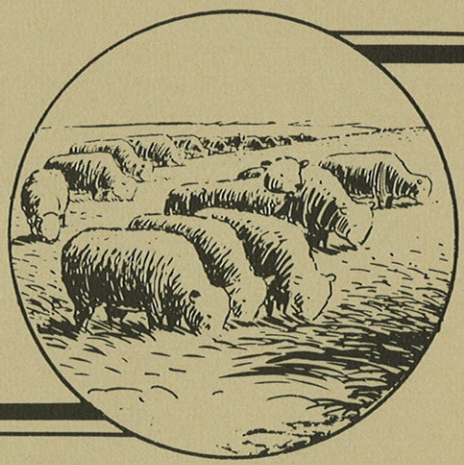
25th ANNUAL WESTERN DAKOTA SHEEP DAY

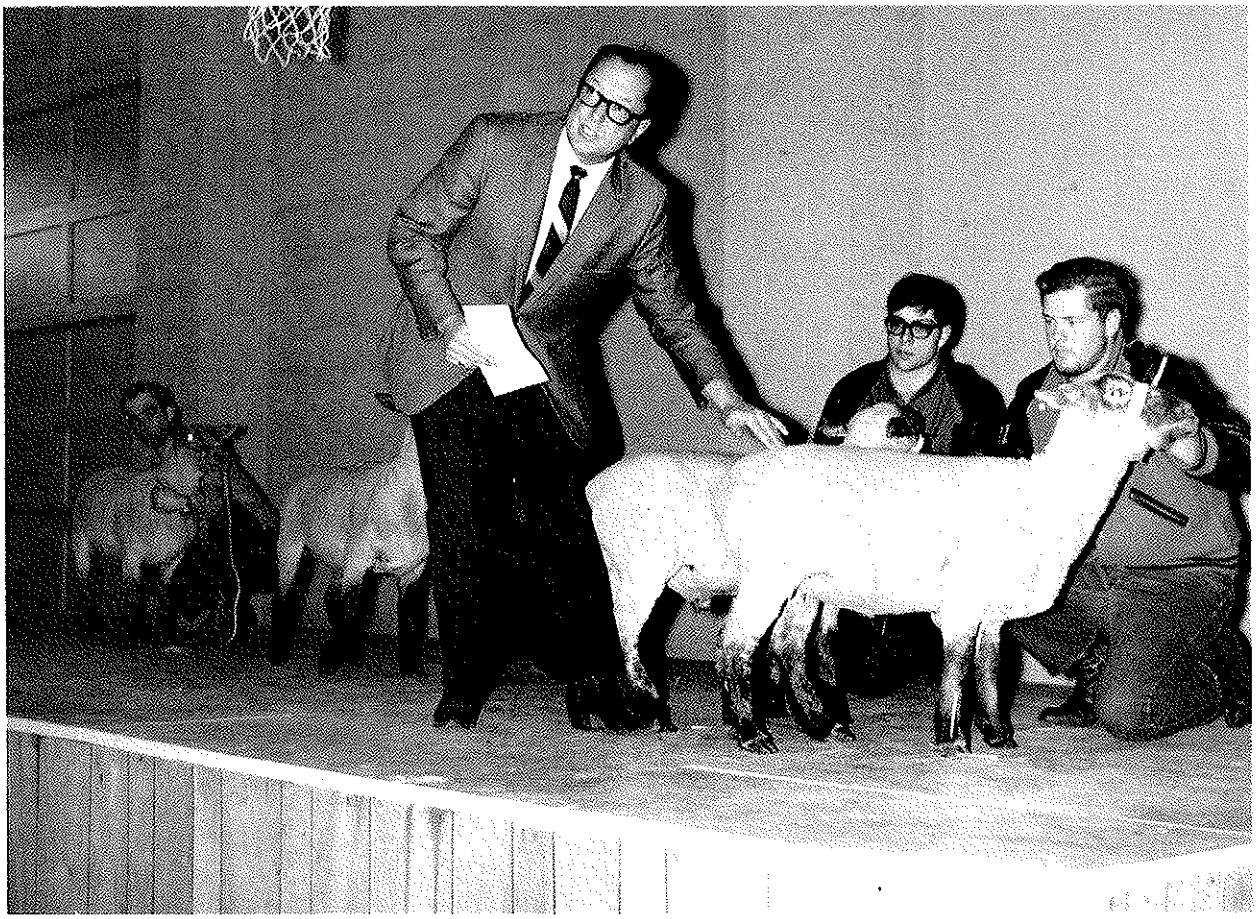
1960–1984



HETTINGER ARMORY
FEB. 8, 1984

Timothy C. Faller, Supt.
Hettinger Branch Experiment Station
North Dakota State University

IN MEMORY OF MERLE R. LIGHT



1920 - 1984

This 25th Sheep Day is dedicated to the memory of Merle Light, a scientist, a teacher, a dad and husband, a sheepherder, and a friend. He was the only person to be actively involved in everyone of the first 24 Sheep Days. His total involvement made this event what it is today. He gave of himself completely and unselfishly to the improvement of the sheep industry in North Dakota and the World. His presence will be greatly missed today and forever by those who were touched by the friendship of Merle R. Light, a true North Dakotan who was always excited about the sheep business.

P R O G R A M

9:45 a.m.	Coffee
10:15 a.m.	FOOT ROT CONTROL Dr. I.A. Schipper Roger Haugen Timothy C. Faller, Superintendent
10:45 a.m.	HETTINGER & FARGO STATION REPORTS Timothy C. Faller, Superintendent Dr. Paul Berg Dr. Duane Erickson
12:00 Noon	LUNCH: Roast American Lamb
1:15 p.m.	WELCOME Dr. H.R. Lund, Director Agriculture Experiment Station North Dakota State University
1:30 p.m.	HETTINGER'S FIRST SHEEP DAY Mr. Howard Gordon Fargo, ND
1:45 p.m.	CONTROLLED ENVIRONMENT SHEEP PRODUCTION Prof. Merle Light Animal Science Dept. North Dakota State University
2:15 p.m.	SHEEP IN NORTH DAKOTA Mr. Melvin Kirkiede Extension Animial Scientist North Dakota State University
2:35 p.m.	WE NEED YOU Fred Eagleson Buchanan, ND
2:45 p.m.	SELECTION FOR IMPROVED PRODUCTION VIA-MULTIPLE BIRTHS Dr. Leroy Johnson Animal Science Dept. University of Wyoming

* There will be a program for the ladies in the afternoon featuring, "Amateur Photography" and "Natural Arrangements".

SHEEP DAY DIGEST

by

Timothy C. Faller, Supt.
Hettinger Experiment Station

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17. FIELD EVALUATION OF A REPELLANT TO REDUCE COYOTE PREDATION IN SHEEP
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18. ESTRUS CONTROL IN SHEEP
Sec. II. pp. 54-58.

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34. FLOCK CALENDAR OUTLINE
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36. SHEEP PLANS LIST
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37. SHEEP FEEDER PLANS
Sec. IV. pp. 101-106.

38. CONFINEMENT BARN PLANS
Sec. IV. pp. 107-108.

39. RAM FERTILITY AND MANAGEMENT
Sec. IV. (Supplement)

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

25th Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

February 8, 1984

RELATIVE RESPONSES OF SELECTION PRESSURES APPLIED TO EWES
Project 6260

Paul Berg, Tim Faller, Merle Light and Leroy Johnson

Summary

A long term single trait selection project involving 90 Columbia ewes, begun in 1967, was terminated in 1983. Selection of ewe lamb replacements was on the basis of weaning weight, visual appraisal and yearling fleece production. At the conclusion of the study, no significant differences had been demonstrated between the three treatment groups for weaning weight nor for mature ewe weight. Mature weight was slightly lower at the conclusion of the project as compared to the beginning. Fleece weight apparently responded to selection pressure as the treatment group selected for fleece production consistently sheared more wool than the other treatments.

Introduction

The objective of this project was an attempt to improve traits by selection for single traits with selection pressure applied to the ewes only. The project was begun in 1967. A flock of 90 Columbia ewes was divided into 3 equal lots of 30. Selection criteria for Lot 1 was based strictly on lamb production of the ewe. From 1967 through 1979 replacement ewes were selected based on total pounds of lamb produced by the ewe. On this basis, a pair of 60 pound twin ewe lambs would have been preferred to a 100 pound single ewe lamb. In 1980 the selection procedure for this lot was changed so that the ewe lambs with the heaviest adjusted weaning weight would be retained. Also prior to 1980, eight mature ewes were culled from each of the lots. First cull criteria was age, as ewes were automatically removed as they reached eight years of age. Beginnning in 1980, age of ewe was discretionary. If the shepherd determined that a ewe was sound, age was not to be a cull factor but production and fertility were to be stressed.

Columbia type standards based upon visual appraisal was the basis for selection for Lot 2. In Lot 3 selection was based upon (yearling) fleece weight. Rams were selected on visual appraisal and were used for two successive lamb crops. A random sample of 10 ewes from each of the 3 treatment groups were mated to each of 3 rams; thus the influence of the ram was equally spread over the lots (ram effect was zero by design).

Experimental Procedure

Numerous measures of production were collected over the 17 years of the study. The objective measures are weaning weight of the lambs and grease fleece production. It is necessary to monitor other factors, however, in that some changes may occur by chance or in association with other selection criteria. We will discuss only lamb weaning weight (adjusted and unadjusted) pre-lambing mature ewe weight, lambs raised

per ewe and fleece weight as these are the production measures most routine to on farm production testing. Comparisons will be made between treatment selection groups for these five traits.

Results and Discussion

Figures 1 and 2 summarize lamb weight both adjusted and unadjusted. The large decline in the unadjusted lamb weight after the 1973 season was due primarily to weaning at an earlier age. Although Lot 1 selection was for lamb production, clearly no superiority in lamb weaning weight, either adjusted or unadjusted, evolved for this group. Lot 1 lambs averaged highest of the 3 selection groups only 4 times and tied for the heaviest an additional 3 times in the 17 years based on unadjusted weights. Adjustment for birthtype, lamb age and ewe age did not alter this pattern. Lot 1 lambs averaged greatest 5 of the 17 years with one tie, but Lot 2 lambs also averaged heavier for adjusted weaning weight 5 times with two ties. Lot 3, selected for wool production, lambs were also heaviest 5 times. This equality suggests either that selection for lamb production is ineffective or that each of the single trait selection criteria is equally effective for weaning weight.

