Which Ewes Should We Cull?

Joe V. Whiteman, R. B. Harrington, C. W. Nichols and W. L. Basler, Jr.

Culling is a form of selection. When we cull rams or ewes, we have decided that they will produce no more lambs in our flock. There may be many reasons for such culling. Generally, however, culling should be done for one of the following reasons or we will have gained nothing:

1. **Removal of permanently disabled animals that can no longer produce efficiently.** Culling animals with poor mouths, spoiled udders and such things as broken legs is a standard and necessary practice for efficient production. The animals culled for these reasons vary from high to low in productivity. In so far as the trait for which the animal was culled is permanent, there is an immediate economic gain from removing nonproductive animals.

2. **Removal of permanently low producers so that the herd will increase in average productivity thereby.** When low producers are culled, there is opportunity for gain in two ways. (1) If low producers are replaced by average or better producers, the herd productivity increases. (2) To the extent that the trait in question is heritable, there is an opportunity to raise better replacements so that the average productivity of the herd improves with time. This benefit is realized only if the producer raises his own breeding stock.

Oklahoma sheepman usually buy replacement ewes. Their opportunities for improving the productivity of their flocks lie in either (1) buying more productive ewes or (2) culling from their flocks the less productive ewes. In buying ewes the principal selection that can be made is between breeds. Whiteman *et al.*, (1960)* reported that Rambouillet ewes were superior to several crosses of Rambouillet with Columbia, Panama or Merino for fall lambing. These results are in agreement with those of many other workers. However, within a breed there are great differences in productivity but these are not readily distinguishable. If one is to cull the less productive ewes from his flock, which ewes or for which traits should he cull.

This paper is concerned with trying to answer some of these questions.

MATERIALS AND METHODS

In 1955 one hundred each of Rambouillet and ¼ Panama X ¾ Rambouillet yearling ewes were purchased and used to establish the experimental flock, at Ft. Reno. Starting during the spring of 1957 forty ewe lambs (20 from each above breeding of ewe) were kept for

* Whiteman, Joe V., Richard Pittman and Kenneth Urban. 1960. The lambing performance of different kinds of ewes. Okla. Agr. Exp. Sta. Misc. Pub, MP-57, p. 14.

replacements and 40 yearling ewes (20 each of two different breeding groups) were purchased to compare on a lifetime basis. During 1958 and 1959 similar groups were raised and bought to make up a flock of 240 ewes for this test.

Routine records were kept on all ewes relative to mating and lambing records, growth rate of lambs and weight of wool produced. Since no ewes were culled for traits that are considered in this discussion, it is possible to determine what gain might have been made by eliminating certain ewes on the basis of their early performance.

Figure 1 illustrates the present breeding schedule for the experimental flock and represents only slight modifications of the one used throughout the study. (See footnotes)

The ewes were mated to Dorset rams during the early years of the study and to Dorset, Hampshire, Suffolk, and Rambouillet rams during more recent years. All rams were fertility tested prior to their use.

The results presented here considered only fall lambing and do not give ewes credit for lambing during January and February. Ewes that lambed during these winter months were removed from their lambs by April 15th each year and conceived during the following May-June breeding period as well as those that had lambed during the fall.

