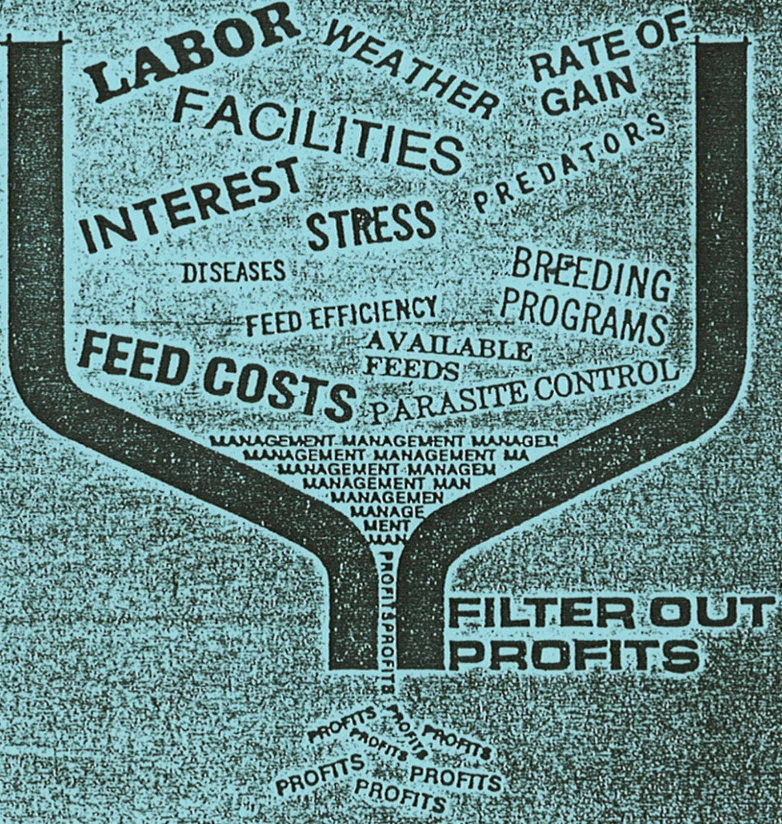
21 st ANNUAL

WESTERN DAKOTA SHEEP DAY

WEDNESDAY, FEBRUARY 13, 1980, HETTINGER ARMORY

SHEEP MANAGEMENT

"DRYLOT — CONFINEMENT"



TIMOTHY C. FALLER, SUPT.
HETTINGER BRANCH EXPERIMENT STATION
NORTH DAKOTA STATE UNIVERSITY

P R O G R A M

10:15 a.m. (MST)	COFFEE A look at new Sheep Handling Equipment
11:00 a.m.	PROGRESS REPORTS Hettinger Station Reports Timothy C. Faller Superintendent Hettinger Branch Station Fargo Station Reports Prof. Merle Light Animal Science Dept. North Dakota State University
12 Noon	Roast American Lamb Dinner
1:15 p.m.	WELCOME Don Anderson, Ass't Director Agricultural Experiment Station North Dakota State University
1:30 p.m.	SUNFLOWER MEAL FOR FINISHING LAMBS Dr. Duane Erickson Animal Science Dept. North Dakota State University
1:55 p.m.	CONFINEMENT - WHAT DOES IT COST? Roger Haugen Extension Livestock Specialist North Dakota State University
2:35 p.m.	EWE SELECTION Dr. Paul Berg Animal Science Dept. North Dakota State University
3:00 p.m.	WHAT'S NEW IN PROMOTION? Mr. Will Meyers Asst. Public Relations Director American Sheep Producers Council Denver, Colorado
3:30 p.m.	Drawing and Coffee

* The "Ladies Program" begins at 1:30 p.m. at the Hettinger Armory

SHEEP DAY DIGEST
by
Timothy C. Faller, Supt.
Hettinger Experiment Station

SECTION I

Reports of

Research in Progress

at the

Hettinger Experiment Station

Presented by

Timothy C. Faller
Superintendent

Dr. Paul Berg
Animal Science Department
North Dakota State University

Dr. Duane Erickson
Animal Science Department
North Dakota State University

Professor Merle Light
Animal Science Department
North Dakota State University

at the

21st Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

February 13, 1980

THE RELATIVE RESPONSE TO SINGLE TRAIT SELECTION PRESSURE APPLIED TO COLUMBIA EWES

P. T. Berg, W. D. Slanger, M. R. Light,
C. L. Johnson, and T. C. Faller

Summary

Data on single trait selection applied only to ewes has been gathered for 11 lambing seasons at the Hettinger (North Dakota) Experiment Station. The 90 ewe flock was separated into three equal groups. Group one was selected for weaning weight (lamb production); Group two was selected on the basis of Columbia type (visual); and Group three on yearling fleece production.

Selection based on weaning weight (group one) did not increase either the mature weight of the ewe flock or weaning weight of lambs. A 30% increase in fleece weight based on a ratio of original fleece weight flock mean vs 1978 fleece mean has resulted.

Selection based on visual type (group two) did not increase either mature ewe weight or lamb weaning weight but fleece weight, based on 1978 production as a ratio of 1967 production, increased 33%.

Selection for wool production (group three) has resulted in a 51% increase in wool production but no apparent increase in either mature ewe or lamb weaning weight.

Duncan's New Multiple Range Test indicated a significant difference in 1978 wool production between groups one and three but not between groups three and two or two and one. The differences in the 1978 weaning weights among the three groups are non-significant. This suggests that selection based on the wool trait responds more favorably to pressure on the ewes only, than do the weight parameters. The apparent ineffectiveness of selection for weaning weight may suggest that pressure applied to the ewe flock only is insufficient to make improvement. More sophisticated data analysis is in progress and may offer a better explanation.

Introduction

There are few studies relative to selection for either lamb production or yearling fleece weight when the selection pressure is applied to only one sex. No study involving these traits where selection pressure was applied only to ewes could be found. If a reasonable lamb crop could be maintained, selection of the upper one-fourth and one-third of the ewe lamb crop each year should be possible. Single trait, objective measures of 120 day lamb production and yearling fleece weight were chosen for this study. A third group, where selection was based on visual appraisal of general type, was also included.

Yearling (hogget) fleece weight proved to be a useful indicator of lifetime wool production in studies in the United States and other countries (Gartner and VonUngern-Stenberg, 1938; Terrill, 1939; Wolf, 1951; Young et al., 1960). Elliott et al. (1979a) found that fleece weight and yearling body weight had the greatest influence on lifetime economic productivity. In an additional study, Elliott et al, (1979b) showed a high phenotypic correlation between yearling body weight and yearling fleece weight. The genetic correlation between these two traits was negligible, thus they concluded that the relationship between the traits was largely due to the shared environment factors, i.e., a larger surface area of body yields more wool and is positively associated with larger body weights. On this basis, one would expect that selection for either wool or body weight would tend to also increase the other parameter. Elliott et al. (1979b) also found a significant positive phenotypic correlation between weaning weight and yearling fleece weight.

Numerous studies testing the feasibility of selection based upon weaning weight are available. However, with regard to selection based upon adjusted pounds of lamb at 120 days per ewe (selection based on ewe productivity rather than lamb performance), no similar study can be found in published literature.

Selection based upon visual appraisal has been the method of animal husbandmen since wild animals were domesticated and in this study, served as the basis for comparison.

The objective of this study was to determine the rate of change in production of wool and 120 day lamb production when these factors are selected as single traits and pressure applied only to the ewe flock.

Experimental Procedure

The Hettinger Experiment Station purebred Columbia flock of 90 ewes was randomly divided into three equal groups in the fall of 1966. Three registered Columbia rams were exposed to ten ewes of each flock yearly. In this manner, the influence of each ram was distributed uniformly across the ewe groups. Rams were selected on visual appraisal and their selection was intended to be such that their influence in any genetic progress would be nil. Subsequently, ewes were culled each fall on the following basis: 1) age; 2) ill health, spoiled udder, other mechanical or phycial reasons; 3) Flock A (Group One) - low lamb production; Flock B (Group Two) - general type (visual selection); Flock C (Group Three) - low fleece production.

Approximately eight ewes (25% replacement) were selected each fall. Replacement selection was on the following basis:

Group one - (Lamb production) - Physically sound yearling ewes with preference given to ewe lambs born twin and from ewes with the greatest 120 day corrected production for that year.

Group two - (Visual selection) - Ewe lambs showing the most desirable Columbia breed type as suggested by the Columbia Sheep Breeders Association of America.

Group three - (Fleece production) - Physically sound ewes which show the heaviest fleece at first shearing.

Data on 13 ewe and eight lamb parameters were collected by the Hettinger Experiment Station personnel. These parameters for the ewes were: 1) pasture weight (PW); 2) breeding weight (BW); 3) shorn weight (SW); 4) weaning weight (WeW); 5) fleece weight (FW); 6) fleece length (FL); 7) fleece grade (FG); 8) birth type of ewe (BT); 9) dam age (A); 10) unadjusted weaning weight per ewe (UW/E); 11) weaning weight adjusted for age in days only per ewe (AAW/E); 12) adjusted weaning weight per ewe (AW/E); and 13) pounds lamb born per ewe (LB/E).

For the lambs the parameters were: 1) sex (s); 2) birth weight (LBW); 3) unadjusted weaning weight (LUW); 4) weaning weight adjusted for age in days only (LAAW); 5) adjusted weaning weight (LAW); 6) age (LA); 7) birth type (LBT); and 8) raised code (RC).

The Lamb Index Calculator suggested by the American Hampshire Sheep Association was used to adjust weaning weights of all lambs. Adjustment was for age of dam, birth type, raised code, sex of lamb and age in days of lamb.

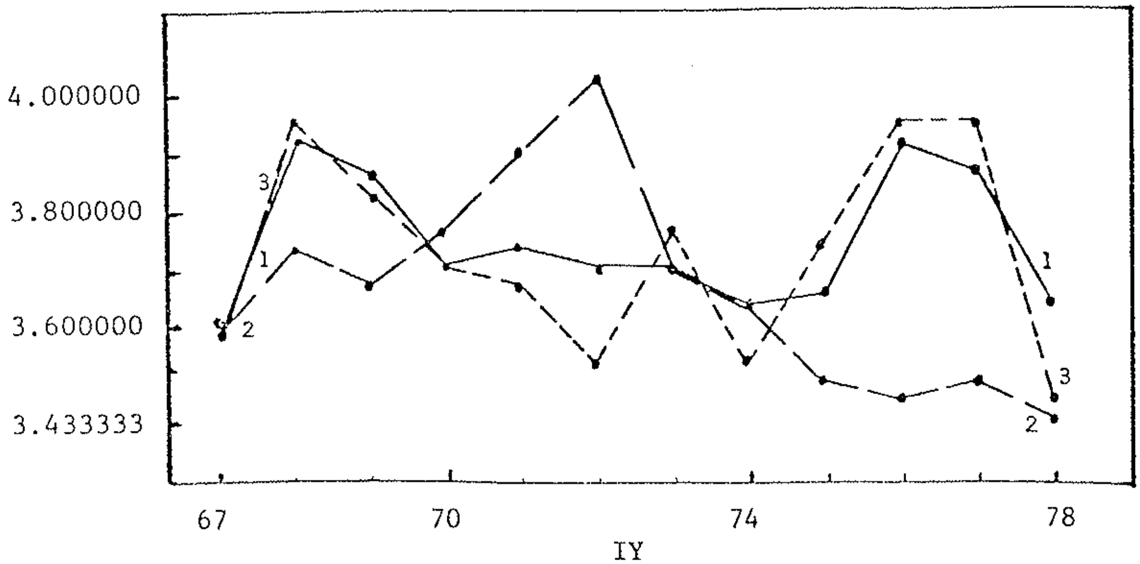
Data were analyzed by the Statistical Analysis System of Barr and Goodnight. Plots of the within year means for the three groups were developed. A one-way analysis of variance and an accompanying Duncan's New Multiple Range Test were conducted within each of the 11 years for each variable. Duncan's New Multiple Range Test indicated no significant difference between the groups at the beginning of the study in 1967.