The key issue, then, is whether selection for production based on the ewe alone is effective. Levels of lamb production were essentially static for the first 10 years. In 1977 adjusted weight fell dramatically but since then a fairly steady increase in average adjusted lamb weight has been demonstrated. No biological explanation for the extreme deviation of the 1979 weights can be offered other than the 1979 winter and spring were very mild. The slight change in selection principles (1980) for the lamb production lot had no dramatic effect on results, although since its inception progress in adjusted weights has been shown 3 of 4 years.

Another way of monitoring size of animals within the flock is to use mature weight. The most severe problem with mature weight is when to weigh the animals. We chose to use a pre-lambing weight, feeling this weight was the most consistent of those possible during the year. Figure 3 summarizes mature weight of the ewes for the 3 treatments over the course of the experiment. Six times out of the 17 years the lot selected for weaning weight contained the heaviest ewes. Unfortunately, four of those six were in the first 5 years; however, twice in the last 3 years these ewes were heaviest. No clearcut trends based upon selection groups were evident over the course of the experiment.

Figure 4 shows the average number of lambs weaned per ewe exposed. Since 1980, Lot 1 has consistently weaned the highest lamb percentage. This is consistent with several other studies which showed a greater lambing percent associated with selection of replacements based on heavy weaning weight, irregardless of birth type. Selection based upon total weight of lamb produced by a ewe favoured the selection of replacements who were from multiple births; however, only 3 times in 13 years was Lot 1 the most prolific. It appears that selection for the heaviest 120 day weight has greater potential for improving ewe productivity than selection for total weight of lambs produced in a season.

Finally, figure 5 shows the result of selection for fleece weight. While it is apparent that selection for increase of weaning weight when selection is based on pressure on the ewe flock only is questionable,

selection for fleece weight has proven to be effective. Not only has the fleece weight of the flock improved from the average at the inception but more importantly, with the exception of the first four years, the Lot 3 (fleece production) ewes sheared the highest average 12 out of the last 13 years. Statistically significant differences existed between the various selection lots in '79 and '81 (5% level), meaning that the differences in fleece production in those years was due to something other than chance alone. The differences in other years, though not great enough to be termed statistically significant, are consistent from year to year and could be expected to continue.

Single trait selection with pressure applied only to the ewe lamb replacement stock was practiced for lamb production, fleece production and for visual appraisal based on Columbia breed standards. Over the course of this 17 year study lamb weaning weight did not respond to specific selection pressure. No significant differences among the lots were demonstrated. Quite possibly the other selection groups were not antagonistic to lamb production. Columbia breed standards would not limit an astute visual appraiser from selecting the largest replacements and it is possible that large lambs would also shear the most wool. The most disappointing conclusion is that average lamb weight adjusted for age of lamb and ewe and rearing type was slightly lower at the conclusion of the study as compared to year 1.

Selection for fleece production showed signficant response with the specific selection group consistently shearing heavier fleece weights than the other groups.

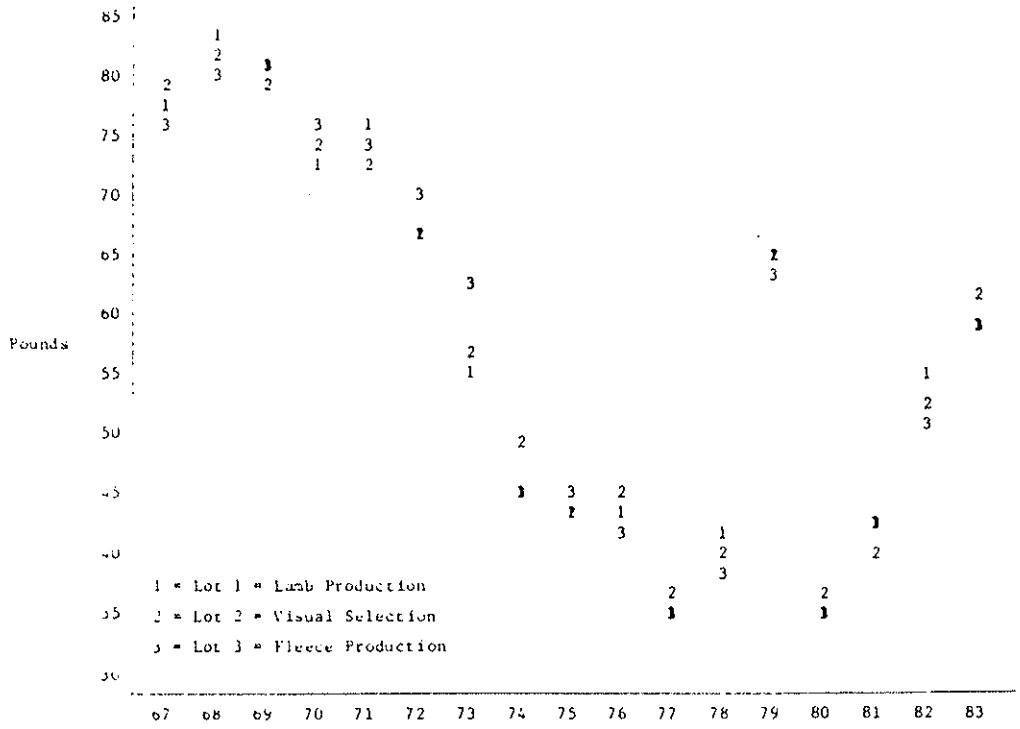
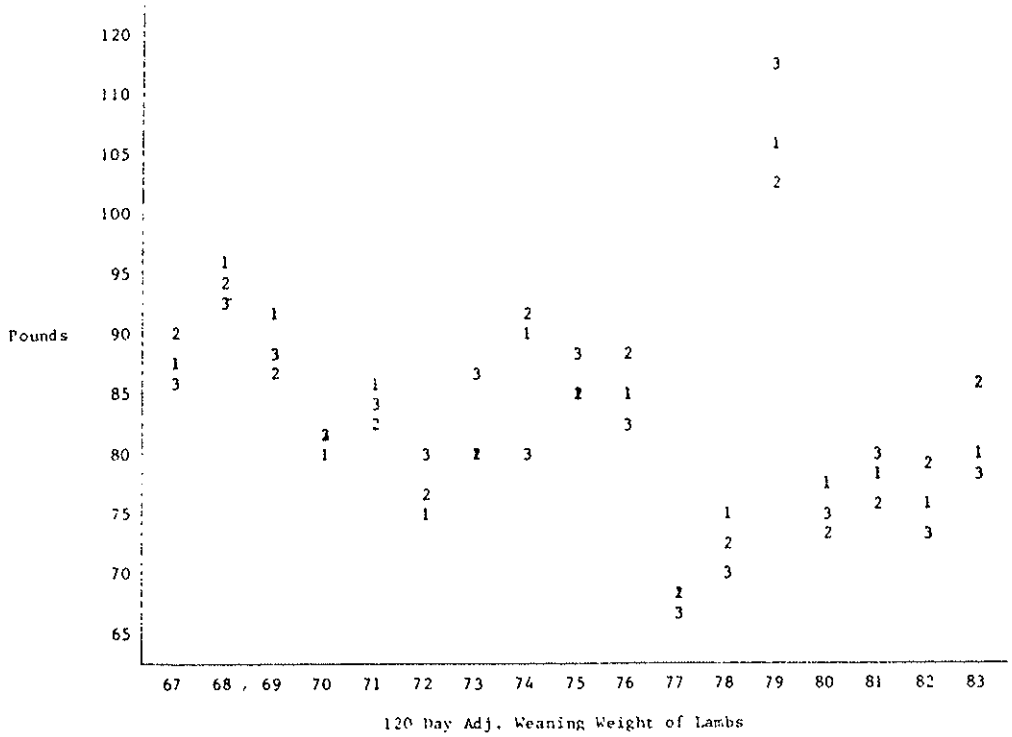
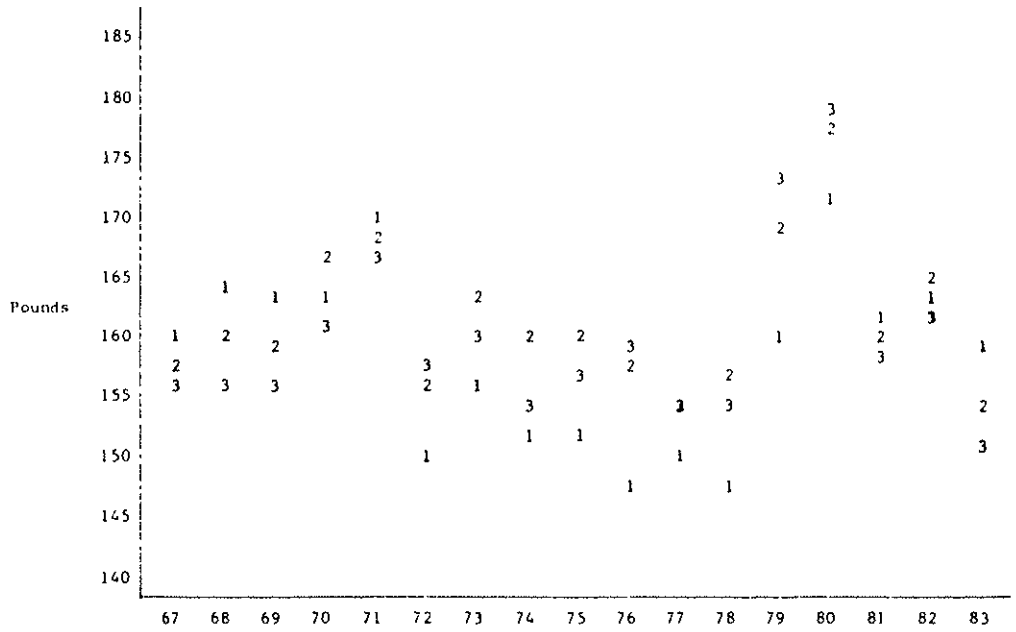


