THE RELATION OF FACE COVERING TO LAMB AND
WOOL PRODUCTION IN RANGE
RAMBOUILLET EWES

CLAIR E. TERRILL

United States Department of Agriculture

WOOL covering has been developed on the face of some breeds of sheep because early breeders thought that covered faces were associated with heavy fleece weight. However, Marshall (1920) found that open-faced Rambouillet ewes had heavier fleece and body weights than wool-blind ewes. These results were confirmed by Spencer et al. (1928) who showed that Rambouillet ewes with the barest faces had heavier fleece weights, both unsoured and scoured, than those having heavily covered faces.

More recently Terrill (1941) found that Rambouillet ewes with open faces produced nearly 9 pounds more lamb per year than those with covered faces. These results were based on the lifetime lamb production of 393 registered ewes born at the U. S. Sheep Experiment Station from 1925 to 1934. The advantage of the open-faced ewes was mainly due to a higher percent of lambs born and weaned although there was also an advantage of nearly a pound in weaning weight. In this study little or no relationship of face covering to wool production was found. There was a slight tendency for ewes with open faces to have lighter grease fleece weights. Peters (1945) also found that open-faced Rambouillet ewes weaned more pounds of lamb per ewe per year than those with covered faces. Results from Texas (1945) showed that a much higher percent of open-faced Rambouillet ewes dropped lambs than of covered-face ewes.

Because of the economic importance of face covering, as indicated by its relationship to lamb production, further analyses were made at the Western Sheep Breeding Laboratory using more recent data. The purpose of this study was to determine further the relationship of face covering to lamb and wool production and to study the specific phases of reproduction responsible for the differences in lamb production.

Data and Methods

Data on face covering, lamb and wool production were taken from 798 Rambouillet ewes born during the years from 1938 to 1940 at the Western Sheep Breeding Laboratory, Dubois, Idaho. These were the most recent

1 Acknowledgment is made to John A. Stoeckl for assistance in the collection of the data.
2 Western Sheep Breeding Laboratory, Dubois, Idaho.
groups in which lifetime lamb and wool production data were available. In addition, data on yearling wool production were obtained on 1701 Rambouillet ewes born during the years from 1941 to 1946.

The ewes were scored for face covering just before shearing at yearling age by each of three experienced animal husbandmen. Wool covering on the face was scored as follows: "1" not covered beyond the poll, "2" covered to the eyes, "3" covered slightly below the eyes but open faced, "4" covered below the eyes but not entirely covered and subject to wool blindness, "5" almost or entirely covered and subject to wool blindness. Face covering in Rambouillets is usually restricted to the last three scores. Illustrations of faces of Rambouillet yearling ewes showing various degrees of face covering are presented in figure 1. Nine scoring units were possible by assigning plus or minus values to ewes considered as being slightly above or below an even unit. Average scores of the committee were used in the analysis. Rambouillet ewes with a score of 3+, 3 or 3 - are generally referred to as open-faced; those with a score of 4+, 4, or 4 - as partially covered; and those with a score of 5+, 5 or 5 - as covered.

Grease fleece weight, clean fleece weight and staple length were recorded for all yearling ewes. Grease fleece weights were taken on the shearing floor during the latter part of May or the first part of June and were recorded to the nearest 0.1 pound. Clean fleece weights were estimated from the clean yields of small side samples (about 35 grams) and grease fleece weights on yearlings born from 1938 through 1941. Staple length was measured at the side to the nearest 0.2 centimeter just before shearing.

Data on lamb and wool production were tabulated for each ewe year for the first 5 lambing years, although all ewes having at least 1 lambing year were included in the study. Lambing data for ewe years in which the ewe died before weaning time were excluded.

Information as to whether the ewe lambed, number of live and/or dead lambs born, number of lambs weaned, weight of lambs weaned and grease fleece weight was recorded each year. Lambs given to a foster mother were credited to their own mother as being born alive but to their foster mother for weaning data.