In 1972 and 1973 two rams from within the experiment were chosen as replacement sires. Ram HES1 produced offspring in 1973 and 1974 and ram HES2 produced offspring in 1974 and 1975. Both rams were selected from the visual group. All offspring and subsequent descendants of these two rams in groups one and three were removed from consideration in the data analysis. The two rams were from the visual group and any unique genetic material which may have evolved within that group could have been transferred to the other two groups through use of these rams. The loss of approximately one-third of the observations in 1973, two-thirds of the observations in 1974 and one-third in 1975 coupled with the removal of of descendents of these two rams, limited the numbers in subsequent years. In some instances, the differences among the within year means of the three groups may be due to small sample sizes rather than true differences.

Results and Discussion

The plots of within year means of the three groups for ten variables are in figures 1 through 10. Each figure is discussed separately.

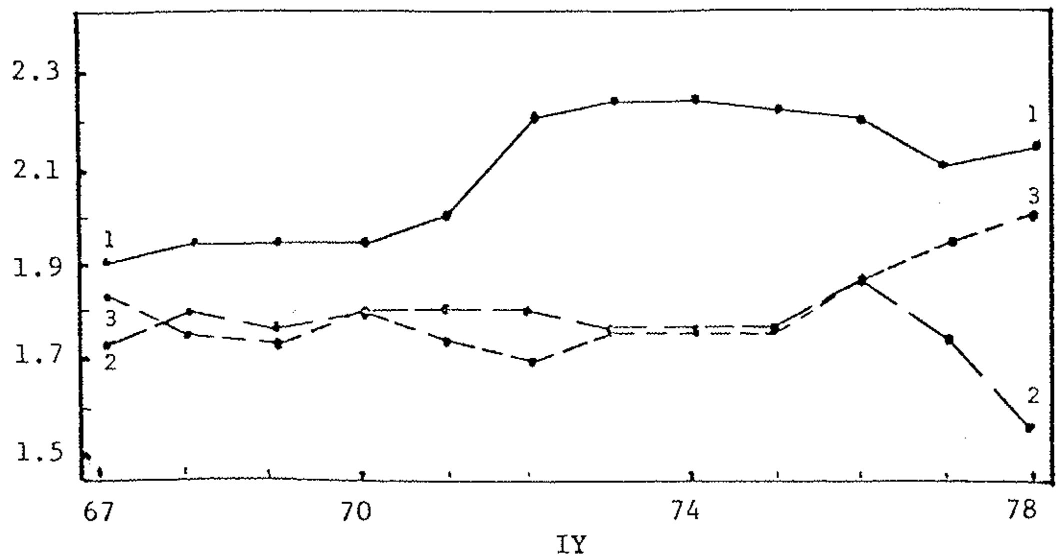
FIGURE 1. DAM AGE



1 ——— = Group 1
2 — — = Group 2
3 ---- = Group 3

In accordance with the project proposal in this study, age becomes a measure of soundness. Ewes were customarily culled on an age basis unless some physical deficiency showed up prior to their sixth year. The values for age represented by figure 1 reflect the degree to which young ewes were culled. If a disproportionate number of young ewes were removed, the average age would increase dramatically. The reverse would be true if only old ewes were culled. For example, in group three in 1978, five of the eight ewes removed were coming six-year-olds. Thus, the sharp drop in the average age.

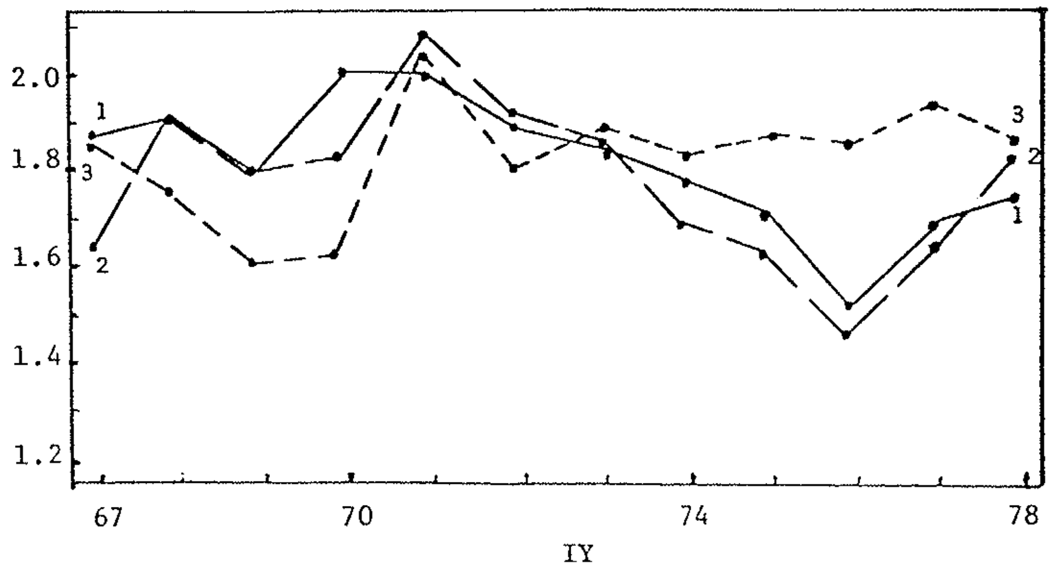
FIGURE 2. BIRTH TYPE OF EWES LAMBING



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

Selection within group one favored retention of ewe lambs born twin. Thus, one would expect this group to show a higher proportion of twin born ewes. The selection within group two was for appearance and it would be expected that singles would look better than multiple births.

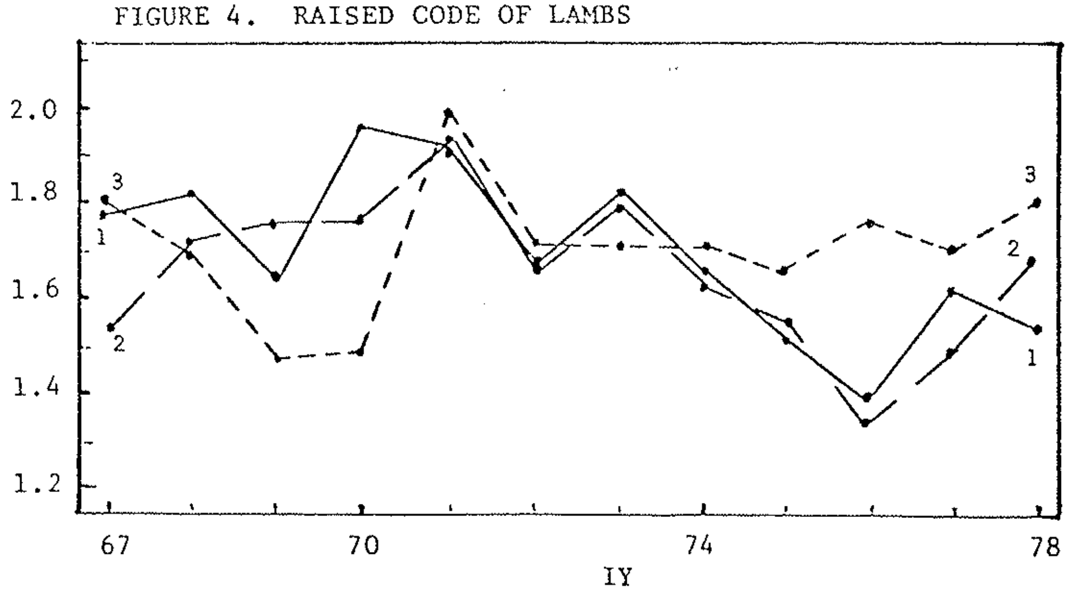
FIGURE 3. BIRTH TYPE OF LAMBS BORN



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

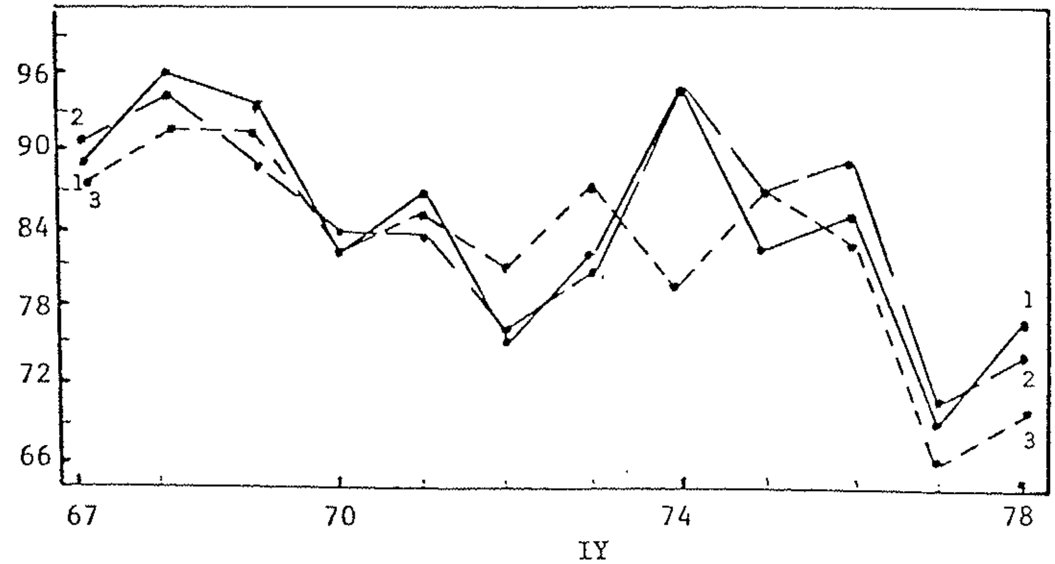
Comparing birth type of ewes with birth type of lambs it is apparent that while selection within group one has favored multiple births, these ewes apparently produce no more multiple births than do the other two groups. Conversely, visual selection of ewe replacements in group two appears to have favored singles, yet as many twins are born in that group as in one. The most consistent item in figures 3 and 4 (raised code) is the tendency for groups one and two to vary together while three is different. This is somewhat different than would be expected based on the birth type of the ewes where until 1976 groups two and three seemed to vary together.