Figure 1



120 Day Adj. Weaning Weight of Lambs

Figure 2



Ewe Weight Pre-Lambing

Figure 3

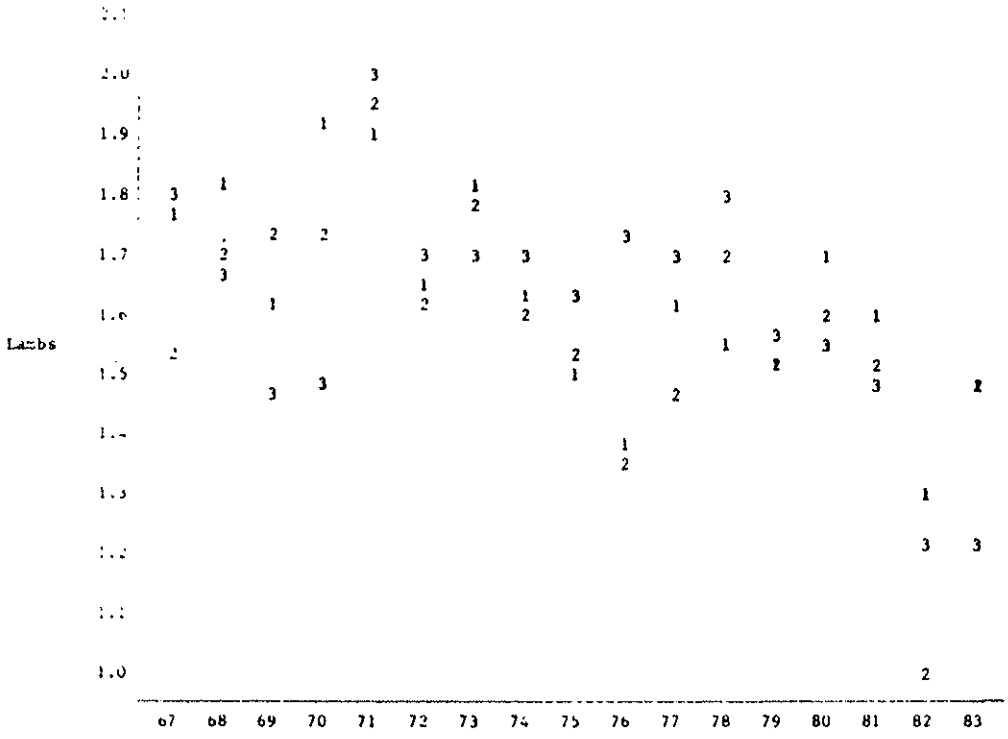


Figure 4

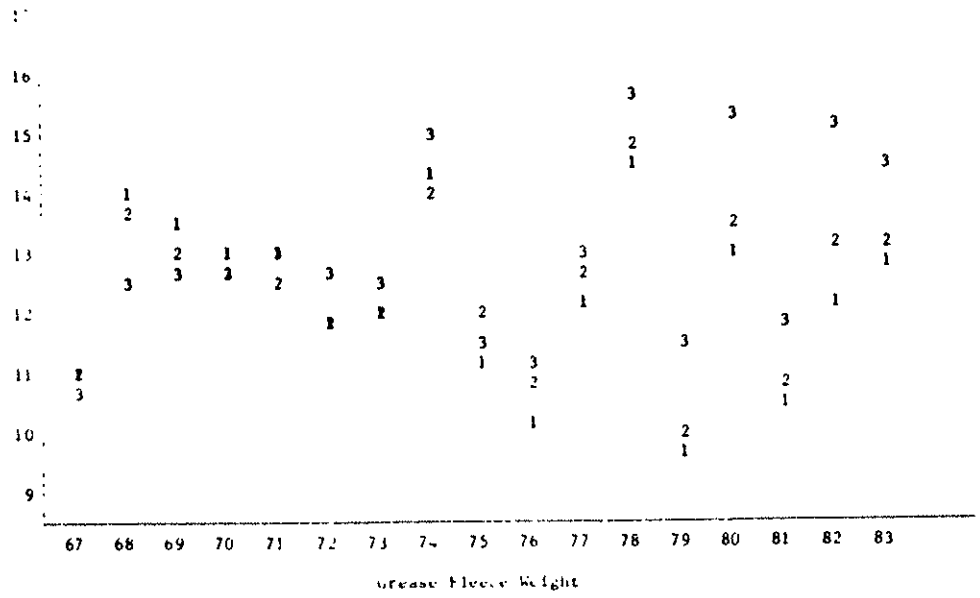


Figure 5

BARLEY, OATS AND BARLEY/OATS COMBINATIONS FOR FEEDER LAMBS

D.O. Erickson, M.R. Light, T.C. Faller and L. Insley

Hettinger, 1983

Summary

Barley, oats and two combinations (1/3 and 2/3) of barley and oats were compared in a 2 x 4 factorial experiment. Two hundred and forty feeder lambs with an average initial weight of 74 pounds were allotted by weight, breed and sex and randomly assigned one of the 4 treatment diets. The lambs were on experiment for 65 days and at an average weight of 109 pounds the experiment was terminated. All the diets contained 20% alfalfa and balanced to contain 15% protein. The TDN's ranged from 70.5 to 66.8% as the amount of oats in the diet increased from none to 100%. The barley and oats were heavy, weighing 52 and 37 pounds a bushel, respectively. There were no differences in lamb gains due to diet. Lambs on the oats diet required slightly more feed than those on barley (7.47 compared to 7.04, respectively). Dressing percent was slightly higher and shrink lower for the lambs fed barley. These data suggested that heavy barley and heavy oats are similar in feeding value with a slight edge to barley, which would be expected with the lower fiber levels and a higher TDN.

Introduction

Corn is generally used as the major grain in lamb rations. Barley and oats are available as alternative grain sources to many producers. There is a need to know how feeder lambs perform with barley or oats or combinations of barley and oats in high energy diets for feeder lambs on an equal protein basis.

Experimental Procedure

Two hundred and forty lambs with an average weight of 74 pounds were allotted by weight, breed and sex and assigned to one of four diets. The diets were: 1) barley; 2) barley 2/3, oats 1/3; 3) barley 1/3, oats 2/3; and 4) oats fed with 20% alfalfa hay and soybean meal to contain a 15% protein diet. Two replications were used. Lamb weights and feed intake were recorded on a bi-weekly basis. Complete ground mixed diets were fed free choice. Diets were sampled several times during the experiment and analyzed for nutritional composition. Lambs were taken off experiment when their average weight was 109 pounds, which was at 65 experimental days. Lambs were taken to John Morrell & Co. at Sioux Falls, South Dakota and data concerning shrink, dressing percent and grade were obtained.

Results and Discussion

The composition of the feedstuffs used in the diets and bushel weights of the barley (52#) and oats (37#) are shown in table 1. The protein levels of the barley and oats were high for heavy bushel weight grains. The nutritional composition of the diets and the diet makeup is presented in table 2. TDN decreased with increasing oats in the diet, resulting in a slight increase in feed required for gain (tables 2 and 3). The lambs gained the same on all diets (.54 to .55 pounds a day). The lambs on barley shrunk less than those on combinations of barley and oats or oats alone. Dressing percent and grade were similar among all treatments. Heavy barley and oats support satisfactory and similar lamb performance with a slight edge for the barley in some parameters.

TABLE 1. COMPOSITION OF FEEDSTUFFS USED IN THE BARLEY, OATS AND BARLEY/OATS TRIALS

Feedstuff	% (90% dry)			
	Protein[a]	TDN[b]	Ca[a]	P[a]
Alfalfa	16	52	1.25	.173
Barley[c]	13.9	77	.07	.461
Oats[d]	13.2	72	.05	.350
SBM	44.0	78	.25	.600

[a]Analyzed in Animal Science laboratory, NDSU.
[b]NRC.
[c]Bushel weight 52#.
[d]Bushel weight 37#.

TABLE 2. FEEDSTUFF AND NUTRITIONAL COMPOSITION[a] OF THE BARLEY, OATS AND BARLEY/OATS TRIAL

	Diets			
	Barley	2/3 Barley 1/3 Oats	1/3 Barley 2/3 Oats	Oats
	%			
Alfalfa	20	20	20	20
Barley	74.7	49.5	24.6	-
Oats	-	24.7	49.1	73.1
SBM	3.3	3.8	4.3	4.9
Limestone	1.0	1.0	1.0	1.0
TM salt	.5	.5	.5	.5
Ammonium chloride	.5	.5	.5	.5
Protein	15	15	15	15
TDN	70.5	69.3	68.0	66.8
Calcium	.66	.65	.65	.65
Phosphorus	.399	.372	.346	.320

[a]Vitamins A,D, & E according to requirements (plus). Antibiotics according to recommendations.

TABLE 3. PERFORMANCE OF LAMBS AS AFFECTED BY BARLEY, OATS OR BARLEY/OATS COMBINATIONS

	Barley	2/3 Barley 1/3 Oats	1/3 Barley 2/3 Oats	Oats
Daily gain (#)	.54	.54	.54	.54
Feed/gain	7.04	7.32	7.33	7.47
Feed intake/day (#)	3.80	3.95	3.96	4.10
Initial wt. (#)	74±10	74±11	74±11	74±11
Final wt. (#)	109±11	109±13	109±12	110±13
Dressing %	56.17	54.68	55.47	54.97
Shrink %	2.09	5.63	7.46	6.51
Grade	choice	choice	choice	choice

No differences in any of the parameters except shrink.

THIRTY YEARS OF SHEEP PRODUCTION AT NDSU

Merle R. Light, Roger Haugen and Wes Limesand

Like all facets of agriculture, our sheep our changing! Production records since 1951 are presented in table 1. Significant changes have occurred in areas having to do with growth. Corrected 90 day weights have increased tremendously. Suffolk weights are now 62 percent greater and Columbia weights have increased by almost 60 percent since 1951. The Hampshire breed has shown a gain of 45 percent but initially this breed was the heaviest at 90 days.

Birth weights for the Suffolk and Columbia breeds have risen by 21 and 30 percent, respectively. This might be expected since there is a positive correlation between birth weights and 90 day weights. It is more difficult to explain the 45 percent gain in Hampshire 90 day weights along with a decrease in birth weights. Selection in all breeds has been towards greater skeletal framework and delayed maturity patterns.

We have not seen significant changes in lambing rates for the years 1951 through 1981. Selection pressure at NDSU has been mainly towards increasing growth rate and mature size. It is expected that there will be increased emphasis on selection for increased fecundity in future years.