The ewes were maintained under typical range conditions for the Intermountain West. The ewes were herded on sagebrush-grass range near Dubois, Idaho from the latter part of September until breeding in November or December. They were fed hay and bred in pens for about 30 to 34 days. After an interval of a few days a few rams were turned in for range breeding for an additional 15 to 30 days. The ewes were herded on the fall or winter range until sometime in January when they were taken to the feed lot and fed alfalfa hay until the spring range was ready in the latter part of April.
Figure 1. Face covering of yearling Rambouillet ewes. A, open face with score of 3; B, C and D, partially-covered faces with scores of 4+, 4 and 4− respectively; E and F, covered faces with scores of 5+ and 5 respectively.
A protein supplement or oats was fed from about a month before lambing until the ewes were turned on the spring range. The lambs were born in April and May and were herded with their dams on the sagebrush-grass range until about July 1, when the flock was trailed to the high summer range near the Targhee National Forest. They remained on the summer range until weaning time in the latter part of August. The average age at weaning was around 130 days.

All ewes included in this study which were subject to wool blindness had the wool clipped from around the eyes about three times a year. Thus, the differences in production occurred in spite of this corrective treatment.

**Results and Discussion**

The relation of open-face to greater lamb production was fairly consistent for each of the groups of ewes born in the 3 years. The difference in lamb production between open and covered faced ewes decreased somewhat in the successive years. Also more ewes were classified in the covered-faced group and less in the open and partially covered groups in the succeeding years. This may have been the result of changes in scoring standard, which often occurs with subjective methods and may have caused the narrowed differences between open and covered-faced groups. It was thought that a combination of the 3 years would give the most representative differences so the 3 groups were combined for further study.

The relation of face covering to various phases of lamb production is shown in table 1. Open-faced ewes excelled those with covered faces in every phase of lamb production including percent of ewes lambing, percent of lambs born of ewes lambing, live lambs as percent of lambs born, lambs weaned as percent of live lambs born and average weaning weight, although the difference was slight for live lambs as percent of lambs born, and for lambs weaned as percent of live lambs born. Each of these factors is fairly independent although as the percent of lambs born increases, the percent of

<table>
<thead>
<tr>
<th>Face covering</th>
<th>No. of ewe years</th>
<th>Percent ewes lambing of ewes bred</th>
<th>Percent lambs born of ewes lambing</th>
<th>Percent live lambs of lambs born</th>
<th>Percent lambs weaned of live lambs born</th>
<th>Average weaning weight in pounds</th>
<th>Percent lambs weaned per ewe bred</th>
<th>Pounds lamb weaned per ewe bred</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>286</td>
<td>95.5</td>
<td>126.4</td>
<td>91.9</td>
<td>89.0</td>
<td>76.5</td>
<td>99.0</td>
<td>75.5</td>
</tr>
<tr>
<td>Partially covered</td>
<td>845</td>
<td>95.4</td>
<td>124.3</td>
<td>92.3</td>
<td>88.1</td>
<td>74.8</td>
<td>96.3</td>
<td>72.1</td>
</tr>
<tr>
<td>Covered</td>
<td>1557</td>
<td>91.9</td>
<td>119.7</td>
<td>90.0</td>
<td>88.6</td>
<td>73.4</td>
<td>87.7</td>
<td>64.4</td>
</tr>
</tbody>
</table>
lambs weaned and the weaning weights are apt to decrease since mortality is higher and weaning weights are lighter for twins. The last two columns in table 1 represent the combined effect of the preceding factors, showing that ewes with open faces wean 11.3 percent more lambs and 11.1 more pounds of lamb per ewe bred than ewes with covered faces.

Production of ewes with partially covered faces was much closer to open-faced ewes than to covered-faced ewes for all features of lamb production except percent of live lambs weaned and weaning weight. They weaned 8.6 percent more lambs and 7.7 more pounds of lamb per ewe bred than ewes with covered faces. This indicates that some progress toward more open faces is immediately reflected in increased lamb production under range conditions.

Differences in lamb production within the groups presented in table 1 were found for the various degrees of face covering, particularly for the partially covered and covered-faced groups. For instance, ewes given a score of 5 weaned 62.8 pounds of lamb while those with slightly more open faces, having a score of 5+, weaned 66.4 pounds of lamb per ewe bred. Of those with partially covered faces, ewes given a score of 4— weaned 70.7 pounds of lamb, those scored 4 weaned 72.4 pounds of lamb, and the most open-faced of the partially covered ewes with scores of 4+ produced 74.9 pounds of lamb per ewe bred. The average age at weaning was around 130 days. This consistent increase in lamb production as the scores progress toward more open faces leads to confidence in the value of even small improvements in removing the face covering from range sheep.