FIGURE 4. RAISED CODE OF LAMBS



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

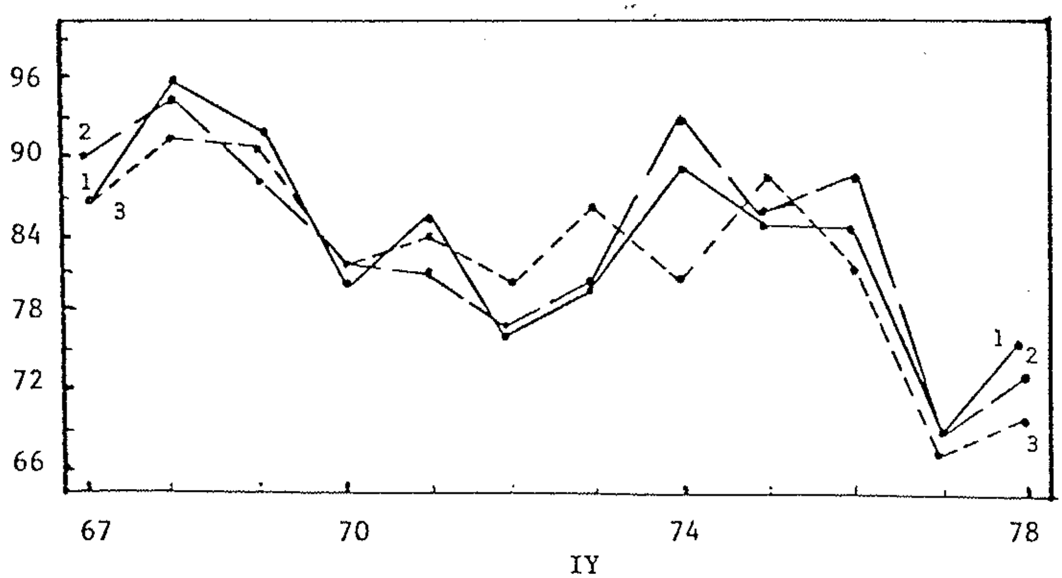
FIGURE 5. ADJUSTED WEANED POUNDS OF LAMB PER EWE



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

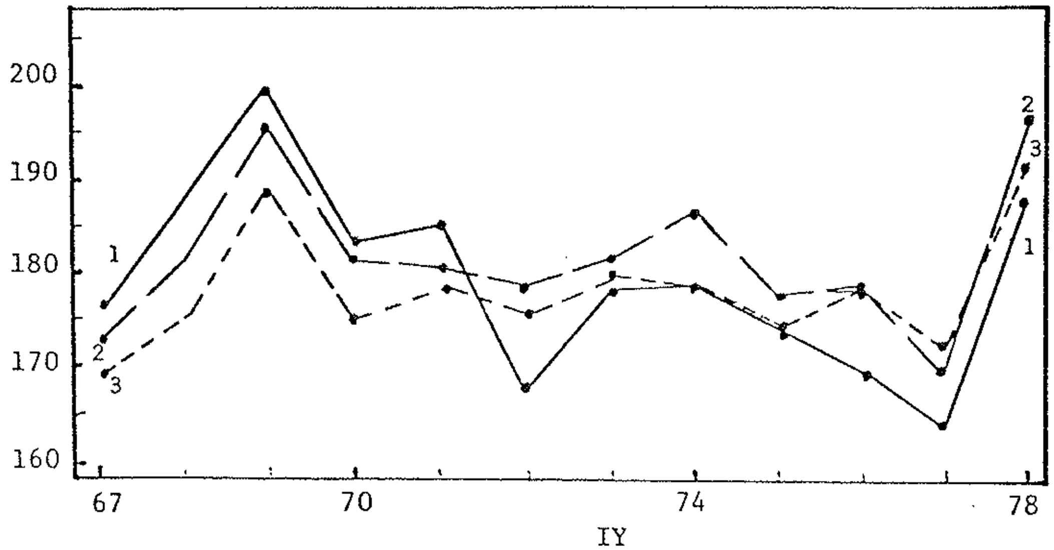
The dramatic decline in adjusted weaning weight, whether expressed as lamb production per ewe or as lamb data, in 1972, 1977 and 1978 can largely be attributed to extremely severe late winter and spring weather. Both 1976-77 and 1977-78 winters were notable for extended periods of extreme cold with relatively high snowfall and high wind. Livestock losses were commonplace throughout southwestern North Dakota. This effect is most notable in the decline from 1976-77. The 1978 data shows a slight recovery.

FIGURE 6. ADJUSTED WEANING WEIGHT OF LAMBS



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

FIGURE 7. EWE SHORN WEIGHT (PRELAMBING)



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

The plot of shorn weight data shows a general decline in weight from 1969 through 1977. Extremely severe weather in 1977 may have adversely affected the ewe weight between 1976 and 1978. The better winter conditions of 1978 may be the reason behind the dramatic increase in average shorn weight for all three groups.

The mature weight of the ewes, irregardless of the group, generally show a response similar to the lamb weaning weight data. While there are differences between groups in some years, it is only 1978 that a significant difference between groups was detected by Duncan's New Multiple Range Test. This suggests the following possible conclusions:

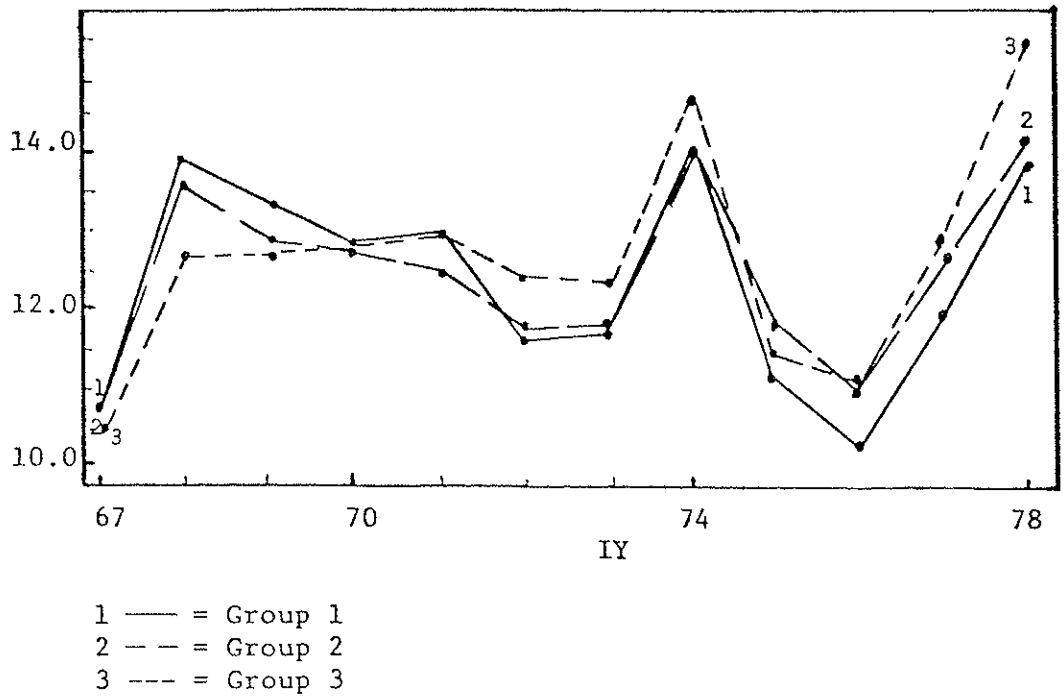
1. Selection for growth criteria, as reflected either by mature ewe weight or lamb weaning weight, based on pressure to the ewe flock was ineffective.

2. The lack of difference between groups, although only group one selection was on a strict weight parameter, suggests that all three selection schemes include weight or growth in their composition. This is in agreement with Elliott *et al.* (1979) who found a significant phenotypic positive correlation between yearling weight and grease fleece weight.

3. No attempt has been made to correct for ram (sire) differences. Chance selection of a superior or inferior sire could grossly affect the data with numbers of observations no larger than are present in this study.

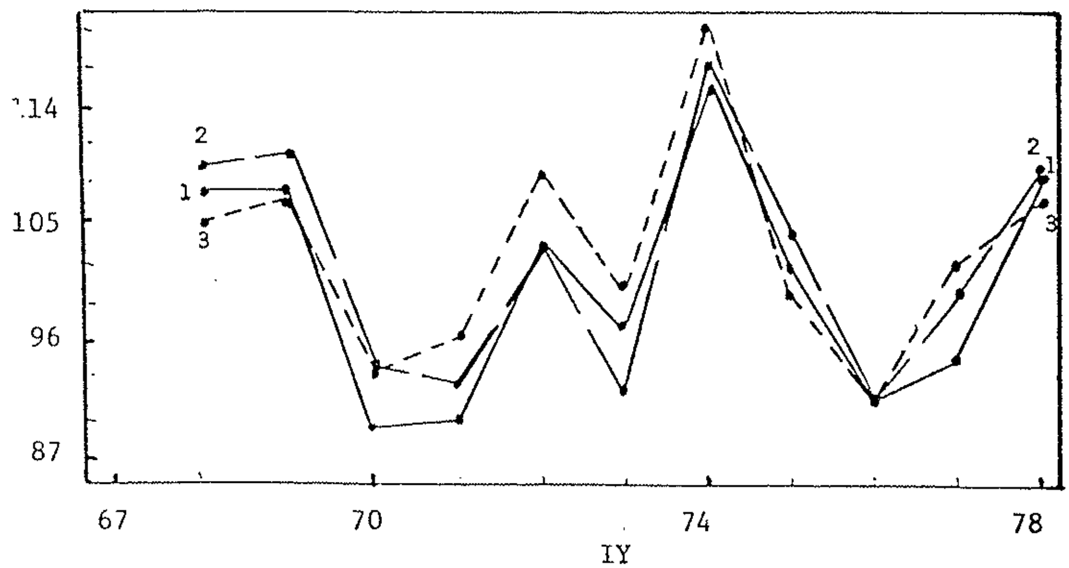
4. Differences due to the environmental factors which cannot be controlled or accounted for may be more significant than selection.

FIGURE 8. FLEECE WEIGHT OF EWES LAMBING



It appears that selection for fleece weight was more successful than selection for body weight. Although drastic reduction in fleece weight occurred between 1974 and 1976, only in group one of 1976 was the mean fleece weight lower than the mean weight at the inception of the experiment in 1967. If selection were to be considered totally successful, group three should have moved away from the other groups in a more consistent and convincing manner. Although some variability in trends for fleece selection is evident from figure 8, the 1978 means are considerably higher than at the inception of the study. To use two group means in any study as the denominator or numerator for a ratio to measure progress may be questionable. For such a measure to be a legitimate measure of true progress a smooth plot of means data would be required. While figure 8 certainly does not represent a "smooth plot", if the 1967 group means serve as the denominator and the 1978 group means as the numerator, an expression of "current" progress can be calculated. On this basis group one showed a 30% increase, group two a 33% increase and group three a 51% increase. In only three of the 11 completed years of selection did the Duncan New Multiple Range Test show the group means to be different. In 1968 group one was significantly higher than group three. In 1972 group three was significantly higher than either group one or two. In 1978 there was a significant difference between groups one and three.