TABLE 1. PRODUCTION RECORDS

Breed	Suffolk			Columbia			Hampshire		
Year	51	76	81	51	76	81	51	76	81
Number of ewes	22	58	84	59	22	41	48	43	49
% Lambing rate	159	167	156	159	159	151	138	147	167
Birth wt. ave.	10.4	11.0	12.6	9.5	10.5	12.4	12.1	10.4	11.2
Adj. 90-day wt.	58	90	94	52	78	83	63	85	90

HIGH PROTEIN SUNFLOWER MEAL (40+) COMPARED TO SOYBEAN MEAL FOR EARLY WEANED LAMBS

D.O. Erickson, M.R. Light, M. Hankel and L. Insley

Summary

A 2x2 factorial experiment was conducted using 40 purebred lambs to compare sunflower meal (SFM 40+) to soybean meal (SBM) on an equal replacement basis (11% of a high energy diet). Initial weight of the lambs averaged 66 ± 9.3 pounds. Diets were pelleted and fed 2 x a day all they would consume. Both SFM and SBM supported excellent lamb performance, gaining .95 and 1.03 pounds daily with feed efficiencies of 4.36 and 3.80, respectively. The gains and efficiencies of the SBM fed lambs were better ($P<.05$). The diet composition, by analysis, was very similar for most nutritional fractions (protein 14.5, Ca .71 and P .37%). The fiber (ADF) was higher in the SFM diet (15.4 compared to 14.5% for the SBM diet). This difference contributes to the slightly reduced feed efficiency on the SFM diet.

Introduction

Considerable information has been generated on the feeding value of sunflower meals over the past several years by this Station. The meals that have been available in this area are the 28 and 34% protein meals. The "Sun Industries, Inc." plant in eastern North Dakota produces a sunflower meal with 40+ protein on which limited information concerning feeding value is available. It is of economic importance that the livestock producers have alternatives for protein sources. In order to make sound management decisions, a knowledge of nutritional composition and the livestock performance is necessary. The main objective of this experiment was to compare SFM to SBM in high energy corn-alfalfa diets to early weaned lambs on an equal replacement basis.

Experimental Procedure

Forty purebred lambs weaned at 56 days were allotted by weight, breed and sex and assigned to one of four pens. The lambs averaged 66 pounds at the start of the experiment and were taken off experiment at an average of between 105 to 110 pounds. The lambs were fed complete pelleted corn-alfalfa-protein supplement diets 2 x a day all they would consume. The protein supplement, SFM or SBM, made up 11% of the diets which were balanced to contain 71 or 72% TDN, respectively. Lamb weights and diet intake were recorded on a bi-weekly basis. Four samples of each diet were taken during the experiment and were analyzed for nutritional composition in duplicate.

Results and Discussion

Both the SFM and SBM supported excellent daily gains of .95 and

1.03 (P<.05), respectively (table 3). The feed required per unit of gain was also very low for both meals, 4.36 and 3.80 (P<.05), respectively, for SFM and SBM. The SFM diet contained slightly more fiber (ADF), 15.4 compared to 14.5 for the SBM diet, which would contribute in part to the increased feed to gain ratio. SFM (40+) supports excellent feedlot lamb performance and should be balanced on an equal energy, fiber and protein basis with SBM.

TABLE 1. FEED COMPOSITION FOR FEEDSTUFFS USED IN THE SFM OR SBM TRIAL

	% (90% dry)			
Feedstuff	Protein[a]	TDN[b]	Ca	P
Corn	10.0	80	.005[a]	.30[a]
Alfalfa	12.0	52	1.20[a]	.25[a]
SFM	41.0	72	.28[b]	.69[b]
SFM	42.0	78	.25[a]	.60[a]

[a]Analyzed in NDSU laboratory.
[b]Feed tag or NRC values.

TABLE 2. FEED AND NUTRITIONAL COMPOSITION* OF THE DIETS TO COMPARE SFM OR SBM

	Dietary Treatments	
Feedstuff	SFM	SBM
	%	
Corn	61	61
Alfalfa	28	28
SFM	11	11
TDN[c]	71.3	72.0
Protein[c]	13.9	14.1
Protein[a]	14.5 ± .47	14.5 ± .48
Fiber[a]	15.4 ±1.34	14.5 ±1.51
Calcium[a]	.71± .060	.72± .133
Phosphorus[a]	.37± .029	.37± .020
Ash[a]	5.60± .773	6.01±1.234

*.5% TM salt, .5% ammonium chloride, Vitamins A,D,E and antibiotics.
[a]Analyzed n=8.
[c]Calculated based on feedstuff analysis or NRC values.

TABLE 3. LAMB PERFORMANCE ON SFM COMPARED TO SBM ON EQUAL REPLACEMENT

	Treatments	
	SFM	SBM
Daily gain (#)	.95[a]	1.03[b]
Feed/gain	4.36[a]	3.80[b]
Feed intake/day (#)	4.15	3.90
Initial wt. (#)	67±9.6	66±9.0
Final wt. (#)	105±12	110±15

[a,b]Different (P<.05).
±Standard deviation.

THE PERFORMANCE OF LAMBS FED HIGH ENERGY DIETS WITH VARYING CALCIUM TO PHOSPHORUS RATIOS

D.O. Erickson, M.R. Light, T.C. Faller and L. Insley

Hettinger, Spring 1983

Summary

An experiment was designed to determine the effects of 4 calcium to phosphorus ratios (1:1, 2:1, 2.5:1 and 3:1) using barley (narrower ratios) and corn (wider ratios) fed to lambs. Diets were balanced based on the analysis of the feedstuffs to be used in the experiment. Diets were sampled from 16 to 20 times during the trial with the resulting calcium and phosphorus levels and ratios considerably different than the calculated levels in the formulated diets. The ratios (from analysis) were 2.7:1, 3.9:1, 3.9:1 and 4.7:1, respectively. Urinary calculi should not be a problem with these ratios, which was the case in this experiment. The lambs on the corn diets gained faster ($P<.05$) than those on the barley diets. Lambs on the barley diets appeared to be more efficient in feed conversion. This may have been due to the higher amount of alfalfa (35%) in the corn diet compared to (22%) the barley diet. All diets were calculated to have equal TDN (69%). The relationship of calcium and phosphorus levels and ratios to the incidence of urinary calculi remains to be determined on rapid gaining early weaned lambs. Feedstuffs, especially alfalfa, vary considerably in their content of calcium and phosphorus which makes it difficult to provide diets of constant levels and ratios when diets are mixed several times during a 70 day feeding period.

Introduction

Urinary calculi has been an occasional problem in lamb feeding trials and is also reported by producers. Ammonium chloride has been used as one of the preventative measures of urinary calculi. The problem seems to be more prevalent when phosphorus levels are high and/or in relation to the calcium levels. A narrow ratio increases the probability of urinary calculi. The National Research Council for Sheep (1975) recommends .32% Ca and .22% P for lambs gaining about .5 pounds a day, which results in a ratio of 1.45:1 Ca:P. We have used levels of .25 to .3% P and .6 to .8% Ca in past lamb feeding experiments with lambs gaining from .75 to 1 pound a day. The higher level of minerals (above NRC) facilitate the more rapid gains and improved feed conversions. The objective of this experiment was to determine the effect of 4 Ca:P ratios ranging from 1:1 to 3:1 in barley or corn diets on the incidence of urinary calculi and lamb performance.

Experimental Procedure

Four ratios of Ca:P (1:1, 2:1, 2.5:1 and 3:1) were to be tested with corn or barley/alfalfa/soybean meal diets. The diets were

calculated 69% TDN and 14% protein on an as is basis. Each treatment was replicated twice.

Three hundred and twenty lambs with an average initial weight of 58 pounds were allotted by weight, sex and breed and randomly assigned to one of the four treatments. Diets were sampled from 16 to 20 times and analyzed for several nutritional parameters. The lambs were weighed bi-weekly with the experiment terminated when the lambs averaged 100 pounds. The diets were coarsely ground, mixed and fed free choice.

Results and Discussion

The calcium and phosphorus contents of the feedstuffs used in the experiments (table 2) were different from the samples that were analyzed for the basis of formulating the diets (table 1). All of the mixed diets contained about 2 x the amount of calcium expected, resulting in diets wide in Ca:P ratios. These types of diets would not cause a potential urinary calculi problem and none was observed. The major result from this experiment was the confirmation of previous experiments that corn improves lamb gains (table 3) compared to barley when balanced on an equal energy basis. The lambs on corn diets required more feed/gain which may be explained on the basis that the corn diets contained higher fiber levels (14% compared to 11% for the barley diets)(table 2). Corn diets had 35% alfalfa compared to 22% for the barley diets (table 2).

Additional experiments are planned to study the effect of narrow Ca:P ratios in lamb diets.

TABLE 1. COMPOSITION OF FEEDSTUFFS[a] USED IN THE CALCIUM AND PHOSPHORUS STUDY

	% "as is"			
Feedstuff	Protein	TDN	Ca	P
Alfalfa	16.0	52	1.250	.173
Corn	9.0	80	.012	.285
Barley	12.5	75	.071	.461
Soybean meal	44.0	78	.250	.600

[a]Samples from the Hettinger Station.

TABLE 2. DIETS* AND COMPOSITION (CALCULATED[c] AND ANALYZED[a]) FOR THE CALCIUM AND PHOSPHORUS STUDY

Calculated	Ca/P 1:1	2:1	2.5:1	3:1
	%			
Alfalfa	22	22	35	35
Barley	74	74	-	-
Corn	-	-	56	56
SBM	3	3	8	8
Limestone	.3	1.4	.6	1
	Nutritional Composition			
TDN[c]	69.3	69.3	69.2	69.2
Protein[c]	14.1	14.1	14.2	14.2
Protein[a]	14.3±.91	14.8±.71	13.5±1.17	14.2±1.37
Fiber (ADF)[a]	11.3±1.77	11.3±1.21	14.0±2.30	14.1±2.19
Calcium[c]	.393	.780	.675	.810
Phosphorus[c]	.397	.397	.270	.270
Calcium[a]	.623±.243	1.167±.343	1.119±.307	1.376±.473
Phosphorus[a]	.228±.078	.302±.059	.290±.022	.292±.020
Ca:P[a]	2.7:1	3.9:1	3.9:1	4.7:1

*.5% TM salt, vitamins A,D & E and antibiotics.
[a]Analyzed values were based on 20 samples determined in duplicate.
±Standard deviation from the mean.