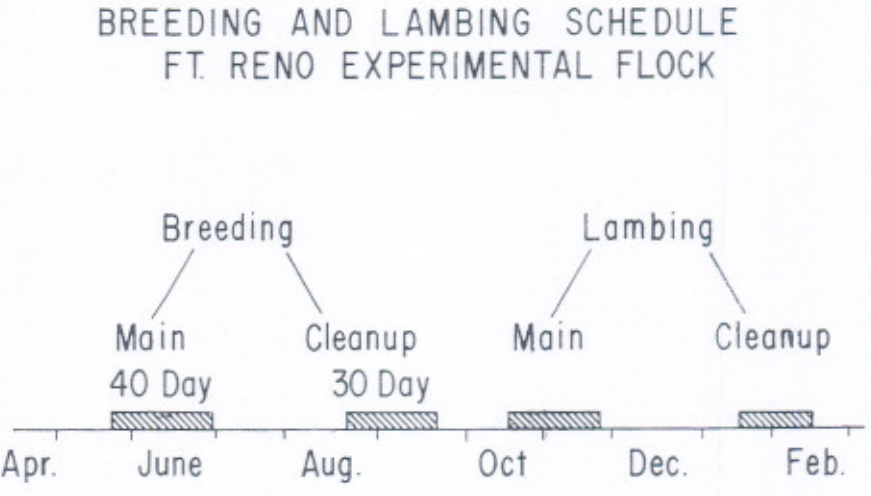

Figure 1. Sketch showing the breeding and lambing schedule of the Ft. Reno experimental sheep flock used from 1958 to the present.

---

* In 1955 and 1956 breeding was for 48 days starting about May 21st. In 1957 breeding was for 32 days starting about June 1st.

**There was no cleanup breeding in 1955 or 1956. Cleanup breeding for other years was Aug. 1st to 20th in 1957; Aug. 11th to 30th in 1958 and Aug. 20th to Sept. 21st since.

RESULTS AND DISCUSSION

Failure to lamb during the fall

During any year that a ewe fails to lamb or lambs late she is a liability or at best produces little profit. Consequently, culling ewes that do not lamb during the fall is a strong temptation. If such failure to lamb during the first year or two of production is an indication that such ewes will continue to fail frequently, then culling would be justified. On the other hand if such ewes subsequently produce at a rate comparable to other ewes then culling would result in an immediate economic loss if the sheep in this project are typical.

Table 1 presents the rate of reproduction of the original ewes in the project by years. The low performance in 1957 was no doubt due in part to the 32 day breeding season used that year resulting in fewer ewes lambing. The purpose of table one is to illustrate that younger ewes are less productive. These were most productive at five years of age. Most research indicates that ewes are most productive at ages three through six or seven.

Table 1.—The Percent Lamb Crop Raised* by Years and Age of Ewe For the 167 Ewes tha Remained itn the Flock for Seven Years.

Year	Age of ewes	¼ Panama X ¾ Ramb.	Rambouillet
		87 ewes	80 ewes
1955	Yrl.	45	80
1956	2	82	99
1957**	3	67	101
1958	4	100	126
1959	5	124	130
1960	6	113	114
1961	7	109	106

* The number of lambs raised per 100 ewes in the breeding flock.
**There was a 32 day breeding season used in 1957 which contributed to fewer ewes lambing.

Culling a ewe at age two or three results in a loss in that replacement yearlings cost $15.00-$18.00 and culled ewes usually sell for $6.00-$10.00 if sold for slaughter. If numbers are to be maintained the ewe must be replaced. The yearling ewe that replaces her will probably be less productive in her first two years than the ewe she replaces would have been in her next two years of production.

In order to study what would have resulted under different hypothetical methods of culling, the records of the 87 ¼ Panama X ¾ Rambouillet and 80 Rambouillet ewes that remained in the flock from 1955 to 1961 were studied. It was assumed for most of the study that the culling would be done after one or two years of production for each ewe. Therefore, the total production for each ewe was calculated for the last five years of production as an indication of her lifetime production after probable culling age.

A study of Table 2 will indicate several interesting points for consideration. First, if all ewes that failed to lamb either during their first year or their second year had been culled, the culling rate would have been heavy—19 to 41 percent. Such heavy culling would result in great immediate loss.

Second, the increased lamb crop reared in subsequent years that would result from culling ewes failing to lamb the first year was not great. The ¼ Panama X ¾ Rambouillet ewes that would have been culled raised a 102 percent lamb crop during their 3rd to 7th years as compared to the 111 percent lamb crop of those that lambed the first year. Had the dry ewes not been culled the first year, the lamb crop would have been (actually was) 107 percent or a gain of 4 percent resulting from culling. The benefits from culling the Rambouillets would have been even less.