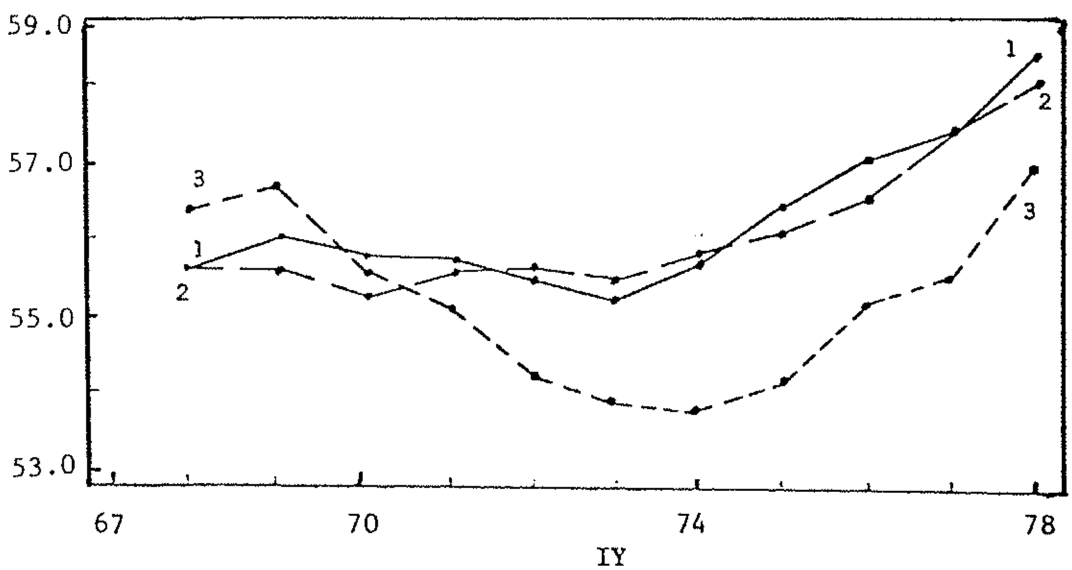
FIGURE 9. FLEECE LENGTH OF EWES LAMBING



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

Elliott *et al.* (1979b) showed a positive genetic and phenotypic correlation between fleece weight and staple length. A high phenotypic correlation is certainly evident when comparing figures 8 and 9.

FIGURE 10. FLEECE GRADE OF EWES LAMBING



1 —— = Group 1
2 — — = Group 2
3 --- = Group 3

Grade was determined by spin count and it can be seen that group three shows the coarsest fleece. This is in agreement with others (Turner *et al.*, 1970; Barlow, 1974; Elliott *et al.*, 1979b) who showed that selection for heavier fleece weight is likely to lead to coarser wool.

Literature Cited

Barlow, R. 1974. Selection for clean fleece weight in Merino sheep. II. Correlated responses to selection. Austral. J. Agric. Res. 25:973-94.

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Gartner, R., von Ungern-Stenberg. 1938. Correlation of the most important performance characters in the Mutton Merino. Ani. Breeding Abstr. 6:110-11 (abstract)

Terrill, G. C. 1939. Selection of range Rambouillet ewes. Proc. Am. Soc. Anim. Prod. 32:333-40

Turner, H. N., M. G. Brooker, and C. H. S. Dolling. 1970. Response to selection in Australian Merino sheep. III. Single character selection for high and low values of wool weight and its components. Austral. J. Agric. Res. 21:955-84.

Wolf, G. 1951. Can conclusions be drawn about average lifetime wool yield from the yearling wool yield in Bavarian Merino-land sheep? Ani. Breeding Abstr. 19:353.

Young, S. S. Y., H. N. Turner, and C. H. S. Dolling. 1960. Comparison of estimates of repeatability and heritability for some production traits in Merino rams and ewes. I. Repeatability. Austral. J. Agric. Res. 11:257.75.

SELF-FEEDING STRAW IN RATIONS FOR GESTATING EWES

M. R. Light and T. C. Faller

Summary

This study reports the results of self-feeding straw with alfalfa hay at levels of 0, 20, 40 and 60 percent until six weeks prior to lambing. There was a significant reduction in weight gains from years 1977 to 1978. Lamb survival between groups varied from 79 percent to 75 percent in 1979. Percent ewes lambing in 1979 were 93.9, 93.9, 81.8 and 82.4 for lots consuming, 0, 20, 40 and 60 percent straw. Average number of lambs dropped per ewe exposed in 1979 were 1.42, 1.54. 1.27, and 1.29 for those lots consuming 0, 20, 40 and 60 percent wheat straw. The use of straw at levels of 40 and 60 percent significantly decreased lambing rates and increased the percent of barren ewes.

Introduction

Self-feeding sheep is a management technique that can substantially reduce daily labor requirements for the ewe flock. This experiment was designed to study the feasibility of utilizing straw in rations for self-fed ewes during the interval from breeding until 4-6 weeks prior to lambing. Straw is an abundant and inexpensive roughage source, its successful incorporation into self-fed roughage rations could materially reduce feeding and labor costs during certain periods of the sheep management year.

Experimental Procedure

At the Hettinger Branch Experiment Station one hundred and thirty-three Suffolk ewes were assigned to a completely randomized design experiment on the basis of age, weight and condition. Ewes were placed in four replicated lots and were self-fed rations containing 0, 20, 40 and 60 percent wheat straw for a period of 59 days post-breeding. All ewes were weighed and scored for condition. During the last six weeks of gestation, all ewes were self-fed a ration that more than met minimal NRC requirements.

Body scores for condition indicate the amount of fat over the rib. A condition score of 1 indicates less than .1 inch of fat or an emaciated ewe and a score of 6 would indicate more than .4 inches of fat or a very fat ewe.

Results and Discussion

Condition scores, feed consumption, feed analyses, body weight changes, and lamb production and survival are presented in tables 1 through 5.

The condition scores for all ewes in all years have ranged from medium plus to thin plus at the conclusion of the 1977, 1978, and 1979 seasons. These condition scores reflect a slightly less than desired state of condition. In each of the years there was an increase in body fat in those groups consuming 100 percent ground alfalfa rations. Contrary to the 1977 results those ewes consuming straw at the 20 percent level in 1978 lost body fat. Although ewes that were fed no straw and 20 percent straw gained weight, the weight gains were very slight and below what would be considered minimal. All lots consuming more than 20 percent straw lost weight during the 59-day feeding period in 1978, however, all lots gained weight in 1979.

Feed consumption was lower in 1978 than in 1977 and 1979. The lowered consumption can be explained by the quality of the roughage offered. Alfalfa hay which was used during the first half of the 1978 feeding period was very low in quality containing 10.8 percent protein and 39.3 percent fiber and compared to 17.1 percent protein and 27.9 percent fiber in 1977 and 14.5 percent protein and 32.1 percent fiber in 1979. These observations reinforce the statement that if straw is to be used as a portion of the ration then the alfalfa must be good quality. Climatic conditions would appear to greatly influence the performance of ewes when self-fed high fiber rations. Weather conditions during the course of the trial would be termed to be near average in 1977 much below average in 1978 and above average in 1979.

Lamb production and survival are presented in table 5. There was an increase in lambs born per ewe exposed in 1979 in all lots as compared to the 1978 lambing drop. The survival of lambs showed little difference between 1979 and 1978. The reasons for the poor lamb survival is unexplained but may be due in part to the genetic makeup of the flock (inbred). The percent lambs born decreased significantly when straw is included at levels of more than 20 percent. The percent of dry ewes increased when more than 20 percent straw is included in rations. There appears to be embryonic death losses occuring when straw is included at levels of more than 20 percent.

TABLE 1. EWE CONDITION SCORES

Groups	% Straw	Initial Score			Final Score		
		1977	1978	1979	1977	1978	1979
1 + 5	0	3.3	2.78	3.3	3.7	3.16	3.6
2 + 6	20	3.3	2.78	3.2	3.3	2.66	3.6
3 + 7	40	3.3	2.79	3.2	3.0	2.39	3.4
4 + 8	60	3.4	2.85	3.2	2.8	2.28	3.0

TABLE 2. FEED CONSUMPTION

Pen	Ration (% Straw)	Straw per head/day (lb)			Alfalfa per head/ day (lb)			Feed per head/ day (lb)		
		1977	1978	1979	1977	1978	1979	1977	1978	1979
1	0	0	0	0	6.58	5.62	6.43	6.58	5.62	6.43
2	20	1.27	1.15	1.39	5.07	4.58	5.58	6.34	5.73	6.97
3	40	2.20	2.01	2.70	3.29	3.02	4.05	5.49	5.03	6.75
4	60	2.72	2.81	3.64	1.81	1.88	2.42	4.53	4.69	6.06
5	0	0	0	0	7.13	6.11	6.72	7.13	6.11	6.72
6	20	1.26	1.03	1.33	5.02	4.11	5.32	6.28	5.14	6.65
7	40	2.43	1.86	2.61	3.65	2.80	3.92	6.08	4.66	6.53
8	60	3.03	2.51	3.37	2.01	.167	2.24	5.04	4.18	5.61
1 + 5	0	0	0	0	6.85	5.86	6.58	6.85	5.86	6.58
2 + 6	20	1.26	1.09	1.36	5.05	5.45	4.45	6.31	5.44	6.81
3 + 7	40	2.31	1.94	2.66	3.47	2.91	3.99	5.78	4.85	6.65
4 + 8	60	2.87	2.66	3.51	1.91	1.78	2.34	4.79	4.44	5.85

TABLE 3. FEED COSTS

Pen	Ration % Straw	Cost*Per Head/day Dollars 1977	1978	1979	3 year Average
1	0	.164	.141	.161	.156
2	20	.146	.132	.160	.146
3	40	.125	.106	.142	.124
4	60	.086	.090	.115	.097
5	0	.178	.153	.168	.166
6	20	.144	.118	.153	.138
7	40	.129	.098	.137	.121
8	60	.096	.080	.107	.094
1 + 5	0	.171	.147	.165	.161
2 + 6	20	.145	.128	.156	.143
3 + 7	40	.121	.102	.140	.121
4 + 8	60	.098	.084	.111	.098

*Costs are computed on the basis of $50/T alfalfa and $30/T straw

TABLE 4. FEED ANALYSES

Ration Description	Matter (%)			Fiber (%)			Protein (%)		
	1977	1978a*	1978b*	1977	1978a*	1978b*	1977	1978a*	1978b*
0% Straw	84.4	84.7	89.3	27.9	33.7	39.3	17.09	16.4	10.8
20% Straw	84.6	86.0	87.6	28.1	31.8	43.5	15.81	14.3	9.0
40% Straw	83.2	87.5	86.7	32.9	38.6	44.0	12.58	11.9	8.9
60% Straw	85.9	87.5	89.4	35.7	43.4	47.2	10.69	9.4	8.2

* 1978a - fed during last 30 days of trial; 1978b - fed first 30 days of trial.