TABLE 3. DAILY GAIN AND FEED/GAIN

	Treatment Barley		Corn	
	2.7:1	3.9:1	3.9:1	4.7:1
Gain (#/day)	.62[c]	.61[c]	.70[a]	.66[b]
Feed/gain	5.08	5.05	5.70	5.67
Feed/day (#)	3.14	3.08	4.00	3.74
Initial wt. (#)	58±8.7	58±7.8	59±7.7	59±8.8
Final wt. (#)	102±13	99±14	107±13	105±16

No incidence of urinary calculi.
[a,b,c]Different (P<.05).
±Standard deviation from the mean.

SUNFLOWER MEAL (40^+) COMPARED TO SOYBEAN MEAL FED IN DIETS OF EQUAL PROTEIN AND TDN TO EARLY WEANED LAMBS

D.O. Erickson, M.R. Light, W. Limesand and L. Insley

Summary

The feeding value of sunflower meal (40^+) (SFM) for early weaned lambs was determined in a 2x5 factorial experiment. SFM and SFM/SBM combinations (25, 50 and 75% SFM) were compared to the standard SBM diet. Corn-alfalfa-protein supplement diets were formulated to contain 72% TDN and 14.1% protein. The five diets (pelleted) were fed to 140 early weaned lambs using 28 lambs per diet and two replicates. Each of the five diets supported excellent gains and feed efficiencies. Lambs gained faster ($P<.05$) 1.12 on the SFM diet compared to 1.08 on the SBM diet. Lambs on the combination SFM/SBM diets gained slower ($P<.05$) than when either source was fed alone. Lambs were the most efficient in feed conversion on SFM 4.29 or SBM 4.39 compared to 4.53 to 4.63 for the combination diets. These data suggest SFM (40^+) supports lamb performance at least equal to that of SBM when diets are balanced on an equal energy and protein basis.

Introduction

Sunflower meal -40%$^+$ (SFM 40^+) protein is a relatively new product produced in this area. It is of importance to the livestock producers to have information concerning the nutritional composition and feeding value of this product. The purpose of this experiment was to compare SFM to SBM and various combinations of SFM/SBM fed on a equal energy and protein basis to early weaned lambs.

Experimental procedure

Purebred Columbia, Hampshire and Suffolk lambs with an average initial weight of 66 pounds were allotted by weight, breed and sex and one of five treatments were assigned to each group of 28 lambs (14 per pen in 2 replicates). The lambs were weighed and feed intake was recorded on a bi-weekly basis. Feed samples were taken four times during the experiment and analyzed for nutritional composition in duplicate. Diets were balanced to contain 72% TDN and 14.1% protein. Minerals and vitamins AD and E were added so that the diets contained above the recommended levels by the NRC for sheep. Antibiotics and ammonium chloride were also included at recommended levels. Lambs were shorn during the experiment and the lamb weights were adjusted for wool clip.

Results and Discussion

The composition of the feedstuffs is shown in Table 1 and the resulting experimental diets presented in Table 2 which include both calculated and analyzed values. The nutritional composition of the diets were very consistant through the experiment (low variation) and very comparable among the five diets. The calcium and phosphorus levels and ratios were very consistant among the diets with a slight increase as more SFM was incorporated at the expense of SBM. SFM is slightly high in calcium and phosphorus (Table 1). The same pattern is shown with the ash content since SFM is slightly higher in ash than SBM (7.0 vs 5.8%). Initial and final weights along with lamb performance parameters are shown in Table 3. Daily feed intake was very similar for the lambs on all diets ranging from 4.58 to 4.80 pounds with the highest on the SFM diet. The feed required for gain was very low (excellent efficiency) for all the diets. SFM and SBM fed alone resulted in the lowest feed to gain ratios of 4.29 and 4.39 respectively. Feed to gain ratios ranged from 4.53 to 4.63 for the remaining three diets. The SFM diet supported the most rapid gain ($P<.05$) of 1.12 pounds a day followed by the SBM diet of 1.08 pounds a day. The combination of SFM/SBM also supported excellent gains but were slightly lower ($P<.05$) than when either supplement was fed alone. SFM fed as the only protein supplemental source or fed in combination with SBM supports excellent lamb performance and when balanced on an equal protein and energy basis is comparable to SBM.

TABLE 1. FEED COMPOSITION FOR FEEDSTUFFS USED IN THE SFM SFM/SBM COMBINATIONS AND SBM TRIAL

	% (90% dry)			
Feedstuff	Protein[a]	TDN[b]	Ca	P
Corn	10.0	80	.005[a]	.30[a]
Alfalfa	12.0	52	1.20[a]	.25[a]
SFM	41.0	72	.28[b]	.69[b]
SBM	42.0	78	.25[a]	.60[a]

[a]Analyzed in our laboratory.
[b]Feed tag or NRC values.

TABLE 2. FEED AND NUTRITIONAL COMPOSITION* OF DIETS TO COMPARE SFM SFM/SBM COMBINATION OR SBM.

Feedstuffs	Dietary Treatment				
	SBM	SBM75 SFM25	SBM50 SFM50	SBM25 SFM75	SFM
			%		
Corn	61.0	61.62	62.25	62.88	63.5
Alfalfa	28.0	27.20	26.40	25.60	24.8
SBM	11	7.49	5.70	3.80	-
SFM	-	3.69	5.70	7.72	11.7
TDN[c]	72	72	72	72	72
Protein[c]	14.1	14.1	14.1	14.1	14.1
Protein[a]	14.4 ± .69	14.4 ± .51	14.5 ± .20	14.4 ± .21	14.3 ± .34
Fiber(ADF)[a]	15.4 ± .81	15.2 ± 1.71	15.3 ± 1.31	15.1 ± 1.19	15.2 ± 1.82
Calcium[a]	.69 ± .053	.69 ± .063	.69 ± .090	.73 ± .060	.70 ± .062
Phosphorus[a]	.31 ± .016	.32 ± .011	.34 ± .028	.37 ± .019	.39 ± .016
Ash[a]	5.86 ± .42	5.98 ± .52	6.18 ± .93	6.39 ± .41	6.57 ± .55

*.5% TM salt, .5% ammonium chloride and vitamin ADE and antibioties

[a]Analyzed n=8

[c]Calculated based on feedstuff analysis or NRC values.

TABLE 3. LAMB PERFORMANCE ON SFM, SFM/SBM COMBINATIONS OR SBM ON EQUAL ENERGY AND PROTEIN BASIS

	Treatments				
Feedstuffs	SBM	SBM75 SFM25	SBM50 SFM50	SBM25 SFM72	SFM
Daily gain (#)	1.08[a]	1.04[b]	1.04[b]	.99[c]	1.12[d]
Feed/gain	4.39	4.61	4.53	4.63	4.29
Feed intake/day(#)	4.74	4.79	4.71	4.58	4.80
Initial wt. (#)	66 ± 9.2	67 ± 8.3	66 ± 11.4	67 ± 10.8	64 ± 10.9
Final wt. (#)	111 ± 12	108 ± 11	108 ± 14	108 ± 14	107 ± 14

[a,b,c,d]different (P<.01)

± standard deviation

THE EFFECTS OF MANAGEMENT SYSTEMS ON GROWTH AND PRODUCTION OF EWES
Project 3729

M.R. Light, T.C. Faller and D.O. Erickson

Summary

Three groups of yearling ewes having the same genetic makeup were randomly assigned to an insulated sheep barn or to a traditional sheep rearing system in July, 1981. Preliminary results of two year's data indicate that sheep under the confinement feeding regime of this experiment weighed less and produced fewer pounds of lamb than sheep maintained in the traditional manner.

Experimental Procedure

The objectives of this experiment are to determine the effects of confinement on ewe productivity and longevity. The suitability of three different cross-bred ewe groups for confinement or for a traditional sheep rearing system are being studied.

The genetic groups being compared are 1) ½ Suffolk + ½ Rambouillet, 2) ¼ Finn + ¼ Border Leicester + ½ Rambouillet and 3) ½ Finn + ½ Rambouillet. Crosses to obtain these ewes were made at the Hettinger Station utilizing a group of Wyoming range ewes and Finn, Suffolk or ½ Finn + ½ Border Leicester rams.

The inside or confined sheep were placed on trial July 27, 1981. All confined groups were fed three times per week with a mixture of chopped alfalfa hay plus chopped straw in bunks. The ration fed per group was calculated to contain 75 percent of the recommended NRC levels for TDN. Traditional or "outside" sheep were placed on native or tame grass pastures July 27, 1981, until being placed in dry lot for breeding. Outside groups were fed the same ration as confined groups during the breeding period and throughout the post-breeding, maintenance, pre-partum and post-partum periods. All groups were allowed free access to a mineral mixture containing 1/3 TM salt plus 1/3 dicalcium phosphate + 1/3 white iodized salt. Similar management procedures were followed in 1982.

Results and Discussion

The results of the second year's data are given in table 1. There is a difference in average ewe weights and ewe productivity as measured by pounds of lamb weaned per ewe. Post-mating weights of ewes in confinement averaged 77.7 percent of the weight of comparable ewes under traditional methods in 1981, but the difference was less in 1982 (97%). The pounds of lamb produced per ewe exposed was in favor of the outside group but the difference was not as great as in the first year. One of the differences between the two groups is in the number of multiple births. The confined ewes had a greater number of single lambs than the outside group (27 vs 8%). Death loss of lambs was greater in the outside housing (14 vs 22%). A summary of the two year's data (combined

for breeding groups) is presented in table 2. The major difference between the two groups is in percent lambing rate and lambing rate per ewe exposed. These differences have resulted in greater pounds of lamb per ewe.