Third, culling for failure to lamb the second year would have been more beneficial. In the case of the ¼ Panama X ¾ Rambouillet ewes, those that had a lamb the second year raised a 15 percent higher lamb crop during the next five years than ewes failing to lamb their second year. However, the lamb crop without culling was 107 percent raised for an increase of 3 percent from culling. The advantage from culling the Rambouillet ewes would have been greater. They actually had 113 percent lamb crop and if the 13 second year dry ewes had been culled the lamb crop would have been 122 percent.

Fourth, culling ewes that did not lamb either year would have been more beneficial for the ¼ Panama X ¾ Rambouillet ewes and only 10 of the 87 ewes would have culled. These ewes are by breeding

Table 2.—The Production of Ewes (Percent Lamb Crop) That Would Have Been Culled vs. Those not Culled Under Various Systems of Culling.

System of Culling	Culled			Not Culled		
	Ewes No.	Lambs Born	Lambs Reared	Ewes No.	Lambs Born	Lambs Reared
Failure to lamb 1st year						
¼ Pan. X. ¾ Ramb.	36	105	102	51	121	111
Rambouillet	15	125	115	65	126	117
Failure to lamb 2nd year						
¼ Pan. X. ¾ Ramb.	15	97	95	72	118	110
Rambouillet	13	100	86	67	131	122
Failure to lamb both years						
¼ Pan. X. ¾ Ramb.	10	92	88	77	118	110
Rambouillet	3	100	93	77	127	117
Failure to lamb 2 of 3 years						
¼ Pan. X. ¾ Ramb.	20	96	93	67	123	112
Rambouillet	7	107	84	73	129	120

⅛ Lincoln—a breed that does not breed out of season well. It might be expected that some of them would not lamb well during the fall and should be culled. The culling should probably be based on two failures, however, rather than one. There were only three Rambouillets that failed to lamb both of the first years and, therefore, no conclusions should be drawn from their performance.

An easy management method for culling dry ewes is to notch a ewe's ear when she first fails and then when a ewe with a notched ear shows up among those not lambing, she can be marked for sale. This would permit culling those ewes that failed to lamb during both of the first two years. In these data the records of those ewes failing to lamb in two of the first three years were compared to the records of ewes lambing at least two of the three years. The results in Table 2 indicate that some benefit would have been derived from this procedure. However, the culling rate would have been high among the ¼ Panama X ¾ Rambouillet ewes.

Just a word about these results. During the first three or four years of production for these ewes, various management methods were being tested. The failure of a few ewes to lamb or have twins very likely can be attributed to these management changes. The manner in which the studies were run, however, were such that these estimates of the value of culling would be minimum values. In other words, the benefits of culling are probably greater than these results indicate. Since none of the management methods were extreme, it is believed that their influence on these estimates was not great.

Failure to Raise Lamb(s)

Lambs that die prior to marketing are of no benefit to the producer. It was, therefore, decided to determine to what extent, if any, the failure to raise her first lamb(s) was a characteristic of ewes. The results of this study are presented in Table 3.

Table 3.—The Productivity of Ewes (Percent Lamb Crop) That Lost Lamb(s) Early in Life vs. Those That Did not Under Various Systems of Culling.

System of culling	Culled			Not Culled		
	Ewes No.	Lambs Born	Lambs Reared	Ewes No.	Lambs Born	Lambs Reared
Lost lamb 1st year						
¼ Pan. X. ¾ Ramb.	23	124	112	64	111	105
Rambouillet	8	140	117	72	125	116
Lost lamb(s) either year						
¼ Pan. X. ¾ Ramb.	32	118	107	55	113	107
Rambouillet	13	128	109	67	126	118

A study of the lambs born vs. lambs reared values for each group of ewes indicates that under either system of culling [lost lamb(s) first year or lost lamb(s) either of first two year] the ewes that failed to raise one or more of their lambs during the first year or two had a record of losing more of their lambs during the next five years. As an example, the ¼ Panama X ¾ Rambouillet ewes that failed to raise their lamb(s) the first year lost 12 of 126 or about 10 percent of their lambs during the last five years while the rest of the ewes lost an average of 6 of 111 or about 6 percent of their lambs.

