BORDER LEICESTER CROSS EWES FOR FAT LAMB PRODUCTION

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PROBABLY THE MOST IMPORTANT single factor which could improve the production and the efficiency of production of sheep is the raising of the level of fertility of our ewe flocks. Several methods of raising fertility are currently being investigated in this country; for example, breeding and selection within breeds, improvement of conception rates, the use of PMS with or without progesterone, and crossbreeding. No one of these is likely to be the complete answer in itself and all of them may well make contributions varying according to environment and management policy.

This paper is concerned with crossbreeding as a means of increasing lamb production on fat-lamb farms. The standard system in operation throughout the country is one in which Romney or Corriedale ewes are run on the hill country and the surplus breeding ewes are sold down country to the fat-lamb producer who mates them with a Southdown ram and fattens and kills all the progeny. The Romney or Corriedale ewe has therefore to serve its time both on the hills and on the flats—the one breed of ewe serving a dual function. If crossbreeding is to be carried out, an intermediate stage must be introduced between the hills and the flats in which surplus hill ewes are crossed with a high fertility breed and the female progeny of this cross sold down to the fat-lamb producer. The fat-lamb producer then uses his Southdown ram on this first-cross ewe.

During the last six to seven years the possibilities of such a system have been studied at Lincoln College. In choosing the ram to produce the crossbreds, the Cheviot, Dorset Horn, Border Leicester and others were considered and the opinion formed, taking everything into consideration, that the Border Leicester would be most suitable. Corriedale ewes were available at Ashley Dene and consequently the comparison was made with the Corriedale, though substantially similar results would probably be obtained with the Romney and experiments with the Romney have already been started.

Beginning in 1950, comparable groups of Corriedale ewes were mated each year to Corriedale rams and Border Leicester rams, so as eventually to give age-balanced flocks of pure

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Corriedale and first-cross Border Leicester × Corriedale ewes. These sheep have been reared together, mated together to Down rams, and run together in one flock all the time. Over the last three years, there have been between 130 and 170 ewes of each type. In 1951 and 1952, Merino ewes were crossed with the Border Leicester ram and a group of 80 to 100 first-cross Border Leicester × Merino ewes has also been run with the other two groups. For the sake of simplicity it is proposed to deal mainly with the comparison of pure Corriedale and Border Leicester × Corriedale ewes.

Results

Rearing

The Border Corriedale ewe lambs are about 10 lb. heavier at weaning than the purebred Corriedale lambs. As hoggets they are slightly easier to rear, and on average reach 100 lb. live-weight at 12 months of age. At maturity the crossbreds are 15 lb. heavier. This implies that fewer crossbred ewes could be carried per acre. On the other hand, advantage of the fact that the crossbred ewe lambs grow faster may be taken to mate them as ewe lambs, to give about a 50 per cent. lambing. The extra lambs given in the lamb mating trials have not been credited to the crossbreds in the subsequent analysis.

Longevity

There are indications that the teeth of the crossbreds wear slightly more rapidly than the purebreds and that the average life of the crossbreds is one-quarter year shorter. This means that a slightly greater replacement rate is necessary and that a mixed age flock would contain a higher proportion of young sheep. This fact has been taken into account in assessing the overall production of age-balanced flocks.

Prolificacy

The number of lambs born per ewe lambing at the different ages are shown in Fig. 1. This shows that the Border-Corriedale ewe produces 15 to 30 per cent more lambs than the pure Corriedale and that 4 and 5 year Border cross ewes give a lamb drop of about 180 per cent.

Table 1 gives a summary of the vital statistics pertaining to age-balanced groups, that is, age-balanced from two-tooths to 5 year ewes and allowing that there will be a larger proportion of young sheep in the Border Leicester group.

This table shows that the Border cross ewes are more prolific and that they are slightly superior in regard to barrenness and the rearing of their lambs. In the end at weaning, the Border-Corriedale produced 21 per cent. more lambs and the Border-Merino 14 per cent. more lambs, both of these differences being statistically highly significant. The older