TABLE 1. EWE WEIGHT AND PRODUCTION - 1983

	Genetic Groups		
CONFINED EWE GROUPS:	½ Suff ½ Ramb	¼ Finn ¼ B.L. ½ Ramb	½ Finn ½ Ramb
Pre-breeding wt. (6-17-82)	153.6	134.7	125.6
Post breeding wt.	155.1	140.1	134.1
Weaning wt. (3-31-83)	137.1	127.6	121.4
Pre-breeding wt. (6-15-83)	140.1	136.0	124.5
Wool wt.	9.9	11.0	10.7
Ewe score (6-8-83)	2.47	2.47	2.34
Number of ewes	37	36	35
% Ewes lambing	86	89	86
% Lambing rate	156	147	173
Lambing rate per ewe exposed (%)	135	131	149
% Single births	28	36	19
% Twins	72	64	69
% Triplets or more	0	0	12
% Death loss	18	11	13
Lbs. of lamb/ewe exposed	67	66	68
OUTSIDE EWES:			
Pre-breeding wt. (11-17-82)	147.1	139.9	138.4
Post-breeding wt.	158.0	152.8	146.4
Weaning wt. (7-25-83)	148.5	135.0	132.6
Pre-breeding wt. (11-18-83)	151.8	141.0	130.6
Wool wt.	10.1	11.2	10.2
Ewe score	2.76	2.44	2.47
Number of ewes	37	37	35
% Ewes lambing	92	92	97
% Lambing rate	179	191	206
Lambing rate per ewe exposed (%)	165	176	200
% Single births	13	8	4
% Twins	82	83	77
% Triplets or more	5	9	19
% Death loss	23	20	24
Lbs. of lamb/ewe exposed	69	73	76

TABLE 2. TWO YEAR SUMMARY OF EWE WEIGHT AND PRODUCTION

ITEM	Confined		Outside	
	1981-82	1982-83	1981-82	1982-83
Pre-breeding wt. (7/27/81)	111	138	113	143
Post-breeding wt.	115	143	141	152
Pre-breeding	138	134	143	141
% Ewes lambing	92	87	90	94
% Lambing rate	146	159	190	192
Lamb rate/ewe exposed (%)	134	138	172	180
Death loss	18	14	19	22
Lbs. lamb/ewe exposed	69	67	85	73

WHEAT STRAW FOR SELF-FEEDING CONFINED EWES
Project 3729

M.R. Light, T.C. Faller and D.O. Erickson

Summary

Results to date are variable with ewes fed 60% straw performing better than other groups. The reason for this group's level of performance cannot be explained. Percent ewes lambing was less than in 1982 but pounds of lamb produced increased.

Experimental Procedure

Two hundred and four yearling grade Columbia crossbred ewes were allotted into four treatment groups. Each treatment group was subdivided into three groups and placed in 12' x 24' pens on July 7, 1982. Treatment groups were as follows:

1. 100 percent ground alfalfa
2. 80 percent ground alfalfa + 20 percent ground straw
3. 60 percent ground alfalfa + 40 percent ground straw
4. 40 percent ground alfalfa + 60 percent ground straw

The ground roughage was mixed with water to alleviate dust and was fed with a mixer-feeder wagon three times weekly according to appetite. A salt mineral mixture was self fed.

All ewes were scored for body condition when the project was initiated and at intervals during the production year. Body scores of 5 = fat, 4 = good, 3 = medium, 2 = thin and 1 = emaciated. All ewes were fed common rations during the flushing, breeding, pre-lambing and lactation period.

Results and Discussion

All ewes increased their weights over 1981. Body weight and body condition scores are presented in tables 1 and 2. Ewes increased their weight from June, 1982 to November, 1982. Most ewes weighed more in June, 1983 than in June, 1982 except ewes fed the 60% straw:40% alfalfa ration. This group of ewes had the best level of performance, raising more pounds of lamb per ewe exposed.

Condition scores were similar for all groups of ewes throughout most of the year. The ewes fed 100% alfalfa were in the highest condition in June, 1983, averaging good plus condition. Ewes on the 60% straw had the lowest average score, averaging medium in condition.

Lambing rate increased from 1982 as would be expected. Lambing rate per ewe exposed was similar to 1982 data. Lamb death loss was less than in 1982 but higher than desired in two of the treatment groups. Information concerining ewe productivity is shown in table 3.

A summary of the first two year's data is presented in table 4. The experiment will continue for another year.

TABLE 1. EWE WEIGHTS

Ration	Initial 6-17-82	Mid-Gestation 11-22-82	Weaning 3-31 to 4-7-83	Maintenance 6-15-83
100% alfalfa	153.5	167.4	147.5	161.6
80% alfalfa:20% straw	150.0	162.3	150.0	161.3
60% alfalfa:40% straw	143.2	155.0	147.1	149.0
40% alfalfa:60% straw	153.3	159.0	147.0	144.6

TABLE 2. BODY CONDITION SCORES

Ration	Initial 6-17-82	Mid-Gestation 11-22-82	Weaning 4-7-83	Maintenance 6-15-83
100% alfalfa	3.1	3.5	3.2	4.4
80% alfalfa:20% straw	2.9	3.1	3.0	3.3
60% alfalfa:40% straw	2.9	3.1	3.1	3.2
40% alfalfa:60% straw	3.0	3.0	3.0	3.0

TABLE 3. EWE PRODUCTION

Item	Ration 100% Alfalfa	80% Alfalfa 20% Straw	60% Alfalfa 40% Straw	40% Alfalfa 60% Straw
Number ewes exposed	49	49	51	51
% Ewes lambing	84	86	82	88
% Lambing rate	151	155	140	158
Lambing rate/ewe exposed (%)	127	133	116	139
Single births (%)	32	29	42	30
Twin births (%)	68	71	58	62
Triplets and greater (%)	0	0	0	8
Death loss (%)	13	22	20	14
Lbs. lamb/ewe exposed	67	61	54	72

TABLE 4. TWO YEAR SUMMARY - EWE PRODUCTION

Production Item	Ration							
	100% Alfalfa		80% Alfalfa 20% Straw		60% Alfalfa 40% Straw		40% Alfalfa 60% Straw	
	82	83	82	83	82	83	82	83
% Ewes lambing	92	84	98	86	90	82	92	88
	(88)		(92)		(86)		(90)	
% Lambing rate	136	151	146	155	148	140	145	158
	(143)		(150)		(144)		(151)	
% Lambs/ewes exposed	125	127	143	133	133	116	129	139
	(126)		(138)		(125)		(134)	
% Death loss	31	13	37	22	28	20	23	14
	(22)		(29)		(24)		(19)	
Lbs. lamb/ewes exposed	49	67	46	61	51	54	61	72
	(58)		(54)		(52)		(66)	

WARM BARN HOUSING
Project 3729

M.R. Light, T.C. Faller and D.O. Erickson

Summary: Data for labor expenditures have been accumulated for 1983. These data are shown along with data that were collected in the previous 2 years.

Procedure: A log was kept of all work performed with sheep in the confinement barn. A comparison with data collected in 1981 and 1982 is shown in table 1. There were 408 ewes in place in 1982-83 as compared to 374.5 in 1980-81 and 432 in 1981-82.

TABLE 1 LABOR EXPENDITURES

	Hours 1982-83	HR/Ewe	Hours 1980-82	HR/Ewe
Barn Cleaning	78.5	.19	82.3	.20
Feeding	152.0	.37	149.33	.37
Bedding	70.0	.17	81.28	.20
Vaccination & Castration & Hoofing Trimming	57.5	.14	24.05	.060
Lambing	269.5	.66	250.9	.62
Shearing (3 x 16 hr)	48.0	.12	72.7	.18
Total	672.8	1.65	660.56	1.63

Total labor costs for maintaining and caring for 408 ewes and their lambs until weaned amounted to 672.8 hours or 1.65 hours per ewe. Labor expenditures have very closely followed the distribution patterns reported for the previous years.

The sheep unit utilized 11,414 kilowatts of energy to provide lighting and heat for the office building. This amounted to 28.0 KWH per ewe which is less greater than the previous years (33.7 KWH) in 1981 and 36.2 KWH in 1982. This reflects the mild winter of 1982-83.

Water consumption was 1.13 gallons per day per ewe and included water for the lambs until weaning and rams used during the breeding season.

Salt and mineral consumption was 7.5 lbs. per head or .33 oz. per day. This amount compares to .8 oz. per day in 1981 and .24 oz. per day in 1982.

Sheep bedding (straw) for 408 ewes and their lambs amounted to 1832 bales (4.49 bales per ewe). If straw is evaluated at .35 per bale the total cost for bedding was $641.20.

Confinement Management Update:

- Feeding 3 times per week continues to work well.
- 432 shorn ewes will heat facility, however, they may be over maximum for effective ventilation.
- The gravity water system had to be discontinued due to sedimentation in supply lines due to the low line pressure and back flushing did happen.
- Total confinement will require at least 1 hoof trimming annually and more often on white hoof Columbia type ewes.
- Clean wool production continues to be equal or superior to traditional systems, however, extreme caution must be exercised at shearing time to insure that the wool is of a proper moisture content (13% is maximum). We sheared ewes in the barn with no indication of high moisture content that when cored shown 19% moisture.
- Standby generator is a necessity.
- A ventilation system failure is of major consequence and a warning system is needed.
- Rodent control in the attic is important to maintain uniform insulation distribution.
- Poorer quality roughages do become more useable.
- Lambing date or dates may be very influential in lamb survival.
- A fire warnings system is essential.

SECTION II

VARIOUS PREVIOUS REPORTS

Presented by

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and

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Animal Science Department
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and

Dr. Leroy Johnson
Previous Station Superintendent

at the

25th Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

February 8, 1984

A GENERAL SUMMARY AND RECOMMENDATIONS RESULTING FROM RESEARCH CONDUCTED ON FEEDER LAMBS AT THE HETTINGER STATION AND AND THE SHEEP BARN AND RESEARCH CENTER AT THE MAIN STATION

Duane Erickson, Merle Light, William Slanger, Robert Harrold,
Tim Faller, Wes Linesand, and Myron Hankel

SUNFLOWER MEALS:

There are several sunflower processing plants and each plant produces sunflower meals of varying nutritional composition. Research was conducted on meals with protein levels of 28, 34, and 40% with estimated TDN levels of 60, 68, and 72% respectively. The fat content will vary with the processing method used. Fiber contents are usually higher with the lower protein level meals because they contain a high portion of the hulls. Mineral contents are variable among the meals. Each company or plant has this type of information on their respective products.

To determine the nutritional value of sunflower meals several laboratory and lamb experiments have been conducted by the Animal Science Department over the past 5 years. These experiments have included laboratory techniques that establish the solubilities, degradability in the rumen and digestibilities as well as the nutritional contents. Small animal experiments have been conducted to determine protein quality of the meals. Methods to increase rumen by-pass protein have been extensively studied and quality measures on the effects of protein protection have been investigated. Numerous experiments both in the feed lot and in the metabolism crate environments have been conducted using lambs ranging in initial size from about 44 to 70 pounds to determine the lamb performance in terms of gain, feed efficiency digestibility and carcass characteristics. Most of the experiments involved the use of soybean meal as a comparative or control protein supplement.

The experiments have supported the following general conclusions concering sunflower meals as it related to use in lamb diets.