TABLE 5. EWE WEIGHTS

Pen	Ration (%Straw)	Initial Wt. (lb.)			Final Wt. (lb.)			Days			Change (lb.)		
		1977	1978	1979	1977	1978	1979	1977	1978	1979	1977	1978	1979
1	0	149.8	159.7	141.2	172.2	167.1	160.4	59	59	59	+22.4	+7.4	19.2
2	20	149.1	156.9	140.1	167.0	161.9	155.6	59	59	59	+17.9	+5.0	15.5
3	40	147.8	156.8	142.9	151.7	153.5	160.1	59	59	59	+ 3.9	-3.3	17.2
4	60	148.7	156.7	140.9	143.9	148.8	153.8	59	59	59	- 4.8	-7.9	12.9
5	0	150.3	156.8	140.2	183.7	164.3	161.7	59	59	59	+33.4	+7.5	21.5
6	20	150.8	156.9	142.5	173.2	160.8	163.0	59	59	59	+22.4	+ 3.9	20.5
7	40	152.7	156.9	142.2	165.3	155.9	160.4	59	59	59	+12.8	- 1.0	18.2
8	60	151.9	156.6	140.7	159.4	144.8	150.6	59	59	59	+ 7.6	-11.8	9.9
1 + 5	0	150.3	158.2	140.7	178.0	165.7	161.1	59	59	59	+27.9	+ 7.5	20.4
2 + 6	20	149.9	156.9	141.3	170.0	161.4	159.3	59	59	59	+20.1	+ 4.5	18.0
3 + 7	40	150.2	156.9	142.6	158.4	154.7	160.3	59	59	59	+ 8.2	- 2.2	17.7
4 + 8	60	150.3	156.7	140.5	151.4	146.8	152.2	59	59	59	+ .9	- 9.9	11.7

TABLE 6. LAMB PRODUCTION AND SURVIVAL

	1 Alfalfa		2 20% Straw		3 40% Straw		4 60% Straw	
	1978	1979	1978	1979	1978	1979	1978	1979
No. Ewes	35	33	35	33	35	33	34	34
No. Lambed	31	31	32	31	29	27	29	28
% Dry	11.4	6.1	8.6	6.1	17.1	18.2	14.7	17.6
Lambs	44	47	48	51	41	42	41	44
% Born	126	142	137	154.5	117	127.2	121	129.4
Lambs weaned	33	36	30	37	31	33	29	33
% Weaned	94.3	109.1	85.7	112.1	88.6	100	85.3	97.1
Ewes died	1		2		2		0	
% survival	75.0	76.6	62.5	72.5	75.6	78.6	70.7	75.0

SUNFLOWER MEAL FOR FINISHING LAMBS

D. O. Erickson, M. R. Light, M. Hankel,
W. Limesand and T. Faller

Summary

Three experiments were conducted to compare sunflower meal (SFM) to soybean meal (SBM) fed with corn, oats, and corn/oat rations for growing-finishing lambs. Equal quantities of alfalfa hay and straw were included in each of the rations. Rations were balanced to contain 72% TDN and analyzed to contain 15 to 16% protein (100% dry basis) and about 20% fiber. Lambs were fed pelleted rations in the two experiments at Fargo and ground rations at Hettinger. Statistical measures have not been applied to these data but it appears that there will be no real differences among the comparisons in terms of lamb gains or feed efficiencies. The SFM used in these experiments was the crushed whole seed containing 28% protein; therefore; more SFM supplement must be used to produce a ration of equal protein level. It is predicted by the SFM processors that a 38% protein SFM will be the product most available in the near future. The 38% protein SFM would be more comparable on a weight basis in feed value both on a protein and energy basis to SBM.

Introduction

In the near future a number of sunflower processing plants will be operating in North Dakota because the state ranks number one in the production of sunflowers. The major livestock industry in the state if based on ruminants. Many of the common feedstuffs fed will not meet the protein requirements, therefore, a protein supplement is needed. This protein need has been largely filled in the past by SBM and urea. Sunflower meal will soon be available in large quantities, therefore, it is important to determine its comparative value to SBM fed along with various feeds commonly fed to ruminants.

Experimental Procedure

Three experiments using growing-finishing lambs were conducted to evaluate the feeding value of SFM with corn and with corn and oats as compared to SBM. The six rations compared are shown in table 1 and the nutritional compositions are shown in tables,2, 3, and 4. Rations were pelleted for the lambs in the two experiments at the Main Station (Fargo) and ground for the lambs at Hettinger. Rations were fed free choice two times daily and feed intake was recorded by lot. All the lambs had Enterotoxemia toxoid shots. The lambs at the Research Center were of three breeds (Suffolk, Hampshire, and Columbia) and put on experiment in two groups averaging 69 pounds and 52 pounds, respectively. Lambs were allotted by breed, weight and sex with 14 in each lot. At the Sheep Barn (Fargo) crossbred and straightbred lambs of both whiteface (Cheviot, Border Leicester, and Columbia) and darkface (Suffolk and Hampshire) breeding were allotted by breed, weight and sex and put on experiment at an average weight of 54 pounds. There were 16 lambs per pen. The lambs at Hettinger were straightbred Suffolks weighing an average of 53 pounds and were allotted 17 per pen by weight and sex. All six rations were fed at each of the three locations. The lambs in all trials were weighed every two weeks and taken off experiment when they were between 100 and 110 pounds.

Results and Discussion

The performance of the lambs in all treatments at each location was excellent and especially high at the Research Center at the Main Station in Fargo. These lambs gained an average of a pound a day on just over four pounds of feed. A comparison of SBM vs SFM vs SBM/SFM from all experiments shows gains of .78, .79, and .79 per day, respectively, and efficiencies of 5.18, 5.50, and 5.07, respectively. A comparison of corn vs corn/oats from all experiments shows gains of .80 and .76 and efficiencies of 5.27 and 5.25, respectively. These results indicate very little differences in lamb performance with regard to SBM or SFM or combinations of corn or corn/oats as the grain. The choices as to what feedstuffs to use would depend on price and availability. Additional experiments are planned using SFM with lambs on rations of varying protein levels, of other common feedstuffs, and of other protein supplements.

TABLE 1. RATION INGREDIENTS OF ALL THREE LAMB FEEDING EXPERIMENTS[a,b]

	% Feedstuff					
	Corn	Oats	SBM	SFM	Alfalfa	Oat Straw
1.	46.45		12.05		20.00	20.00
2.	48.29			24.50	12.85	12.85
3.	47.03		8.09	8.09	17.65	17.65
4.	29.67	29.67	8.57		15.30	15.30
5.	31.27	31.27		16.96	9.50	9.30
6.	30.14	30.14	5.72	5.72	13.40	13.40

[a] Pelleted for experiments at the Sheep Barn and Research Center (Fargo), ground for the experiment at Hettinger.

[b] All rations had 1% limestone, .5% TM salt and vitamins A, D, and E at levels above NRC requirements.

TABLE 2. NUTRITIONAL COMPOSITION OF RATIONS FED TO LAMBS AT THE RESEARCH CENTER (FARGO)

	Percent[a]						
Ration	Ash	Fiber[b]	Protein	TDN[c]	P	Ca	Mg
1	8.16	20.8	15.8	72.7	.305	.893	.205
2	7.25	21.5	15.8	72.6	.473	.827	.261
3	7.72	21.4	16.2	72.6	.376	.889	.230
4	7.30	19.9	15.1	72.7	.316	.829	.185
5	7.10	20.0	15.2	73.2	.411	.745	.227
6	7.30	19.8	15.2	72.9	.374	.789	.213

[a]100% dry basis

[b]Acid-detergent fiber.

[c]Calculated from NRC values.

TABLE 3. NUTRITIONAL COMPOSITION OF RATIONS FED TO LAMBS AT THE SHEEP BARN (FARGO)

	Percent[a]						
Ration	Ash	Fiber[b]	Protein	TDN[c]	P	Ca	Mg
L	8.80	20.8	16.2	72.7	.332	.877	.207
2	7.35	21.9	16.0	72.6	.458	.806	.265
3	8.01	20.9	16.1	72.7	.368	.881	.222
4	7.76	20.4	16.1	72.7	.328	.777	.188
5	6.73	20.9	16.0	72.9	.368	.723	.190

[a]100% dry basis.

[b]Acid-detergent fiber.

[c]Calculated from NRC values.

TABLE 4. NUTRITIONAL COMPOSITION OF RATIONS FED TO LAMBS AT HETTINGER

	Percent[a]						
Ration	Ash	Fiber[b]	Protein	TDN[c]	P	Ca	Mg
1	8.80	22.1	17.7	72.7	.312	1.122	.275
2	8.04	23.7	17.7	72.6	.463	1.048	.360
3	8.33	23.4	17.3	72.6	.379	1.065	.312
4	8.40	20.1	16.8	72.7	.330	1.051	.251
5	7.81	20.3	16.7	73.2	.443	1.006	.307
6	8.19	21.1	16.4	72.9	.367	1.009	.275

[a]100% dry basis

[b]Acid-detergent fiber.

[c]Calculated from NRC values.

TABLE 5. GAINS AND EFFICIENCY OF ALL THREE LAMB FEEDING EXPERIMENTS

	Location					
	Research Center		Sheep Barn		Hettinger	
Ration	Gain	Eff.	Gain	Eff.	Gain	Eff.
C-SBM	1.10	4.09	.65	5.60	.60	6.48
C-SFM	1.04	4.36	.68	5.56	.67	6.14
C SBM/SFM	1.11	3.95	.68	5.60	.67	5.53
C/O-SBM	.98	4.21	.67	5.40	.67	5.30
C/O-SFM	.92	4.43	.61	5.65	.64	6.85
C/O-SBM/SFM	.97	4.17	.65	5.64	.69	5.56
No. lambs/lot	14		16		17	

TABLE 6. COMBINED GAIN AND EFFICIENCIES

	Comparisons				
	SBM	SFM	SBM/SFM	Corn	Corn/oats
Daily Gain	.78	.79	.79	.80	.76
Feed Efficiency	5.18	5.50	5.07	5.27	5.25

PROJECT: 6261

TITLE: Productivity of Western Whitefaced Ewes Under North Dakota Conditions.

PERSONNEL: Timothy C. Faller

SPECIFIC PROBLEM AREA 310

OBJECTIVE:

Evaluate the profitability of aged western ewes under North Dakota conditions.

PROCEDURE:

100 western ewes were purchased in August 1977 and bred to lamb during March. Records will be kept concerning expenses and income originalism from these ewes. The ewes will be used until they are deemed unproductive and will then be sold to slaughter. Complete records will be kept concerning all problems associated with lamb production from aged ewes: including health, milk production, weights, etc.