A more important consideration, however, is that the ewes that lost lambs raised about as many lambs as those that did not because during the last five years of production they had more lambs. This is not surprising since more twin lambs are lost than single lambs and these ewes had more twins.

These data indicate that culling ewes for losing a lamb or two during their early years of production would be of little or no benefit in increasing the lamb crop raised. This may not be the final answer, however. These data were not examined for individual causes of failure to raise a lamb. A more thorough study of more extensive data might reveal that there are individual causes of lamb losses for which ewes should be culled.

Level of Early Production

Another consideration relative to culling ewes on reproductive performance involves a study of their later production in relation to the number of lambs they produced or raised during their first two years in the flock. A summary of such a study on the records of these ewes is presented in Table 4.

These data indicate generally that there is a relationship between the number of lambs that a ewe either had or raises during her first two years of production and her production thereafter. This does not

Table 4.—The Later Production of Ewes Classified According to Their First Two Years of Production.

Classification (2 yrs.)	¼ Pan. X. ¾ Ramb.			Rambouillet		
	No. ewes	Lambs born	Lambs reared	No. ewes	Lambs born	Lambs reared
Had 0 lambs	10	92	88	3	100	93
Had 1 lamb	21	98	95	18	116	100
Had 2 lambs	36	125	115	34	119	109
Had 3, 4 lambs	20	125	115	25	147	140
Raised 0 lambs	19	85	80	6	120	97
" 1 lamb	35	123	114	24	116	104
" 2 lambs	23	122	116	31	117	109
" 3, 4 lambs	10	124	114	19	157	149
Had twins once or more	29	129	121	29	144	137
No multiple births	58	108	102	51	116	104

mean that one can have a high degree of confidence in culling one or two ewes. It means rather than such a system of culling is certainly better than culling at random.

It is doubtful that one can justify extensive record keeping on commercial ewes but a system of mass marking is practical and would be of benefit. It has been suggested that ewes that fail to lamb during the fall be ear-notched (or otherwise permanently identified) the first time they fail and marked for sale the second time they fail. It might also be worthwhile to permanently identify ewes that were the best producers during their first two years. The results in Table 4 indicate that ewes that had twins at least once during their first two years of production were distinctly more productive later than those that did not. Such young ewes could be given a unique ear tag so that the owner would know that they are among the better ewes.

Advantages of identifying ewes according to lamb production are several. If for any reason, the numbers in the flock are to be reduced, it is well to know which ewes are least productive and can be sold. If replacement ewes are to be reared, it is well to save daughters of the more productive ewes. Other benefits will be brought out later.

Early Gain of Lambs

After a ewe has a lamb, she must raise it to some age when it can take and efficiently utilize other feeds for later growth and fattening. Several studies have indicated that there is tremendous variation in the amount of milk produced by different ewes. Such studies also indicate that the amount of milk that a lamb receives has a very strong influence on his rate of gain, or the weight of a lamb at 6-10 weeks is a good indication of the amount of milk that he got from his mother.

If the amount of milk given by different ewes tends to be a permanent characteristics of the ewes, then it should be possible to evaluate ewes early in life as to their milk producing ability and perhaps cull some that were very deficient in this respect. The efficiency of such culling is proportional to the *repeatability* of the trait in question. The repeatability of a trait is a measure of the degree to which animals repeat their performance for the trait. High repeatability means that animals are very consistent for their performance and thus culling low producers for such traits would result in culling permanent low producers and would be efficient culling.

The seven years of data on the lambs raised by the old ewes was used to calculate the repeatabilities of birth weight the lamb(s) weight at 70 days of age and rate of gain from 70 days of age to about market weight. The 70 day weight was used because results at this station and those of other workers indicated that the milk production of the ewe contributes little to the lamb's feed supply beyond this age. Earlier studies indicated that there was essentially no difference in the rate of gain of the lambs from these two groups of ewes so the data was pooled for this analysis.