- Sunflower meals support satisfactory gains and feed efficiencies in high energy finishing diets.
- Sunflower meals (40^{+}) support gains and feed efficiencies equal to that of soybean meal or with various combinations of sunflower and soybean meals when fed in diets of equal protein and TDN. When sunflower meal was substituted for soybean meal on an equal weight bases without correcting for the lower TDN and protein of the sunflower meal the lambs gained slightly less and required slightly more feed per gain.
- Sunflower meals (28 and 34%) combined in equal quantities with soybean resulted in similar gains and feed efficiencies for the lambs compared to soybean meal.
- Diets containing equal sunflower and soybean meals resulted in similar digestibilities of dry matter protein and energy compared to diets containing only soybean meal as a protein source. The sunflower meal diets alone resulted in slightly lower digestibilities than the soybean and sunflower/soybean meal combinations.

- Protein quality measures were similar between the sunflower and soybean meal diets as measured with lambs or rats.
- Urea can be used to replace part of the SFM in both high and low energy lamb diets without affecting lamb performance, digestibilities or protein quality.
- Sunflower meals are more soluble than soybean meal which would indicate a higher portion of protein degraded in the rumen. The results of test in the laboratory and with lambs indicate that similar amounts and rates of sunflower meals and soybean meal are degraded in the rumen.
- The application of protein protection procedures such as heat, formaldehyde and microwave heat were effective in protein protection of both sunflower and soybean meals as indicated by a reduced protein degradation in the rumen. Some of the higher concentrations of formaldehyde and levels of heat resulted in protein over-protection as indicated by reduced total protein digestibilities. Sunflower and soybean meals did respond differently to protein protection procedures. Microwave treatments did not alter protein quality of absorbed protein as measured by biological values using rats.

PROTEIN REQUIREMENTS:

Protein levels (sunflower or soybean meals) of 14 to 16% (90% DM) are required for early weaned (56 days) lambs with initial weights of 60 pounds or less that have a potential to gain .75 pounds or more per day.

GRAINS:

Lambs usually performed better on shelled corn diets compared to corn/oats diets. When the oats were heavy and lamb initial weights were heavy lamb performance was similar between corn and corn/oats.

VITAMINS:

The addition of the B vitamin niacin to high energy corn diets do not result in increased lamb gain but there was an apparent improvement in feed efficiency.

The information concerning carcass characteristics and some metabolic studies are currently being analyzed and are part of a doctoral thesis. This information will be available and hopefully published early in 1984. The individual experimental results are published in the previous "Hettinger Annual Sheep Day Reports".

All the data generated from these trials on the nutritional characteristics of sunflower meal should help in making more accurate management decisions and recommendations concerning its use in lamb diets.

Graduate students involved in this research:
Larry Insley (Ph.D.), Eduardo Abondano (Ph.D.), Metha Wanapat (Ph.D.) Tim Flakott (MS)

SELF FEEDING STRAW IN RATIONS FOR GESTATING EWES

M.R. Light and T.C. Faller

SUMMARY:

A three-year study of self-feeding ground wheat straw with ground alfalfa from the end of mating until six weeks prior to lambing are reported. Replicated groups of Suffolk were fed rations containing straw at levels of 0, 20, 40, and 60 percent until approximately six weeks prior to lambing. Fertility levels for all groups were poor. Dry ewes in groups ranged from 11.6 to 14.7 percent. The percent lambs dropped per ewe exposed ranged from 129 to 140. Survival rates for lambs in all groups ranged from 73 to 80 percent. It appears that there were no significant differences in production between groups. Rations containing straw were more economical.

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 to 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:

One hundred thirty-five Suffolk ewes were assigned to a completely randonized design experiment on the basis of age, weight and condition at the Hettinger Experiment Station. 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 festation, all ewes were self-fed a ration that more than met minimal NRC requirements.

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

RESULTS AND DISCUSSION

Conditions scores, feed consumption, feed analyses, body weight changes, and lamb production and survival are presented in tables 1 through 7.

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 conditions scores reflect a slightly less than desired state of conditions. In each of the years there was an increase in body fat during the trial 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

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. All lots gained weight in 1979 which is explained by the small differences in protein plus fiber content of rations fed 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 as 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 greatly influence the performance of ewes when self-fed high fiber rations. Weather conditions during the corse of the trial would be termed to be near average in 1977, much below average in 1978, and above average in 1979.

Lamb productions and survival rates are shown in table 6. Lambs born per ewe exposed varies between years as does the number of lambs born per ewe lambing. The overall average (table 7) shows little difference between these variables. Lamb survival rates do not vary significantly when the three-year average is examined although year-to-year differences do exist. By any standards, survival rates of 73 to 80 percent are considered poor and are no doubt a reflection of the inbred parental ewes' productive ability.

TABLE 1. EWE CONDITION SCORES

Groups	Ration (% 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/head/day (lb)			Alfalfa/head/day (lb)			Feed/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/head/Day* (Dollars)			3 - Year Average
		1977	1978	1979	
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./ton alfalfa and $30./ton straw.

TABLE 4 FEED ANLYSES

Ration Description	Matter (%)				Fiber (%)				Protein (%)			
	1977	1978a*	1978b*	1979	1977	1978a*	1978b*	1979	1977	1978a*	1978b	1979
0% Straw	84.4	89.3	84.7	88.8	27.9	39.3	33.7	32.1	17.1	10.8	16.4	14.5
20% Straw	84.6	87.6	86.0	88.6	28.1	43.5	31.8	32.9	15.8	9.0	14.3	13.5
40% Straw	83.2	87.5	86.7	88.6	32.9	38.6	44.0	33.1	12.6	11.9	8.9	13.5
60% Straw	85.9	87.5	89.4	89.7	35.7	43.4	47.2	35.4	10.7	9.4	8.2	13.4

* 1978a - Fed during last 30 days of trail.
* 1978b - Fed first 30 days of trail.

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	+ 0.9	- 9.9	11.7

TABLE 6. Lamb Production and Survival

	1			2			3			4		
	Alfalfa			20% Straw			40% Straw			60% Straw		
	1978	1979	1980	1978	1979	1980	1978	1979	1980	1978	1979	1980
Number ewes	35	33	35	35	33	34	35	33	34	34	34	36
Number lambed	31	31	29	32	31	28	29	27	31	29	28	32
% Dry (ewes)	11.4	6.1	17.1	8.6	6.1	17.6	17.1	18.2	9.1	14.7	17.6	11.1
Lambs	44	47	46	48	51	47	41	42	49	41	44	55
% Born/ewe exposed	126	142	131.4	137	154.5	138.2	117	127.2	144.1	121	129.4	152.8
Lambs weaned	33	36	33	30	37	35	31	33	42	29	33	46
% Weaned/ewe exposed	94.3	109.1	94.3	85.7	112.1	102.9	88.6	100	123.5	85.3	97.1	127.8
% Survival (lambs)	75.0	76.6	71.4	62.5	72.5	74.5	75.6	78.6	85.7	70.7	75.0	83.6

TABLE 7 Lamb production (3-year average)

	1 Alfalfa	2 20% Straw	3 40% Straw	4 60% Straw
Number ewes	103	104	102	104
Number ewes lambed	91	91	87	89
% Dry	11.6	12.5	14.7	14.4
Number lambs born	137	146	132	140
% Born/ewe exposed	133	140	129	135
% Born /ewe lambing	151	160	152	157
Number lambs weaned	102	102	106	108
% Lambs weaned	99	98	104	104
% Lamb survifal	74.5	72.9	80.3	77

RUMENSIN FOR EARLY WEANED WINTER LAMBS

Lambs that are raised in confinement during winter months are frequently infected with coccidia organisms and are diagnosed as having coccidiosis. Symptoms include thin, water, or dark colored feces and a resulting weight loss. Lambs born and raised on pastures rarely contract coccidiosis until brought into close quarters for finishing or pen feeding. Sheep flocks at the North Dakota State University have had a history of coccidia outbreaks in their February and March born creep fed lambs.

This experiment was initiated to test the efficacy of Rumensin for controlling coccidiosis and to determine its effect on weight gains and feed efficiency. Previous work at the Hettinger Experiment Station (1976) had shown Rumensin to be effective in reducing numbers of coccidia oocysts in feeder lambs. It also increased feed efficiency.

PROCEDURE:

Seventy-three weaned Hamphire sired crossbred lambs from Finn x Rambouillet or Border Leicester x Rambouillet dams were allotted into two groups. The control lot consisted of 32 ewe and wether lambs that averaged 35.5 pounds. Rumensin fed lambs were similar in sex and breeding and averaged 38 pounds. All lambs had been creep fed rations that were identical prior to the initiation of this experiment. The ration formulation was as follows:

Ingredient	Percent
Corn	74.11
Oats	14.82
SBOM	9.89
Dicalcium Phosphate	.49
Amonium Chloride	.49
ADE Pre Mix	.20

The grain mixture was hand fed twice daily adlibitum. Alfalfa hay (long) was provided in hay feeders and the amount was restricted to allow maximum grain consumption. Mineral boxes containing two parts of iodized salt and one part of dicalcium phosphate were provided for each lot.

Rumensin was added at the level of 15 grams per ton of grain ration for five weeks and was then increased to 20 grams per ton until the completion of the trial. The Rumensin was batch-mixed with the entire grain ration in a twin spiral mixer.

Fecal samples were collected from four randomly selected lambs when the project was initiated and at varying intervals thereafter. Fecal examinations for Eimeria oocysts were made by the North Dakota State University department of Veterinary Science.

All wether lambs assigned to this experiment were slaughtered under federal inspection when they attained a weight of at least 100 pounds. All ewe lambs that were assigned to this experiment have been retained in the North Dakota State University breeding flocks.

RESULTS AND DISCUSSION

Weight gains for experimental lambs are shown in table 1.

TABLE 1

No.	Treatment	Initial Wt.	Daily Weight Gains by Periods (Pounds) Per 1	Per 2	Per 3	Per 4	Total
32	Control	35.53	.553	.644	.672	.900	.649
41	Rumensin	38.02	.535	.651	.623	.722	.614

Gains for both groups were excellent considering the low initial weights. Data analyses reveal no significant differences in gains between groups due to ration, sex of lambs or breed of dams' sire except in period four when control lambs gained significantly faster.

Feed consumption and conversion ratios are given in table 2.