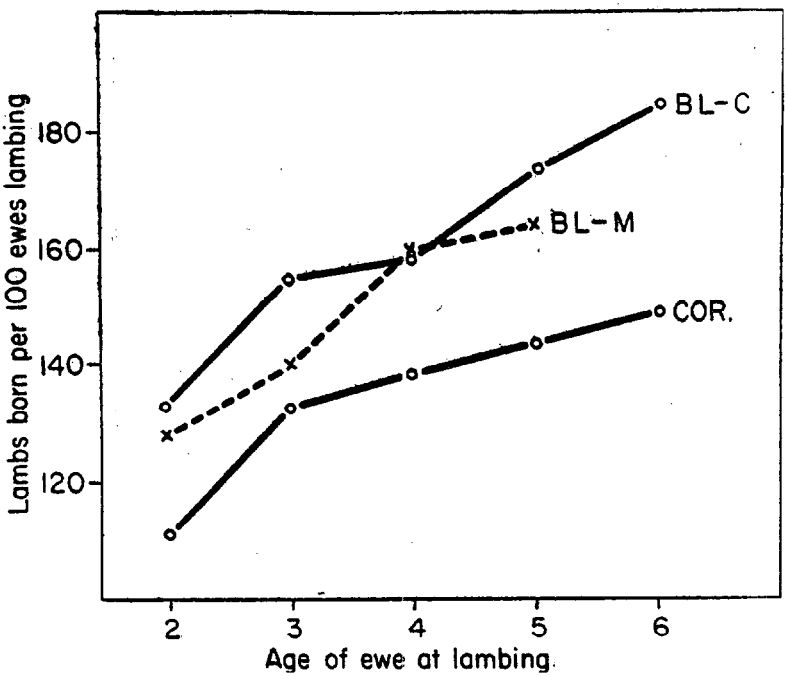

Fig. 1: *Comparison of lambs born to various breeds with ages of ewe at lambing* (BL-M — Border Leicester × Merino; BL-C — Border Leicester × Corriedale; COR. — Corriedale).

TABLE 1: PERCENTAGE OF LAMBS PRODUCED IN AGE-BALANCED FLOCK.

	Lambs Born per Ewe Lambing	Barren Ewes	Ewe Mortality	Lamb Mortality	Lambs Weaned per Ewe Mated
BL × C	158	4.7	1.2	9.4	134
BL × M	153	5.4	1.9	10.0	127
C	136	6.0	1.3	10.4	113

ewes, at 4 and 5 years, naturally give higher production which, expressed as lambing percentage, gives Border-Corriedale approximately 150 per cent. compared with 150 to 130 per cent. in the pure Corriedale.

The lambs out of Border Leicester cross ewes grow faster than those out of pure Corriedale ewes. The age-corrected weaning weights of both single lambs and twin lambs have been about 6 lb. higher for the Border-Corriedale and 3 lb. higher for the Border-Merino. Bearing in mind that the Border cross ewes have more twin lambs, the weaning weight increase of the

flock as a whole is reduced to 4 lb. and 2 lb. respectively. Thus, not only does the Border cross produce more lambs, but it produces better lambs. The weaning weights of single and twin lambs are given in Table 2.

TABLE 2: WEANING WEIGHTS (lb.) OF SINGLE AND TWIN LAMBS.

	1952	1953		1954		1955	
	S	S	T	S	T	S	T
BL × C	68	62	54	67	55	74	65
BL × M	—	56	47	65	53	73	60
C	61	55	48	62	50	68	58

DRAFTING PERCENTAGE AND CARCASE WEIGHT

The superior growth rate of lambs from the Border cross ewes is demonstrated in the drafting data.

Over the years the percentage of lambs drafted fat off the mothers has been consistently in favour of the Border-Corriedale cross by a margin of approximately 15 per cent. This is under conditions of drafting at 85 to 100 days. Thus, if 50 per cent. of prime lambs are drafted fat off the mothers from the Corriedale ewes, about 55 per cent. have been taken from the Border-Merinos and 65 per cent. from the Border-Corriedales. This has meant that there are fewer lambs from the Border-Corriedale ewes to be fattened after weaning.

The carcase weights of the lambs from the Border-Corriedale ewes have exceeded those from the pure Corriedale by 2 lb., and the carcase conformation is not adversely affected. In these days of light lamb production, when the 2 lb. weight increase may not be desired, the alternative exists of drafting these lambs ten days earlier and utilizing the feed so saved to carry more sheep to offset the otherwise lower carrying capacity of Border cross ewes.

Consideration of all these factors shows that, on a per ewe basis, the Border-Corriedale ewe weans nearly 30 per cent. more live-weight of lamb, gives a financial return for lambs 30 per cent. greater than the pure Corriedale, and a financial return on wool plus lambs of a little under 20 per cent. greater. The Border-Merino exceeds the Corriedale in these respects by 15 to 20 per cent. for lamb alone and over 10 per cent. for wool plus lamb.

WOOL

The Corriedale ewe at Ashley Dene clips a fleece of about 9 lb. exclusive of crutchings and bellies in weight and of count 56^{s} The Border-Merino wool is very similar in both weight and count but crossing the Corriedale with the Border Leicester increases fleece weight by nearly 1.0 lb. and reduces the count to $48/50^{s}$.

TABLE 3: ANNUAL FLEECE WEIGHT OF EWES (lb.).