1978 REPORT

No. ewes purchased	100	
No. ewes lambing	89	
Lambs born	119	
% lambs born per ewe bred	119	
% lambs born per ewe lambing	133.7	
Lambs weaned	96	
% lambs weaned per ewe bred	96	
% lambs weaned per ewe lambing	107.9	
Ave. wool production per ewe purchased	9.5#	
No. ewes died August 20, 1977 to June 1, 1978	7	
No. ewes died June 1, 1978 to present	6	
No. ewes culled and send to market as unproductive	22	
No. ewes bred to lamb in 1979	65	
Original purchase price of ewes	2,000.00	
Trucking	165.00	
Ewe feed from Aug. 20, 1977 to August, 1978	3,000.00	
Lamb feed to finish lambs to market	1,200.00	
	6,365.00	Expenses

INCOME:

Sale of 96 lambs at 100# and 65¢/lb.	6,240.00
Sale of ewes culled	792.00
Sale of Wool 950# x .99	940.50
	7.972.50

Returns above purchase price, trucking and feed $1,607.50

1979 REPORT

No. ewes bred lamb 1979	65
No. ewes lambing	60
Lambs Born	84
% Born per ewe bred	129
% Born per ewe lambing	140
*Lambs Weaned	70
% Lambs weaned per ewe bred	108
% Lambs weaned per ewe lambing	117
Ave. wool production 7 months fleece	6.6#
No. ewes died Aug. 1, 1978 to July 1, 1979	8
No. ewes culled and sent to market as unproductive July 1, 1979	23
No. ewes bred to lamb in 1980	34

EXPENSES

Ewe feed - Aug. 1, 1978 to July 1, 1979	1,787.50
Lambs fed to finish lambs to market	780.00
Shearing - 60 x 1.10	66.00
	2,633.50

INCOME

Sale of 60 lambs at 103# at 64¢/lb.	3,955.20
Sale of ewes culled	667.00
Sale of wool 384# x 1.11	426.24
	$5,048.44
1979 returns over direct costs	2,114.94

Note: This is not replicated research, only a cost accounting.

POINTS TO CONSIDER

1. This is not based on statistically proven replicated research, it is only a cost accounting.

2. Feed costs represent costs for feed actually fed to the ewes and lambs. Hay was based on $50./T and grain at $82./T/

3. Wool sales represent total wool marketed. The 6.6# shearing average only represents a seven months fleece growth during 1979.

4. 34 ewes remained productive for a third lambing.

5. The price of aged western ewes has risen from origination of this study to presently 60 dollars per head or even higher depending on the quality and time of purchase.

6. No attempt was made to evaluate labor, veterinarian costs, buildings, depreciation, etc.

Summary

The ewes in this accounting were bred for use in other research projects and this cost accounting results from numerous requests on what income and productivity you could expect from aged western ewes. 2200 ewes from the same area of Wyoming were imported to North Dakota and the 100 ewes delivered to the Hettinger Station represent a sample of this group of ewes.

The ewes had short ground off teeth and were able to graze adequately if grass conditions were good. They were fed and maintained similar to the rest of the ewes at the Hettinger Station. They were shorn in May prior to purchase and again in May for wool production information, and then resheared in January prior to their second lambing in 1979. The ewes were traditional May lambers in Wyoming and this may have contributed to the lowered fertility as 11% remained open. The severity of the winter of 1977-78 affected lamb survival. The ewes had adequate milk production, lambed easily and the lambs born were vigorous. Anyone purchasing ewes of this type should consider treating the ewes for internal and external parasites on arrival.

It would appear that present high prices of aged western ewes may be uneconomical and that producers wishing to purchase ewes should consider young ewes or the purchase of double the number of ewe lambs that you wish to lamb in August and September at approximately 80# and breeding them with the thought that approximately 50% will breed, and the balance can either be sold for fat lambs or as yearling ewes the following fall.

SECTION II

Reports of

Sheep Research in Progress

At the

Main Station, Fargo, N. D.

Presented by

Merle R. Light

at the

21st Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

February 13, 1980

THE ESTABLISHMENT OF OVINE PROGRESSIVE PNEUMONIA (LUNGERS) FREE SHEEP FROM INFECTED HERDS

M. R. Light[1], I. A. Schipper[2], T. W. Molitor[2], J. E. Tilton[1], and W. D. Slanger[1]

Progressive pneumonia is a chronic disease of adult sheep that can cause serious economic losses in affected sheep flocks. The clinical symptoms of OPP include a slow progressive weight loss, physical weakness, a lack of fever, increasing severe respiratory distress with a chronic cough and labored breathing and ultimately death (Siggurdsson et al., 1952; Ressang et al., 1968).

The incidence of ovine progressive pneumonia was first described by Marsh (1923) who reported that 1 to 2 percent of sheep in affected Montana range flocks developed the disease. Since that time, affected individuals have been reported throughout world sheep producing areas including South Africa, Britain, France, Germany, India and America (Palsson, 1976). Cutlip et al. (1977b) surveyed cull slaughter ewes and reported up to 68 percent of old ewes were infected with OPP. Gates et al. (1978) after testing blood sera from Idaho range sheep reported an incidence of 58 percent in all ages to 90 percent of cull ewes had been infected. Light and Schipper (1979) surveyed seven North Dakota flocks and demonstrated through blood sera analyses that all had been infected. Incidence of infection ranged from 18 to 85 percent. Published reports concerning chronic progressive pneumonia together with personal communication to the author from pure breeders throughout the United States lead to the specualtion that chronic progressive pneumonia (lungers) is endemic within sheep flocks in the United States.

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[1] Department of Animal Science.

[2] Department of Veterinary Science

The North Dakota Agricultural Experiment Station imported 26 Border Leicester ewes from Canada in 1970-71 and purchased a number of Columbia ewes from Colorado in 1971. These ewes were found to be highly susceptible to the ovine progressive pneumonia virus already present in the university flocks. In fact, the losses in these strains to OPP were greater than the female replacement stock raised. Because of the high incidence of OPP in these sheep and also the possibility that semi-confined enterprises might encounter similar problems, an experiment was initiated in 1974 to attempt the establishment of sheep flocks that were free of OPP.

Procedure

To establish OPP-free flocks of the Hampshire, Columbia, Suffolk and Border Leicester breeds, the following procedures described by Light et al. (1979) were utilized. (1) Lambs were immediately removed from dam at birth. Ewes were not allowed to lick or suckle lambs. All selected lambs were bottle fed within 4 hours of birth approximately 6 ounces of cows colostrum that had been collected, frozen and stored prior to the lambing season. (2) Each lamb was rountinely administered enterotoxemia antitoxin, sodium selenite and vitamins A, D, and E on day of birth. (3) Each lamb was administered C and D type enterotoxemia toxoid at 28 and 90 days of age. (4) All lambs were transferred within 18 hours from the premises where infected flocks were housed to experimental barns that were disinfected and had been free of sheep for six months and was located one-half mile from infected sheep. (5) All lambs were housed for a period of at least 30 days in an area where temperatures were maintained at 60-65°F. (6) Lambs were reared ion high protein, high fat lamb milk replacers plus suitable high protein (18%) and high energy lamb rations. All additions to the initial flock, either ewes or rams, have been made following the procedures described.

No unusual precautions have been made to restrict traffic by personnel from barns housing parental or experimental flocks, however, separate caretakers are assigned each unit.

Results

The present experimental flock of approximately 120 sheep (four breeds) has developed from the initial lambs raised according to the described procedures. Blood samples of all ewes are withdrawn via jugular puncture annually. Serum from the blood samples are analyzed for the presence of precipitating antibodies using the agar-gel immuno-diffusion technique described by Cutlip et al. (1977a) as modified by Molitor (1978). All sera samples collected from 1975 through 1979 have shown negative response with this test. Necropsy reports from all sheep deaths within this flock together with AGID test results indicate that the isolated flock has remained free of progressive pneumonia.

The procedure outlined appears to provide a method whereby sheepmen can establish sheep flocks free from progressive pneumonia. The immediate isolation and rearing of newborn lambs from infected parental stock may be a great help in preserving valuable bloodlines in pure breeds. The effects of OPP-free sheep upon total ewe productivity and lamb growth are now known at this time. Our observations are that they may be considerable and will be critically evaluated in future experiments.

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SHEEP PRODUCTION IN DRYLOT

Prior to making a decision to begin a sheep operation and especially a confinement operation whether partially or in total, there has to be reasons to justify the operation. In addition, there are pro's and con's of a confinement operation that must be examined.

JUSTIFICATION

Predatory animals, primarily the coyote, are increasing at a rapid rate in the state and as a result sheep numbers have suffered because of economic loss to producers. Lamb and wool are in demand at the present time. Lamb is currently being imported to meet United States' demands. The demand for wool as a natural fiber has increased. Increased production would decrease U.S. petrochemical depletion from production of synthetic fiber.

The national average lamb crop is approximately 90 lambs per 100 ewes and the potential is 200 plus lambs per 100 ewes under confinement. While North Dakota sheep numbers (198,000) declined from 1973-79, the number of ewe lambs held for replacement increased 12 percent, and number of sheep operators increased 5 percent to 2100 during 1978 and 2200 in 1979.

Inventory value of North Dakota Sheep flocks was estimated at 10.8 million dollars and 1979 income from sheep in North Dakota will be approximately 8.8 million dollars.

North Dakota farm land is more productive for sheep when feed is harvested and fed than when the animals are grazed on the land.

Many prospective farmers and ranchers are interested in the confinement of sheep as a diversification of existing farm units and other are interested in the concept as a new enterprise.

With present stock sheep numbers every additional 12% improvement in lamb crop generates 1 million dollars new wealth for the state of North Dakota.

PRO'S AND CON'S

Advantages of Confinement

1. Zero loss to predation
2. Lowered energy requirement of livestock
3. Reduction of parasite problems
4. Opportunity for optimum production
5. Extends the ewe's productive life span.

Disadvantages

1. Requires additional initial capital
2. Reduces opportunity to utilize submarginal lands
3. Superior management ability required.

"BREEDS IN CONFINEMENT"

Sheepmen who intensify management techniques will increasingly be interested in sheep breeds that will maximize the return per dollar invested in his sheep enterprise.

There are two broad categories of sheep being utilized in commercial sheep enterprises; they are the so called "ewe breeds" and sire breeds. Ewe breeds should be selected on the basis of (1) fertility (2) lamb survival (3) early puberty where ewe lamb replacements are being utilized in the breeding program, and (4) good wool production. Rams for use should be selected mainly on the rate of gain because of the fairly high heritability of this trait. High growth rates are also associated with reduced feed requirements per unit of gain.

It would appear that some form of crossing scheme must be used to attain maximum productivity in commercial ewe flocks. Sheepmen have long recognized the value of crossbreeding. The following tables will show the results a Canadian sheep farmer obtained using various crosses in his breeding program.

SECTION III

MANAGEMENT SECTION

Roger Haugen

Extension Livestock Specialist
North Dakota State University

Timothy C. Faller
Superintendent

21st Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

February 13, 1980

E W E   P R O L I F I C A C Y

Breed of Ewe	Ewe Lambing at Age	Ewes Lambing/ 100 Ewes Exposed One	Two	Three & Over
SUFFOLK		61	94	97
WESTERN*		42	95	96
SUFFOLK/WESTERN		64	96	97
FINN/WESTERN		94	98	98
FINN/SUFFOLK		96	97	99
FINN/DORSET		97	98	99
FINN		98	98	99

* Rambouillet and Columbia

E W E   P R O L I F I C A C Y

Breed of EWe	Ewe Lambing At Age	Lambing Rate/ Ewe Lambing One	Two	Three & Over
SUFFOLK		1.12	1.21	1.45
WESTERN*		1.06	1.26	1.40
SUFFOLK/WESTERN		1.14	1.30	1.52
FINN/WESTERN		1.73	2.16	2.27
FINN/SUFFOLK		1.86	2.11	2.33
FINN/DORSET		1.89	2.25	2.28
FINN		2.24	3.08	3.48

* Rambouillet and Columbia

The survival of lambs from birth to market is very important. There are some breed differences in survival of lambs. The survival rate of various breeds and crosses are given below..