The advantage of open-faced ewes over those with covered faces in lamb production was apportioned to specific phases of reproduction. The end point of reproduction in this case was taken as weaning weight since this is the nearest approach to market weight that can be made from these data. These estimates were obtained by determining the effect of the differences in each phase of reproduction of the pounds of lamb weaned per ewe bred. The difference between ewes with open and covered faces in percent of ewes lambing caused a difference of 2.07 pounds of lamb weaned per ewe bred. A greater number of lambs born from the open faced ewes resulted in a difference of 5.17 pounds of lamb per ewe bred. More lambs born alive from the open faced ewes produced a difference of 0.96 pound of lamb weaned, and heavier weaning weights of lambs from open-faced ewes produced a difference of 2.96 pounds of lamb per ewe bred. Thus, about 46 percent of the advantage of open-faced ewes was due to a greater number of lambs born per ewe lambing; 26 percent was due to higher weaning weights; 19 percent was attributed to a higher proportion of the open-faced ewes having lambs; and 9 percent was due to greater viability to weaning
of offspring from the open-faced ewes than from those with covered faces.

The effect of age of ewe on the relation of face covering to lamb production is shown in table 2. The greatest advantage for open-faced ewes in pounds of lamb weaned per ewe bred was found at 3 years of age followed in order by 2, 4, 6, and 5 years. The ewes were sorted into the face-covering groups on the basis of yearling scores. General observations indicate that ewes become somewhat more open-faced as they grow older and in addition

<table>
<thead>
<tr>
<th>Face covering</th>
<th>2-year-old ewes</th>
<th>3-year-old ewes</th>
<th>4-year-old ewes</th>
<th>5-year-old ewes</th>
<th>6-year-old ewes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>54.4</td>
<td>78.1</td>
<td>83.4</td>
<td>84.6</td>
<td>95.7</td>
</tr>
<tr>
<td>Partially covered</td>
<td>48.9</td>
<td>69.7</td>
<td>87.2</td>
<td>91.3</td>
<td>82.1</td>
</tr>
<tr>
<td>Covered</td>
<td>44.0</td>
<td>63.6</td>
<td>74.6</td>
<td>78.2</td>
<td>88.8</td>
</tr>
<tr>
<td>Open minus covered</td>
<td>10.4</td>
<td>14.5</td>
<td>8.8</td>
<td>6.4</td>
<td>6.9</td>
</tr>
</tbody>
</table>

their face covering in later years is apt to vary more in either direction from their yearling score. In this event it would be expected that the advantage of the ewes with open faces as yearlings would decrease as the ewes grow older and there was a tendency in this direction after the third year of age.

The relation of face covering to wool production was studied in 2499 yearling Rambouillet ewes born from 1938 through 1946. On the average covered-faced ewes excelled those with open faces by 0.09 pounds of grease wool and 0.05 pounds of clean wool. Neither of these differences was significant. Covered-faced ewes had greater staple length by 0.16 centimeters than open-faced ewes. This difference was highly significant statistically. The within year correlation coefficients of each of the 3 fleece traits with face covering were low and nonsignificant, indicating that no important relationships existed. In general covered-faced ewes (born 1938-40) produced slightly heavier grease fleece weights (about 0.2 pound) throughout their lifetimes than open-faced ewes.

Discussion

The results indicate that the effect of covered faces in reducing lamb production probably comes about because the wool-blind ewes cannot see to eat as well or as much of the time and therefore are more poorly fed than those with open faces. The wool-blind ewes probably tend to follow the
ewes with open faces and therefore have to depend more on trampled and second choice feed on the range. They also have difficulty in getting to water.

Wool blindness is probably more detrimental at certain times of the year, particularly when the wool on the face has been permitted to grow for some time. Ewes are normally wool-blinded, or clipped around the eyes, in the fall before breeding (October), in the spring before lambing at crutching time (early March), and of course at shearing time (about June 1). Wool blindness would be most prevalent just before these dates. The most critical time is probably just before breeding in the fall as the effect of the lowered level of nutrition at this time on the wool-blind ewes most likely causes the differences in percent of ewes becoming pregnant and in number of lambs born (dependent on number of ova shed).