	1952	1953	1954	1955	1956
BL × C	8.2	9.9	9.2	10.0	9.6
BL × M	—	8.6	8.5	9.0	9.0
C	7.2	8.7	8.1	8.9	9.2
BL × C — C	1.0	1.2	1.1	1.1	0.4

This fleece weight advantage has been held to at least the fleece shorn at 5 years of age. During the last three years, the wool has been binned so that some idea of the relative price might be obtained. This has shown that the Border Leicester-Corriedale wool loses 5d. to 6d. per lb., offsetting the extra weight. In fact, the value of the wool per fleece from the three groups has been almost identical. The precise values for the 1954 and 1955 clips were Border-Corriedale, 41s. and 42s.; Border-Merino, 40s. and 41s. and Corriedale, 41s. and 40s.

FLOCK MANAGEMENT

The Border-Corriedale ewe hoggets grow into a good line of attractive looking sheep. As ewes they are easier to handle at lambing time, being quieter, more easily caught and mothering their lambs better than the Corriedale. Any Border-Corriedale ewes which lose their lambs are always in demand for fostering. The Border-Merino, although a good mother, is wilder than the Corriedale. The Border-Corriedale requires more dagging on account of its longer wool, is heavier to handle, but being clear on the face and legs does not require eye-wigging and is easier to shear.

Discussion

These experiments have shown that a first-cross Border-Corriedale ewe used for fat lamb production will out-produce the pure Corriedale ewe by approximately 30 per cent. in lamb production without gain or loss of income from wool. This increase has come about from the high fertility, high milk-producing Border Leicester. This point is also borne out by the fact that the Border-Merino out-produced by some 15 to 20 per cent. the Corriedale, which is a Lincoln-Merino derivative.

It remains to be proved to what extent the Border-Corriedale would out-produce the pure Corriedale on a per-acre basis. Obviously such a comparison would reduce the advantage of the Border cross since fewer Border-Corriedales could be carried per acre. However, it is believed that, even under such a comparison, the Border-Corriedale would still be left with a handsome margin of superiority. The question of whether the Border-Romney would show a similar superiority over the pure Romney is now a very important one, on which study has begun. The implication from the Corrie-

dale work at Ashley Dene and from the performances of the Border Leicester, Romney and Corriedale breeds in the Lincoln College stud flocks leads one to believe that the advantages would be of a similar order of magnitude.

If crossbreeding is to be used to take advantage of the gains reported, modifications will be necessary in our sheep breeding system. The ideal is one which leaves the breeding of pure Corriedale or Romney ewes to the back-country store-sheep producer and interposes between him and the fat-lamb producer a new category of sheepfarmer devoted to the breeding of crossbreds. This new man, on the good hill country, would purchase purebred breeding ewes from the back country, cross them with the Border Leicester ram, fatten the wether lambs and sell down country the crossbred ewe progeny either as ewe lambs or two-tooths. The fat-lamb producer would then buy all his replacements as Border cross ewe lambs or two-tooths. Such a system, although more complex than the present simple one, has many advantages. It would, for example, solve the problem of the increasing demand for ewes by the fat-lamb producer and the dwindling supply of ewes from the hill-country farmer. It would reduce the proportion of purebred Corriedale or Romney wether lambs which are the most difficult to fatten.

This ideal would take a long time to attain, and in the meantime makeshift arrangements are being made by fat-lamb producers wishing to use Border cross sheep. Some may buy the Border cross ewe lambs from those fat-lamb farmers who use the Border instead of the Southdown as their fat-lamb sire. Others may breed their own by crossing bought-in Corriedale or Romney ewes with the Border. In this system the ewe flock becomes one-third Corriedale or Romney and two-thirds Border cross. Others again, such as Lincoln College at Ashley Dene, with larger flocks propose keeping three flocks, a purebreeding Corriedale flock, a crossing flock, and the fat lamb flock of Border cross ewes mated to Down rams—these three flocks being numerically in the ratio of ¼ : ¼ : ½.

That these new systems have some virtue is shown by the results at Ashley Dene in the last two years. In 1955, which had an exceptionally dry spring and summer, 60 per cent of all the Down cross and white-faced wether lambs had been drafted fat off the mothers by the end of November at 32 lb. and at a mean age of 13 weeks. For every 100 Border Corriedale ewes put to the ram, 132 lambs were drafted fat off the mothers at 32.5 lb. In the 1956 season, with wet, lush conditions in the summer, the lambs were kept to a mean age of 15 weeks, and 80 per cent, of all Down cross and white-faced lambs were drafted off the mothers at 36 lb. For every 100 Border cross ewes mated, 112 lambs were drafted fat off the

mothers at 35 lb. These results are considerably better than those obtained before the Border cross system was introduced.