L A M B   S U R V I V A L

Ewe Group		Single		Twin		Triplet		Quads	
	Days	2	90	2	90	2	90	2	90
SUFFOLK, WESTERNS, SUFFOLK/WESTERN		95	93	94	93	92	86	82	77
FINN CROSSES		96	96	95	93	95	92	86	80
FINNS		98	95	97	95	96	92	92	87
ORPHANS* (Artificial Milk Replacer)		98	95	98	94	97	94	94	90

* Excluding a group of orphan lambs that died due to faulty milk replacer (milk would not coagulate).

Since growth rate is an important factor in the production of sheep, I am including a table of growth rates attained by Ransom Sheep Enterprises at Biossevain, Manitoba. These growth rates should be attainable by most commercial sheepmen.

R A T E   O F   G A I N

Breed of Dam/Sire	Rate of Gain Per DAy			
	Males		Females	
Age (Days)	0 to 50	0 to 90	0 to 50	0 to 90
SUFFOLK/SUFFOLK	.80	.86	.72	.79
WESTERN/WESTERN	.68	.76	.56	.66
SUFFOLK-WESTERN/SUFF OR HAMP	.81	.85	.69	.80
FINN-WESTERN/SUFF OR HAMP	.76	.78	.62	.73
FINN-SUFFOLK/SUFF OR HAMP	.79	.90	.72	.84
FINN-DORSET/SUFF OR HAMP	.72	.83	.69	.77
FINN/SUFFOLK	.76	.80	.66	.72
FINN/FINN	.66	.74	.60	.70

Results of sheep experiments at NDSU closely follow the results shown in the previous tables except that our sheep gain slightly faster under our conditions. The lambing rates of various ewes at Hettinger are presented below.

CROSSBRED EWE PRODUCTIVITY, HETTINGER, 1973 - 76

EWE TYPE	LAMBS BORN/ EWE BRED	LAMBS WEANED EWE BRED
RAMBOUILLET X RAMBOUILLET	1.57	1.29
BORDER LEICESTER X RAMBOUILLET	1.86	1.57
N. C. CHEVIOT X RAMBOUILLET	1.58	1.25
FINN X RAMBOUILLET	1.90	1.71
COLUMBIA X COLUMBIA	1.63	1.30
BORDER LEICESTER X COLUMBIA	1.57	1.36
N. C. CHEVIOT X COLUMBIA	1.44	1.07
FINN X COLUMBIA	2.18	1.74

"NUTRITION"

Given a chance, a ewe will eat 3 times what she needs. Fat breeding sheep are just as uneconomical to keep as are malnourished animals. Maximum profit is only made from ewes which are in optimum condition.

Under confinement rearing, sheep are either a victim or beneficiary of whatev er feed the sheepman chooses to give. Although the sheep as a ruminant has comparatively simple nutritional requirement, no leeway is permitted the confined sheep to undo any nutritional mistake perpetrated against it. For this reason, the nutrition of sheep under confinement conditions must be done on a "required, needed, provided" basis. Sheep cannot be expected, in fact cannot, correct the nutritional mistakes made by man. Following is a list of the daily nutrient requirements of sheep.

DAILY NUTRIENT REQUIREMENTS - 150 LB. EWE

PRODUCTION STAGE	PROTEIN LB.	TDN LB.	CALCIUM GM	PHOSPHORUS GM	VITAMIN A I.U.
MAINTENANCE	.24	1.4	3.2	3.0	1200
1st 15 weeks GESTATION	.28	1.7	3.2	3.0	1800
LAST 4 - 6 WEEKS GESTATION	.43	2.7	4.5	4.3	6000
FIRST 8 WEEKS LACTATION	.57	3.6	12.0	8.6	6000

DAILY NUTRIENT REQUIREMENTS

	PROTEIN LB.	TDN LB.	CALCIUM GM	PHOSPHORUS GM	VITAMIN A I.U.
REPLACEMENT EWE LAMBS	.29	1.8	6.3	3.5	2100
RAMS	.55	3.4	8.3	4.6	4200
EARLY WEANED LAMBS (40 - 50 Days)	.3 - .4	.6 - .9	3 - 4	2 - 3	2 - 3000
FINISHING LAMBS	.4	2.5	5	3.1	1020

The nutrient requirements of a ewe during the maintenance and the first 15 weeks of gestation are very similar. Under controlled feeding as in the case in confinement, a producer can save considerable feed costs by feeding only the needed requirements during these periods. In regards to feeding lambs, it has been found that a minimum of 10% hay, in an otherwise concentrated rations, is necessary to avoid digestive disturbances and development of wool or wood chewing habits.

There is no one universal feedstuff for sheep. Availability usually dictates which feeds are used. Some general rules of thumb on feed composition of different feedstuffs is given below.

"THUMB RULES" for FEED COMPOSITIONS

HAYS -	50% TDN
GRAINS -	75% TDN
SILAGE -	26% TDN
GRASSES -	6 - 12% PROTEIN
LEGUMES -	15% PROTEIN
GRAINS -	9 - 12% PROTEIN
SILAGE -	3% PROTEIN
GRAIN -	LOW CALCIUM, HIGH PHOSPHOROUS
LEGUMES -	HIGH CALCIUM, MEDIUM PHOSPHOROUS
GRASSES -	MEDIUM CALCIUM, LOW PHOSPHOROUS
SILAGE -	LOW CALCIUM, LOW PHOSPHOROUS

These are average values and variations will exist within each feed. Looking at some of the feedstuffs more closely, the following comments can be made.

<u>Alfalfa</u> - Considering all feedstuffs, alfalfa is the closest to being a complete feed for sheep. Good quality alfalfa can provide almost all the daily nutrient requirements of a ewe. Removal of any portion of alfalfa from a ration requires replacing its nutritional equivalent. In short, alfalfa is a "magic" feed for sheep.

Grains - Outside of use in lamb feeding, grains are used in ewe rations during breeding, last 4 weeks of gestation, and first 8 weeks of lactation. Some general rules for feeding ewes during gestation and lactation, including grain feeding, are given below.

"THUMB RULES" FOR FEEDING THE EWE

150 LB. EWE	TDN	PROTEIN
EARLY GESTATION	1.7 lb.	0.3 lb.
LATE GESTATION	2.7 lb.	0.4 lb.
LACTATION	3.7 lb.	0.6 lb.

GRAIN FEEDING / EWE DAILY

Late Gestation	0.5 lb. - 1.0 lb.
Lactation	1.5 lb. - 2.0 lb.

Straw - With the tremendous amount of grains produced in North Dakota, straw is available for feed use. Straw may be used to balance self-fed rations to prevent expensive overfeeding. Good quality straws will replace a portion of the roughage required to maintain a ewe on an annual basis. Feed analysis is valuable in estimating the feed value of your straws. Amount that can be used is dependent on ewe condition and quality of other feedstuffs.

Screenings - North Dakota has an abundance of different types of screenings. Their primary use should be to enhance the energy of poor quality roughages. Screenings are highly variable and should be used for what they are, an economical feed supply stretcher. Screenings will not replace alfalfa or whole grains. Be extremely cautious for the presence of ergot in screening supplies, again feed analysis may be of value.

"FEEDING METHODS"

HAND FEEDING

1. Labor intensive

2. Low mechanical investment

3. Allows maximum use of "The Eye of the Master".

BUNK FEEDING

1. Less labor intensive

2. Requires larger mechanical investment.

SELF FEEDING

1. Even less labor intensive

2. Larger mechanical investment

COMPLETELY AUTOMATED

1. Least labor requirement

2. Greatest capital investment in machinery and facilities.

"FEEDER TYPES"

FEEDING ON GROUND

1. Out dated method should be replaced.

SINGLE SIDED FENCELINE

1. Most expensive for the work it does

2. Offer high level of convenience

3. Some designs allow small lambs to escape from the pen.

DOUBLE SIDED BUNKLINE

1. Most economical

2. Requires moving sheep prior to feeding

3. Works quite satisfactorily.

ROUND 6 SIDED FEEDERS

1. Time consuming to build

2. Easy to move, handy in a storm

3. Nice for small bunches, rams, sick pen, etc.

4. Have to move sheep away for mechanized feeding.

SELF FEEDERS

1. Least labor intensive

2. Good way to utilize straw and poorer quality hays

3. Requires ground roughage.

SPACE ALLOTMENTS FOR SHEEP

SHELTER SPACE	EWE	EWE & LAMBS	FEEDER LAMBS
OPEN FRONT BUILDING with lot	10-12 Sq Ft	12-16 Sq Ft	6-8 Sq Ft
LOT	20-30 Sq Ft	25-35 Sq Ft	15-20 Sq Ft
CONFINEMENT	12-16 Sq Ft	16-20 Sq Ft	8-10 Sq Ft
FEEDER SPACE			
HAND FEEDING	16-20 Inches	16-20 Inches	9-12 Inches
SELF FEEDING	8-12 Inches	8-12 Inches	3-4 Inches
WATERER SPACE			
OPEN TANK	15-25 Ewes/Foot	15-25 Ewes/Foot	25-40 Lambs/Foot
AUTOMATIC BOWL	40-50 Ewes/Bowl	40-50 Ewes/Bowl	50-75 Lambs/Bowl

LAMB CREEP SPACE 1.5-2 Sq. Ft/Lamb

"MANAGEMENT UNDER DRYLOT OR CONFINEMENT"

Caliber of management of sheep under confinement obviously must be only of top level. Because more investment is made in buildings and equipment under confinement rearing, good facilities should generate better managers. The following are some management practices recommended for confinement or drylot production.

PRIOR TO BREEDING

1. Bag and mouth ewes and cull those that don't meet requirements.
2. Replace culled ewes with top-end yearlings or ewe lambs saved for replacement.
3. Keep replacement ewe lambs on good growing ration.
4. Evaluate Sires:
   - Be sure they are vigorous, healthy and in good breeding conditions (possibly production tested).
   - Rams should be conditioned 2 to 3 weeks before breeding season. Flush poor conditioned rams.
   - Allow 2 mature rams or 4 buck lambs per 100 ewes.
5. Crutch ewes.

6. Flush ewes (if in thin condition).

   - 1# grain 2 weeks to 5 weeks (usually 17 days).

   - If ewes are overconditioned the effect of flushing will be lessened.

7. Vaccinate ewes for Vibriosis.

BREEDING

1. The ovulation rate of a ewe is lowest at the first of the breeding season. Vasectomized or teaser rams run with the breeding ewes through the first heat period tend to stimulate them and increase the ovulation rate at the second heat period.

2. Test rams with marking harness or paint on brisket to see if they are getting the job done. Soft gun grease with paint pigment mixed in works good for painting brisket. A color sequence of yellow, red and black is recommended with colors being changed every 17 days.

3. Leave rams in NO LONGER than 57 days (38-40 days more desirable).

   - An exception may be with ewe lambs. Allowing them four heat cycles or 68 days may be beneficial.

