential permits a faster reaction and a consequent exploitation of new markets. After a drought or other natural disaster, the flock with highest reproductive rate will be able to rebuild faster.

The “disadvantage” of higher reproductive rate

Many farmers will claim that the unthrifty tail of their lamb mobs comprise the surviving twins. However, unless they have an identification system they have no way of knowing whether such lambs are singles or twins. Data from Western Australian research stations can be used to estimate survival rates of Merino singles and twins. They indicate that an average 85 per cent of single-born lambs survive compared with 70 per cent of twins. These figures are similar to many eastern states estimates.

Therefore 100 twin births will result in 55 (66 per cent) more lambs than will 100 single births. The extra lambs more than make up, not only for the lower average production by the twins, but also possibly for the cost of some extra feed for the ewes if they lamb when feed is not plentiful.

Commercial methods of identifying the ewes carrying twin foetuses could lead to much of the birth—rank penalty being reduced, as these ewes could be removed before lambing and given better treatment.

The data below for ewes born in 1977 at Avondale Research station shows that not all twins end up in the tail of the mob (Figure 2). In this mob, 67 per cent of lambs were singles and 33 per cent twins. The figure shows the number of lambs or hoggets in each weight class. Assuming that about 20 per cent of lambs or hoggets are culled and end up in the tail of the mob, then the tail would consist of 46 per cent twins and 54 per cent singles for nine month old lambs and 41 per cent twins and 59 per cent singles as 18 month hoggets. Therefore the tail comprises about 20 per cent of all singles in the mob and 30 per cent of all twins. The message is that the majority (70 per cent) of twins are good saleable animals and are not a dead loss.

Ewes which bear and rear twins produce less wool. This penalty can average about 80c per ewe.

It is a fact that twins probably will produce on average about four per cent less wool than singles at 18 months. But one should take into account that for a given total number of lambs, fewer ewes are needed to produce these twins, thus overhead costs are lower.

Why breed for higher reproductive rate?

The quickest way to increase lamb marking percentages is to improve ewe nutrition and management. But equally, the increase is lost immediately if the management is not maintained. Although body weight and fleece weight are also affected very much by management, they are important characters that breeders select for. It follows therefore that as reproductive rate becomes a more important
objective, breeders should put more selection pressure on it.

Both breeding for higher reproductive rate and special management at joining, such as feeding lupins, have a similar effect. A few more ewes will lamb, and more twins will be born and reared as a result of a higher ovulation rate.

Many farmers are prepared to consider improving their management at joining, to produce more lambs, but are apparently not concerned about the extra twins in the resulting ‘drop’. However, when breeding is suggested as a means of producing more lambs, such farmers often argue that they cannot grow twins successfully.

In reality, the lamb survival situation at an improved lambing is the same, whether the improvement is a response to management or breeding. There is an annual cost in improving management, whereas once breeding improvement is accomplished, there is no further cost.

Selection and breeding is a comparatively slower method of achieving improvement, but it brings about a permanent change once the whole flock performance has been improved. However, selecting for higher reproductive rate is no different to selecting for other traits. A two per cent annual increase can be achieved from selection for reproductive rate ... similar to what could be obtained from the same selection pressure applied to a character such as fleece weight.

What the breeder can do

Research indicates that culling dry ewes has relatively little effect. Even ewes which have been dry for two years in a row can still produce lambs. Although positive genetic gains can be made they are small and costly. Table 4 shows that culling once-dry ewes...22 per cent of the ewe flock...lifts the performance of those remaining by only 4.6 per cent. Only 8.5 per cent of ewes were found to be dry in consecutive years. Culling these twice-dry ewes only increased the performance of the flock by 2.4 per cent. Ewes dry three years in a row made up only 4 per cent of the flock. The gains reported in this table are not genetic gains but are simply phenotypic gains made in the current flock. For these gains to be maintained, culling would need to be continued year after year. There is very little if any genetic gain to be made by culling dry ewes. U.K. studies indicated that the heritability of failure to lamb is almost nil. In contrast, the advantage of a genetic improvement can be maintained, once it has been made, without further selection, provided, no contrary breeding is practised.