The results as shown in Table 5 are not very promising. There was an increase in all repeatabilities resulting from adjustment of the data but such adjusting requires a lot of records and work—probably more than the improvement attained justifies. It should also be noted that the repeatabilities were highest for birth weight and lowest for rate of gain from 70 days of age to market weight. Except for the repeatability based on adjusted birth weight these values would all be considered to be low. This means that culling on the basis of one record would not be efficient. Repeated poor performance would be a much better basis for culling and would result in more progress.

Table 5.—The Repeatabilities of Birth Weight, 70 Day Weight and Rate of Gain from 70 Days to Market Weight Based on Raw and Adjusted Data.

	B. wt.	Repeatability 70 days wt.	Gain
Raw data	.20	.17	.11
Adjusted data*	.37	.23	.14

* Data adjusted for the average differences due to sex, type of rearing (single or twin), year and age of dam.

Here again some system of mass identification would be beneficial. If young ewes that did not give enough milk to get single lambs well started were permanently identified, they could be removed when flock reduction occurred or when they repeated the poor performance. Also, ewes, that did an outstanding job of raising single lambs or a good job with twins should be identified as ewes from which to raise replacement ewes.

THE WEIGHT OF FLEECE

Other than having lambs and giving them a start in life, a ewe's main contribution is the wool that she produces each year. This accounts for about 20-25 percent of the income produced by most flocks of commercial sheep in Oklahoma. The wool production of the ewes is therefore another trait for which culling can be done.

Individual ewes in the Ft. Reno flock varied from 9.3 to 17.1 pounds of wool per year for the ¼ Panama X ¾ Rambouillet ewes and from 9.2 to 15.0 for the Rambouillets. With wool selling for over 50 cents per pound (including the incentive payment) the ewes that produce more wool produce considerably more money for the owner. Here again if the repeatability of wool production is high then culling light shearing ewes would be beneficial in increasing fleece weights in future years.

Table 6 shows the repeatabilities that were calculated for fleece weight for four different groups of ewes. These repeatabilities are consistently high as has been shown by other workers generally. As indicated previously, high repeatabilities mean that efficient culling can be done

Table 6.—The Repeatabilities of Grease Fleece Weight for Four Different Groups of Ewes.

Kind of Ewe	No. Ewes	No. Years	Repeatability
¼ Pan. X. ¾ Ramb.	87	6	.63
Rambouillet	80	6	.77
Dor. X. Ramb.	36	5	.84
Dor. X. Ramb.	36	4	.78

for this trait because the ewes are pretty consistent for their particular level of production. As an example the 10 percent of each group of ewes that produced the lightest fleeces at their first shearing, produced an average of 1.6, 2.2, 1.1, and 2.2 pounds less wool per year thereafter for the ¼ Panama X ¾ Rambouillet and two crossbred groups respectively.

DISCUSSION

Commercial sheep enterprises return a relatively low number of dollars on a per head basis because sheep are small animals. Consequently, management practices need to be designed for large operations. Record keeping on an individual animal basis so that most efficient culling can be done probably can not be justified because the cost of keeping records is directly proportionable to the number of animals involved.

A second consideration is relative to the basis for culling. If one culls his flock for only one trait, then improvement will be largely in that trait and other animals will probably need to be culled for other reasons. Also, as indicated previously, selling cull 2-4 year old ewes at around $8.00 and replacing them with $16.00—$18.00 yearlings results in an immediate loss. Finally no decision relative to culling an individual ewe for one trait (of the kind discussed herein) is always correct.

If one tries to tie all of these ideas together into a workable system of culling that will result in reasonably sure improvement at minimum cost, he needs to develop a system of mass identification based on the performance of the ewes for the various traits. For instance, ewes that fail to lamb might be given an ear notch and those that do a poor job of raising a single lamb tagged with a black ear tag, then ewes that produce a light fleece at shearing could be culled if they were ear-notched or had a black tag or both. Conversely, ewes that twinned early in life or did a better than average job of raising their lambs could be given a permanent identification so that they would not be culled for producing a light fleece. Further, as indicated previously, if ewes are somehow identified as to level of productivity (low, medium, high) the producer will have a better chance of saving his replacements out of his best ewes and if he reduces flock size, he will have a good basis for knowing which ones to sell.