The much greater effect of face covering on proportion of ewes lambing noted in the Texas Station Report, 1945, than in this study may be attributed to the ewes in Texas having been bred in pastures, where wool-blind ewes might even escape being bred. This was not likely at this Laboratory as the ewes were all bred in small lots. At Texas the ewes were scored for face covering each year which might show the effects of face covering with advancing age more accurately than in this study.

The slight reduction in the viability of lambs from birth to weaning from the covered-faced ewes indicates that there is probably little effect of wool blindness during the spring and early summer. This may be due to clipping the wool from the eyes with machine clippers at crutching and shearing, which is probably more effective than clipping with blade shears in the fall.

The disadvantage in weaning weight of lambs from covered-faced ewes may be partly due to increasing degree of wool blindness in the late summer resulting in earlier reduction of milk supply of the wool-blind ewes. This difference may also be partly due to developing wool blindness in the lambs as ewes with covered faces are more apt to have lambs with covered faces (Terrill, 1941; Terrill and Hazel, 1943, 1946). Lambs sometimes become wool blind just before weaning and probably suffer from being less able to obtain milk from their mothers and feed through grazing. The use of open-faced sires might remove at least part of the detrimental wool blindness of the lamb as these lambs would probably be more open-faced than their dams.

The detrimental effects of covered faces might be partially corrected by more frequent clipping around the eyes, especially in late summer or early fall, though this is not often practical under range conditions. Elimination of wool blindness through breeding and selection would be much more
effective and would be permanent. Work at this Laboratory (Terrill and Hazel, 1943, 1946) has shown that the heritability of face covering is high (0.56 for weanling face score) and therefore may be readily changed by selection provided some variability in face covering exists. Where the incidence of open faces is low, i.e., variability in face covering is low, initial progress in selecting toward open face may be slow. The results reported here show that even slight progress toward more open faces will be immediately reflected in increased lamb production. The high economic importance and heritability of face covering indicate that it should receive as much or more attention in selection than any other trait in sheep, if wool blindness is a problem.

The slight relationship between covered faces and increased wool production is not large enough to be important. It is reasonable that wool blindness may appear earlier and be more apparent in those having long staple. There is also a tendency for weanling selections to retain the open faced ewe in spite of a light fleece but to cull the covered-faced ewe with a light fleece. The advantage in grease fleece weight of the covered-faced mature ewes may be explained by the greater lamb production of the open-faced ewes, as Terrill and Stoehr (1942) have shown that grease fleece weight is reduced by increased lamb production. In fact practically all of the disadvantage of the open-faced mature ewes in wool production can be explained by the effect of their greater lamb production.

Summary

The lifetime lamb production of 798 Rambouillet ewes born during the years of 1938 through 1940 at the Western Sheep Breeding Laboratory, Dubois, Idaho, was studied in relation to face covering.

Ewes with open faces produced 11.3 percent more lambs and 11.1 more pounds of lamb per ewe bred than those with covered faces. Ewes with partially covered faces weaned 8.6 percent more lambs and 7.7 more pounds of lamb per ewe bred than those with covered faces. Differences in face covering within these groups were associated with corresponding differences in lamb production. These advantages for ewes with open faces occurred in spite of three periodic clippings around the eyes of all ewes subject to wool blindness.

About 46 percent of the advantage of open-faced ewes was due to a greater number of lambs born per ewe lambing; 26 percent was due to higher weaning weights; 19 percent was attributed to a higher proportion of the ewes becoming pregnant; and 9 percent was due to greater viability to weaning of offspring.

Open-faced ewes excelled covered-faced ewes in lamb production at each
year of age. The greatest advantage for open-faced ewes in pounds of lamb per ewe bred was found at 3 years of age followed in order by 2, 4, 6, and 5 years.

The yearling grease and clean fleece weights and staple lengths of 2499 Rambouillet ewes and the lifetime grease fleece weights of 798 Rambouillet ewes were slightly greater for covered-faced ewes than for those with open faces. The differences were not significant except for staple length and were not large enough to be economically important.

The great economic importance and high heritability of face covering indicate that it should receive as much or more attention in selection than any other trait in sheep if wool blindness is a problem.

**Literature Cited**


Peters, Hobart, F. 1945. A Study of Rambouillet Sheep with Special Reference to Face Covering. (Unpublished manuscript from University of Saskatchewan.)