4. Remove rams (don't winter rams with ewes).

PRIOR TO LAMBING (First 15 weeks)

Early Pregnancy

1. Watch general health of ewes, if possible sort off thin ewes and give extra feed so they can catch up.

2. Feed the poor quality roughage you have on hand during this period saving the better for lambing.

3. An exception to the above is feeding pregnant ewe lambs. They should receive good quality roughages and grain during this period.

LAST 6 WEEKS BEFORE LAMBING

1. Drench ewes (Tramisol).

2. Six - four weeks before feed 1/4 - 1/3# oats per ewe per day.

3. Shear ewes, trim hoofs, and vaccinate ewes for Enterotoxemia and Soremouth. If Vibriosis has been a problem, give ewes second vaccination for Vibrio.

4. Four weeks before lambing increase grain by 1/2 - 3/4# per head per day (usually done immediately after shearing).

5. Check facilities and equipment to be sure everything is in order.

6. Two weeks before lambing increase grain to 1# per head per day.

LAMBING

1. Be prepared for the first lamb some 142 days after turning the rams with the ewes, even though the average pregnancy period is 147 days.

2. Watch ewes closely as extra effort will be repaid with more lambs at weaning time. Saving lambs involves a 24-hour surveillance. Additional help at this time is money well spent. Every lamb saved means a $50 bill.

3. Put ewe and lambs in lambing pen (jug) after lambing (not before).

4. Be available to privide assistance if ewe has troubles.

5. Disinfect lambs navel with iodine as soon after birth as possible.

6. Use heat lamps in cold weather.

7. Be sure both teats are functioning and lambs nurse as soon as possible.

8. Brand ewes and lambs with identical numbers on same sides.

9. Turn ewes and lambs out of pen as soon as all are doing well (24hrs.-6 days).

10. Bunch up ewes and lambs in small groups 4-8 ewes and then combine groups until they are in a workable size unit.

11. Castrate and dock lambs 1-2 weeks after birth.

12. Provide a place for orphan lambs. Only one lamb should be left on ewe lambs and two left on older ewes. Very few ewes can successfully raise more than two lambs. Listed below are some management ideas for orphan lambs.

ORPHAN LAMBS

1. Buy a good milk replacer, should be 30% fat. Good replacers available from:
    A. K & K Mfg., Rogers, Minnesota
    B. Land O'Lakes

   Each lamb will require from 12 to 15 pounds.

2. Use good equipment. NDSU has had good success with the LAMB Bar, K & K Mfg., sells a self priming nipple and tube assemble that we have found to be excellent for starting orphans.

3. Start on nurser quickly. Young lambs start easier. Check ewes udder right after she lambs and make decision. Lambs from ewes that are questionable in any manner should be put on artificial milk. Lambs will take to nurser best at young age.

4. Self feed cold milk replacer after lambs are started. Milk replacers should be mixed with warm water for best results and then cooled down. Lambs fed cold milk grow well with less problems from scours and other digestive disturbance. Colk milk keeps better too.

5. Vaccinate lambs to protect against overeating. For immediate protection use antitoxin. For long term protection use bacteria (cl. per fringens type D).

6. Vaccinate to protect against "white muscle" disease. Use 1 Se or Bo Se.

7. Best results have been obtained when lambs are fed in groups of 3 or 4. This would be advisable when lambs are just being started. After lambs are successfully trained, they can be handled in groups of 25.

8. Orphan lamb pens should be heated. A plastic tent can easily be devised and heated. Extra heat will save extra lambs.

9. Provide colostrum milk for all orphans. Colostrum should be provided as quickly as possible. Colostrum milk is rich in fats, vitamins and antibody globulins to protect against disease organisms. Cow colostrum milk can be substituted for ewe colostrum milk.

10. Provide supplemented feed at 7 days. Use high energy, highly palatable feed, Where few lambs are being fed it may be advisable to purchase a good commercial lamb creep feed.

11. Provide clean, fresh water.

12. Wean lambs abruptly at 21-30 days of age. When to wean depends upon whether lambs are eating creep feed. Newly weaned lambs will go backwards for several days. Don't worry - lambs will make compensating gains later on.

END OF LAMBING TO WEANING

1. Feed ewes according to number of lambs suckling with ewes having twins receiving a high plane of nutrition.

2. Provide creep feed for lambs.

WEANING

1. Wean ewes from the lambs, not lambs from the ewes (ewes are removed from the pen).

2. Lambs should be weaned between 40-60 days of age or when they weigh approximately 50 lbs. and are eating creep and drinking water. The advantages of early weaning are that the ewe's milk production drops off.

3. Restriction of hay and water to the ewe following weaning will lessen the chance for mastitis to occur.

WEANING TO PRE-BREEDING

1. Drench ewes.

2. Time of rest for ewes. Feed a maintenance ration.

3. Time for shepherd to adjust ewes conditions so they can be effectively flushed for next breeding season.

BREEDING EWE LAMBS

Confinement or drylot rearing has increased the practice of breeding ewe lambs. The reasons are:

1. Reduced maintenance costs before start of production.

2. Shortened generation interval that results in more rapid genetic gains from selection.

3. Increased lifetime production.

This last statement is one of the reasons why producers for many years were skeptical about breeding ewe lambs. They felt that breeding ewe lambs at such a young age would reduce their body size and thereby decrease their future production. Research has shown that early breeding of well managed and adequately nourished ewe lambs has no detrimental effect on their subsequent reproductive efficiency. However, there is a tendency for ewes lambing as yearlings to be lighter and have poorer reproductive performance at 2 years of age than those who did not lamb as yearlings. This difference, however, disappears at 3 years of age.

Several factors influence the fertility of 7-8 month old ewe lambs.

1. Size and Condition at Breeding Time

   The health, vigor and physiological well-being of the ewe lamb is positively correlated with estrous response. Good condition of the ewe lambs means not getting them too fat. They should be 65% of their mature body weight at breeding time.

2. Breed Makeup

   The breed or breed makeup of the ewe lamb influences her fertility. The following indicates research results of various conception rates of different breed or breed combinations.

Suffolk, Hampshire, Specklefaced	60%
Rambouillet, Columbia, Targhee, Whitefaced	40%
Finn or Finn-Crosses	95%

3. Season of Birth

   Early born lambs (Jan-Feb) are better than late born lambs (April-May).

4. Time of Year Bred

   Higher fertility rate if bred during the end of October and November than September and first of October.

Ewe lambs that are bred at 7-8 month ages to lamb at about a year of age should be fed to gain 35 to 40 pounds during gestation. A pregnant ewe lamb should never experience hunger.

MONEY MANAGEMENT OF SHEEP REARED IN DRYLOT - CONFINEMENT

The North Dakota sheep industry is experiencing a transfusion of renewed interest and vigor. One of the new terms commonly heard in connection with this renewed interest is "drylot or confinement production". Established sheepmen, as well as newcomers, are seeking answers to the profitability of confinement rearing of sheep. The banking and financial community is now taking a long-awaited new look at the sheep industry as a viable livestock enterprise.

Foremost in the minds of most producers, as well as the financial institutions, considering this type of production are costs. Confinement sheep production creates increased investments which require maximization of all phases of production to insure reasonable profitability.

The following is a closer look at some of the investments and costs associated with confinement production. They are estimates and should be taken as such. Future changes in market values, material costs and interest will change the estimates. However, they should serve as relative starting points for producers interested in going into drylot or confinement rearing.

Breeding Stock

For many years, producers could buy good yearling ewes for the price of a choice 100 lb. market lamb. Not any more! Today, yearling ewes are bringing over $100 and fat lamb are at $65-70/hundred weight. From the standpoint of the sheep industry these high prices for ewes do have a positive effect in the commitment one must make to sheep. Now, a $100 ewe represents more wealth, more security and greater borrowing power. Hopefully, this should result in better management and profit potential in the sheep industry. The old saying of "a sick sheep is a dead sheep" has a different meaning today as far as mangement is concerned when you're looking at $100 ewes versus $20-25 ewes.

A comparison of interest and depreciation costs of purchased ewes is given below.

COMPARISON OF
INTEREST AND DEPRECIATION COSTS OF PURCHASED EWES

	EWE LAMBS	YRLGS	MATURE EWES (5-7 YEAR OLDS)					
COST/HD	$95	$115	$50		$60		$70	
PRODUCTION YRS	7	6	2	3	2	3	2	3
ANNUAL INTEREST COST/EWE	8.14	10.06	5.63	5.00	6.75	6.00	7.88	7.00
ANNUAL DEPREC. COST/EWE PLUS MORTALITY	11.51	16.63	16.60	11.60	21.60	14.93	26.60	18.27
TOTAL ANNUAL CAPITAL COSTS/EWE	19.65	26.69	22.23	16.60	28.35	20.93	34.48	25.27

INTEREST @ 15%
MORTALITY @ 4% ANNUALLY FOR EWE LAMBS AND YEARLINGS, 8% FOR MATURE EWES.
SLAUGHTER EWE VALUE OF $20/HD.

Ewes normally are productive thru 7 years. Very few ewes remain productive after 8 years. Interest and depreciation are calculated as if the loan was amortized, as most banks would expect. Mortality at 4% for ewe lambs means if you started with 100 ewe lambs, after 7 years 72 would be left to sell for slaughter. This data suggests that mature ewes are seldom worth more than 50% the value of yearling ewes. In the case of purchased ewe lambs, they must be bred to lamb at 12 to 14 months of age to realize their advantage in lower annual capital costs.

Confinement or drylot rearing of sheep creates increased building and equipment costs. Listed below are some estimated annual non=feed costs of a ewe.

Buildings (Deprec. plus int.)	$5.50[1]
Equipment (Deprec. plus int.)	3.50[2]
Vet/medicine	3.00
Ram costs	2.00
Shearing	1.25
Fuel, repairs, misc.	2.00
	$17.25

[1]Building cost figured on 20 sq. ft./ewe at $4/sq. ft. on a 20 year depreciation @ 10% interest.

[2]Equipment includes feed bunks, waterers, pens, etc. Interest at 13% on 10 year depreciation.

With inflated building and equipment expenses, these nonfeed costs now represent more of the cost of production than before. More importantly, these costs are independent of the level of production and are the same whether you raise a 100% lamb crop or a 150% lamb crop.

Annual feed costs/ewe used to represent about 70-75% of the total cost per year. Now with confinement or drylot, they represent about 60-65%. An estimate annual feed cost/ewe is:

1700 lbs hay equivalent @ $35/ton	$29.75
100 lbs grain @ 3.5/lb.	3.50
	$33.25

The grain includes that required the last 4 weeks of gestation and approximately 8 weeks of lactation.

By adding the annual non-feed and feed costs per ewe, it costs approximately $50 to keep that ewe. This is independent of the cost of the ewe herself.

Estimate feed costs for raising a lamb to market are:

80 lbs of creep @ 8¢/lb (10-50 lbs at 2 to 1 FE)	$ 6.40
270 lbs of grain @ 4.5¢/lb (50-110 lbs at 4.5 to 1 FE)	12.15
	$18.55

Looking at the increased costs involved with raising sheep in confinement, top management is a key to making it a profitable enterprise. Financial rewards from rearing sheep in drylot or confinement will not be realized by a producer weaning 100 - 130% lamb crop. Mediocre management that results in high mortality, inefficient production, high costs, and sub-par productivity per ewe will not pay the bills in confinement rearing.