These data indicate that culling ewes for failure to lamb will improve later lamb crops, culling poor milkers will leave a flock that will

cause lambs to grow off a little faster and culling light shearers will leave a flock of heavier shearers. The improvement will not likely be profound but it will result in a higher performing flock. If one is going to have better sheep each year, than the year before, he must work at it. The system suggested here has been used before for some of these and other traits and will work.

SUMMARY

Seven years of production records for 167 ewes in the Ft. Reno experimental flock were studied to determine how the ewes might have been culled during the first year or two of production so that the remaining ewes would have been more productive for the rest of their lives. The production traits studied were whether or not the ewes lambed during the fall of their first, second or both years; their level of lamb production during their first two years; their frequency of raising the lambs produced; the birth weight, 70 day weight and post 70 day rate of gain of their lambs; and the weight of wool produced yearly.

Culling the ewes that failed to lamb during the fall of their first year would not have resulted in appreciable improvement. Culling the ewes that failed during their second year would not have required such heavy culling as culling on first year's performance and would have resulted in more improvement. The data suggested that ewes that failed to lamb during the fall in both of the first two years could be culled with considerable assurance of removing ewes that would be lower than average producers for the rest of their lives. Ewes that had twins during either or both of their first two years raised 19 and 33 percent larger lamb crops for the next five years than ewes that did not. This suggests that such ewes could be identified as better than average producers so that they would not be culled for other reasons or so that an effort could be made to save their daughters as replacements.

Culling ewes that lambed but failed to raise one or more lambs during their first two years would not have changed the flock productivity appreciably. However, the data were not adequate to permit a study of individual causes of failure to raise lambs. Such a study might yield different conclusions.

The repeatability of birth weight on unadjusted data was low but was moderate when the data were adjusted for the sex, type of birth and age of dam of the lamb and the year in which he was born. The weight of the lamb(s) at 70 days of age and rate of gain from 70 days to market weight (about 90 pounds) were traits of low repeatability in these data and consequently one evaluation of a ewe for these traits would not give one a sound basis for culling.

The repeatability of fleece weight was high when calculated for these ewes plus two groups of Dorset X Rambouillet crossbred ewes that were raised. Thus the culling of ewes that sheared the lightest fleeces would be efficient from the point of view of increasing the weight of wool

sheared by the flock but unless light shearing ewes were also poorer than average performers for lamb production, they probably should not be culled.

Procedures for mass identification of ewes according to general level of performance for the various traits were suggested. The immediate economic loss vs. the long time gain to be expected from culling and the advisability of culling ewes that were deficient in more than one trait were considered.

The Lifetime Reproductive Performance of a Hereford Cow Herd

E. J. Turman, L. S. Pope and Dwight Stephens

A beef cow herd yields only one source of income, a marketable calf at weaning time. Thus, the gross monetary return to the producer is completely dependent upon the number, weight and quality of the calves weaned. Anything that can be done to improve the performance of the beef cow herd in any of these categories will make an important contribution towards increasing the gross income of the cattleman.

The rather obvious importance of numbers of calves at weaning is shown in Table 1. This table gives the price per cwt. necessary to break even at various herd average weaning weights and calf crop percentages, assuming an annual cow cost of $80.00. It can be seen that raising the calf crop weaned percentage 10% is equivalent to an increase of 50 lbs. in average weaning weight.

Table 1.—The Necessary Selling Price Per Cwt. to Break Even at Different Herd Average Weaning Percentages and Weaning Weights Assuming an Annual Cow Cost of $80.00.

Percent Calf Crop Weaned	Average Weaning Weight (lbs.)			
	400	450	500	550
100	$20.00	$17.80	$16.00	$14.55
95	21.05	18.70	16.85	15.30
90	22.20	19.75	17.80	16.20
85	23.55	20.90	18.80	17.10
80	25.00	22.20	20.00	18.20
75	26.70	23.70	21.35	19.40
70	28.60	25.40	22.85	20.80