Dry ewes must be identified, preferably before lambing, before they can be culled. A number of methods are available:

| Table 4 |
|-----------------|-------------------|-------------------|
|                 | Ewes culled %     | Ewes lambing per 100 ewes joined | Gain % |
| Culling once-dry Ewes | 22.0              | 77.2               | 81.8    | 4.6   |
| Culling twice-dry Ewes | 8.5               | 77.0               | 79.3    | 2.4   |

- Teasers with sire-sire harnesses and crayons can be used to mark the non-pregnant ewes which normally return to service every 17 days during the breeding season. A further simple technique is “wetting and drying” ewes before and after lambing. With experience, palpation can be used.
- The more expensive and technical methods of pregnancy diagnosis using X-ray and ultrasonic equipment. An example of ultrasonic pregnancy diagnosis equipment is the Scanopreg, which which a good operator can distinguish dry from pregnant ewes. The more expensive ultrasonic equipment can further detect single and twin pregnancies.

Indirect selection to get an associated correlated gain in reproductive rate is at best slower than direct selection, and often gives no response. For example, selection on body weight should lead to best to a very slow improvement in reproductive rate. If body weight is being used as an indirect measure, an allowance or correction factor should be made for twin-born animals so that they are not disadvantaged in the selection process. To be effective, indirect selection must be based on a trait which has a high genetic correlation with reproductive rate, and is highly heritable.

There is evidence that selection for open faces in Merinos and Corriedales leads to a few more lambs and also to slightly higher wool production and bodyweight. Similarly selection for plain body can lead to higher reproductive rate.

Crossbreeding with a high fertility breed is the quickest way to breed for higher lamb marking percentages. In Australia the Booroola Merino is available. The Booroola has a litter size comparable with the best exotic sheep breeds. It is the only breed in the world which combines high fecundity with production of an unpigmented Merino-quality fleece. Crossing the
Border Leicester with the Merino achieves a substantial heterosis (hybrid vigour) effect.

Selection for a direct measure of reproductive rate has proved successful with breeds such as the Merino and the New Zealand Romney. The character usually selected for is the number of lambs born, though other measures such as lambs weaned and total weight of lamb weaned have been used successfully.

Individual farmers could 'go it alone' and increase the selection pressure on reproductive rate within their own flocks. This could be achieved simply by increasing the use of twin-born rams. In this case ram breeders should be encouraged to identify multiple-born rams. A further step would be to identify ewes of better-than-average lambing performance and breed rams from them for use on the farm. This requires labour-intensive recording of lambing percentage of individual ewes to identify twin-bearing or twin rearing ewes.

A limitation of 'going it alone' may well be the low numbers of multiple-bearing ewes to breed from.

To counter the problem of flock size, groups of farmers could get together for joint selection and breeding ventures. This greatly increases the base flock from which fertility breeding stock are selected, thus the reproductive rate of the selected stock is much higher. That is, only the most fertile sheep from each flock in the venture would be involved in the fertility breeding flock. This would help to maximise the rate of genetic gain in reproduction. Rams would be passed back to the co-operating breeders, thereby infusing genes for reproductive rate into the participating flocks.

This method is similar in concept to the Co-operative Fertility Breeding Project.

The Co-operative Fertility Breeding Project

In 1980, the Department of Agriculture with Australian Wool Corporation support started working with stud Merino breeders in a breeding project aimed at increasing the genetic potential for reproductive rate of stud rams sold while maintaining the stud's own wool and body type and weight. Therefore buyers of such high fertility stud rams would reap the benefits of infusing genes of higher reproductive rate into their own commercial flocks.

The scheme has been received very favourably, with more than 15 per cent of Western Australia's stud Merino breeders participating. These breeders will be able to develop their own lines (families) of high fertility sheep within their studs. After comparing the production of these families with that of their 'standard' stud sheep, they will be able to offer clients a choice—the stud's type of ram with or without genes for higher reproductive rate. Interested commercial ram buyers can encourage participating breeders by buying high fertility rams when they are offered for sale.

The scheme is based on stud maiden ewes selected on the basis of their expected level of fertility. Stud maiden ewes which shed two eggs at their first joining were transferred to the Animal Breeding and Research Institute at Katanning to form the base high fertility ram breeding flock. Rams bred from this flock will be passed back to participating breeders.

The major selection emphasis at the ABRI will be on reproductive rate as assessed by reproductive history of the dam history. But this does not mean that every ewe will produce twin lambs each year. The increases in fertility in commercial flocks are expected to be derived partly from reduced barrenness and partly from extra twin lambs born and reared.

References and Further Reading