From the fat-lamb producer's point of view—and also, it is believed, the whole country's—the crossbreds should be kept at the first cross which should be continually renewed and not inbred, although the evolution of new breeds by inbreeding from the Border-Corriedale or Border-Romney cross would be worth testing as the simple system of having only the one type of ewe in New Zealand is not without some advantage. In the meantime, it is of interest to determine whether, in the cold light of commercial practice, the first-cross sheep will give the same lift to production that is being obtained at Ashley Dene. Preliminary results from those farmers who are following the system and have bred first-cross Border-Romney ewes are promising.

DISCUSSION

Q: : *I believe that you are fortunate in New Zealand in having such a good potential fat lamb mother running on hill country. In Australia there is a greater stratification of the sheep industry in an attempt to produce a Border Leicester-Merino cross ewe for fat-lamb production. To me this seems a clumsy system. If we adopt Professor Coop's suggestion of running three flocks on one farm, what effect is this going to have on the evenness of the carcass quality of our lambs and hence of our export market? Surely, too, it will increase the managerial difficulties.*

A: : I do not believe we can achieve efficient production by using one breed of sheep over a wide range of different environments. The whole object of these experiments is to increase our lambing percentage and so raise the efficiency of our fat-lamb industry. Concerning the disadvantage of running three flocks on the one farm, this would obviously apply only to the larger flocks which breed their own replacements for fat-lamb production. At Ashley Dene, it is only at tupping time that we need to run these three flocks separately. At all other times they can be run together. We have found no differences in carcass quality between lambs from the Border cross and the purebred ewes.

Q: : *Professor Coop has compared the lambing performance of flocks of equal age composition. How would a cast-for-age Corriedale flock compare with a mixed age crossbred flock?*

A: : Even a mixed age crossbred flock would out-produce a cast-for-age Corriedale flock but by a lower margin.

Q: : *I can see the advantage of the experiment as outlined by Professor Coop. However, there is ample evidence that our variable environments are fast becoming evened-out by topdressing and the improvement of hill country.*

A: : This may be so, but there still remain big differences in environment over which, on the existing system, the one breed of sheep is expected to thrive.

Q: : *What methods of selection do you use for your Border Leicester rams?*

A: : We place most importance on wool and have found a fairly high incidence of faults in Border Leicester rams. We try to avoid hairy britches, kemp, and doggy-tip wool. We do not pay much attention to

carcass conformation. In the experiments described, the rams were of course unselected.

Q: : *The basic fat-lamb mother in Victoria is the Border Leicester-Merino cross ewe. Experiments have shown that this cross is superior to the Romney-Merino cross. I would like to ask Professor Coop what is the origin of the New Zealand Romney? As a long-term measure, would it be an advantage to use a Border Leicester or Cheviot ram over most of New Zealand's Romneys?*

A: : It would take a long time to describe the origin of the New Zealand Romney. I believe we would run into trouble if we used the Border Leicester on hard hill country. The Border Leicester is not really a very hardy sheep and for this reason this breed has got to stay on good country. The Cheviot, being a hardy sheep, might have possibilities if the price of wool declined.

E. A. CLARKE: : Before the Romney achieved its present popularity, Border Leicester sheep were run on quite large areas of our hill country and proved to be a difficult sheep for this particular environment. At the Ruakura Hill Station, we have been using Border Leicester rams to cross with our Romneys in an attempt to increase fertility through the crossbred. After two months tupping, these rams come in almost skin and bone and during the subsequent winter they are very difficult to keep alive. In contrast, the half-bred is 20 per cent. more fertile than the Romney, clips one pound more wool, and is a hardier sheep than the straight Romney.

Q: : *Would Professor Coop elaborate on his objections to inter-breeding the crossbred? Could not any loss of hybrid vigour be more than offset by selection?*

A: : There is not enough information on this point, but I believe that by going no further than the first cross makes it possible to keep the system under control.

PROF. A. L. RAE: : While I agree with Professor Coop that no information is available, every breed of sheep has been developed by inter-breeding crossbreds. Unfortunately, there are few cases where the methods used and the results obtained have been adequately documented. However, I believe that there is every chance that adequate selection can make up for any decline in hybrid vigour.

PROF. G. S. PEREN: : For some years we have been interested at Massey in the Cheviot-Romney cross. From these experiments, our advice is that, where the Romney is putting up a satisfactory performance, carry on with the Romney; where, however its performance is unsatisfactory, try out the half-bred. The weight of wool produced by the half-bred is misleading. We must also think of the type of fleece produced, especially on marginal country. When one takes into account breaks, tenderness and percentage of cotts there is not much difference between the half-bred doing well and the Romney which is not.