TABLE 2 EIMERIA OOCYST FECAL COUNTS

Lot	Control	Rumensin
Grain/day pounds	1.90	1.81
Hay/day pounds	.375	.293
Pounds grain/lb. gain	2.93	2.96
Pounds hay/lb. gain	.58	.48
	3.51	3.46

There were no significant differences found in consumption or conversion ratios. The level of feed consumption and also feed conversion was excellent in this trial. The amount of hay fed and consumed was low, varying from 14 to 16.5 percent of the ration. The low roughage to concentrate ratios did not seemingly detract from lamb performance although it is possible that faster gains might have been obtained had a somewhat higher proportion of alfalfa hay been fed.

The effect of adding Rumensin to rations on coccidia oocysts levels are given in table 3. Values are for lambs samples at random. (Following page)

Rumensin markedly reduced average oocyst numbers per gram of wet feces within the first weeks. For all practical purposes coccidiosis was eliminated within the first month. The most surprising finding in this experiment was that control lambs gained as rapidly and efficiently as those fed Rumensin even though more heavily parasitized.

Experiments should be designed to test whether feeding Rumensin to the pregnant ewes would reduce or eliminate coccidia infection in the lambs from birth through market weights.

TABLE 3 EIMERIA OOCYST FECAL COUNTS

Treatment - Rumensin							
Date	4-07	4-14	4-22	4-29	5-06	5-25	6-03
Oocysts No's	3300	600	0	0	9850	0	0
	600	1200	650	50	200	0	50
	2800	0	300	200	0	50	0
	550	5450	1300	400	0	0	0
Total	7250	7250	2250	650	10050	50	50
Average	1812.5	1812.5	562.5	162.5	251.5	12.5	12.5
Treatment - Control							
Date	4-07	4-14	4-22	4-29	5-06	5-25	6-03
Oocysts No's	1200	900	14500	700	33600	0	1100
	55800	650	56000	1800	19400	0	5950
	450	550	250	6650	2850	50	300
	700	400	1400	5350	12950	2600	20050
Total	55150	2500	59100	14500	68800	2650	27400
Average	13787.5	625	14775	3625	17200	662.5	6850

CONCLUSIONS:

Rumensin was effective in reducing coccidis oocysts within 28 days. No differences were found between control lambs or those fed Rumensin in rate of gain or feed conversions.

PROJECT: HES 6261

TITLE: Ralgro Implants for Pasture Lambs

PERSONNEL: T.C. Faller, M.R. Light, W.E. Dinnuson

OBJECTIVES: To evaluate the use of Ralgro (zeranol) implants for increasting the growth rate of mixed lambs grazing alfalfa pasture.

PROCEDURE:

Ninety-one ewe lambs and ninety-seven wether lambs of mixed breeding were wormed and randomly allotted to four lots. The lambs in one lot of each group were implanted in the ear with a 12 mg. pellet of Ralgro (zeranol). All lambs were grazed on alfalfa stumpage for 55 days, from July 24 to September 17. The results of gains is given in the following table.

	No.	Weight (lbs.) Initial	Final	Average Daily Gain (lbs.)	% Increase
Ewes, control	46	72.7	95.7	0.419	
Ralgro	45	75.9	99.3	0.426	+ 2
Wethers, control	48	75.6	98.8	0.403	
Ralgro	47	80.0	106.5	0.480	+19.1

One lamb was lost from bloat in the ewe control and wether treated lots. It is interesting to note that the ewe lambs in the control lot outgained the wether lambs in the control lot whereas, the treated wether lambs outgained the treated ewe lambs by about 12.5%

Looking at the results another way, by using covariance analysis to adjust initial weights, it can be predicted that for all lambs, both ewes and wethers, implanting with Ralgro and pasturing on alfalfa stumpage will result in an increased gain of about 2.5 pounds per lamb.

Work planned for the coming year:

A similar trial will be conducted in 1977, and possibly will be expanded to include young growing lambs that are nursing.

PROJECT: HES 6261

TITLE: Monensin for Finishing Lambs (Hettinger)

PERSONNEL: T.C. Faller, W.E. Dinnuson

OBJECTIVES:

1. To evaluate Monensin as a coccidiostat for lambs.
2. To determine the most efficient dosage level.
3. To measure any other effects of Monensin on Lambs.

PROCEDURE:

Two hundred and forty range lambs will be purchased and randomly allotted by sex and weight groups into eight lots of thirty lambs each.

Prior to initiating the experiment fecal samples will be taken as prescribed by Eli Lilly and Co., and sent to the Greenfield Laboratories for analysis. If this preliminary sample show that the lambs have coccidiosis, the project will be aborted rather than attempt to replace them with "clean" lambs and other treatments will be used. If lambs are clean, then samples will be taken each 28 day period. If clinical coccidiosis is observed during the experiment, fecal samples will be collected from affected individuals.

Initial and final weights will be taken after an overnight shrink and for each 28 day period during experiment. To permit evaluation of effect of Monensin on feed intake, an extra weight will be taken 2 weeks (14 days) after initiation of experiment. Feed intake will be recorded for the first 14 days, 28 days, and each 28 day period thereafter.

Monensin will be used at 4 levels; 0, 5, 20, and 30 grams per ton of total ration. Each level will be fed to two lots (simple replicates). The Monensin will be thoroughly mixed with wheat bran to form a pre-mix (in 30 pounds of wheat bran per 1000 pounds of grain) to permit more uniform mixing. When thoroughly mixed in the grain (crushed corn) the grain will be mixed with chopped roughage in proper ratios in a mixing wagon and put in self-feeders in the respective lots.

Samples of grain mix and also of total ration should be taken for five days, mixed and pooled for analysis. A sample of this pooled mixture will be submitted for analysis. Sampling will be done in this manner for each ration and each time a new grain mix is made. These samples will be sent to Eli Lilly for determination of uniformity and level of Monensin in each mix. Samples for feedstuffs - roughage and grain - shall be sent to North Dakota State University, Animal Science, for standard feedstuffs analysis.

The rations fed will be 2/3 cracked wheat, 1/2 crushed oats and chopped alfalfa. A suitable mineral mixture will be fed ad libitum. The roughage to concentrate ratio shall be 60% roughage, 40% grain for first 28 days, a 50:50 ratio for next 28 days and a 40:60 for the third 28 days or as long as lambs are on trial.

Lambs will be marketed at weights of 100-120 pounds. If lambs average less the 65 pounds initially they may all be implanted with Ralgro. If heavier, than Ralgro will not be used to permit at least a 56 day finishing period, preferably 84 days. All Monensin will be removed at least 48 hours before slaugher.

At conclusion of experiment lambs will be taken to slaughter and routine carcass measurements taken (dressing percentage, grade and finish) as well as any other measures deemed appropriate.

Elanco data sheets will be used to record weights and feed intake.

The experimental results will be provided to Eli Lilly's representative, period by period and the summary of results published in Hettinger Sheep Day reports.

Hettinger Branch wishes to acknowledge a grant of $2500.00 by Eli Lilly Co. for support of this project.

"SUMMARY OF REMENSIN FEEDING PROJECT"

	Pen 1 5 grm level	Pen 2 Cont. 0 grm level	Pen 3 30 grm level	Pen 4 20 grm level	Pen 5 5 grm level	Pen 6 Cont. 0 grm level	Pen 7 30 grm level	Pen 8 20 grm level
INITIAL INFORMATION								
Ave. Initial Wt. (lbs)	77.63	73.96	75.53	74.47	74.30	73.96	73.83	73.43
Ave. Initial Wt. shorn (lbs.)	73.70	69.56	70.83	69.94	70.17	69.83	69.60	69.30
Ave. Wool Wt.	3.93	4.40	4.70	4.53	4.13	4.13	4.23	4.13
Ave. Final Wt. (30 hd.)	102.83	102.20	100.80	99.70	103.90	99.70	98.80	95.33
Ave. Wt. of Carcass Data Lams (15 hd.)	102.2	99.86	98.33	101.53	102.30	101.33	100.4	97.86
GAIN INFORMATION								
Ave. Wt. Gain Period 1 (14 day)	(-.866)	4.60	(-.067)	(-1.33)	(-.967)	(-2.90)	4.30	(-2.03)
Ave. Da. Gain Period 1 (14 day)	(-.602)	.316	(-.005)	(-.095)	(-.069)	(- .20)	.288	(-.145)
Ave. Wt. Gain Period 2 (14 day)	9.46	8.30	10.70	10.30	10.86	8.6	6.63	6.70
Ave. Da. Gain Period 2 (14 day)	.676	.593	.764	.736	.776	.614	.474	.479
Ave. Wt. Gain Period 3 (28 day)	15.13	13.67	12.30	11.43	15.10	16.10	12.80	14.73
Ave. Da. Gain Period 3 (28 day)	.540	.488	.439	.408	.539	.575	.457	.521
Ave. Wt. Gain Period 4 (13 day)	5.40	4.20	7.07	9.36	8.7	8.1	6.13	6.63
Ave. Da. Gain Period 4 (13 day)	.415	.323	.544	.721	.669	.623	.471	.510
Ave. Gain Full Period (lbs.)	29.13	32.64	29.97	29.76	33.73	29.87	29.30	26.03
Ave. Da. Gain Full Period (lbs.)	.422	.473	.434	.431	.488	.433	.425	.377

Summary of Rumensin Feeding Project (cont.)

	Pen 1 5 grm level	Pen 2 Cont. 0 grm level	Pen 3 30 grm level	Pen 4 20 grm level	Pen 5 5 grm level	Pen 6 Cont. 0 grm level	Pen 7 30 grm level	Pen 8 20 grm level
Carcass Information								
*Ave. Shrunk Wt. at Sioux Falls	98.80	96.46	94.93	98.13	98.9	97.93	97.0	94.46
*Ave. Shrink	3.40	3.40	3.40	3.40	3.40	3.40	3.40	3.40
Hot Carcass Wt. (lbs.)	52.06	51.53	49.20	52.07	52.33	50.43	51.67	48.80
Dressing Percent (%)	52.69	53.42	51.82	53.06	52.91	51.49	53.26	51.76
Loin Eye Area (sq.in.)	2.297	2.225	2.316	2.360	2.371	2.204	2.335	2.308
Est. Kidney Fat (lbs.)	2.96	2.68	2.98	3.03	2.43	2.98	2.81	2.82
Fat Thickness	.165	.160	.156	.188	.175	.170	.173	.185
Firmness Grade (2-25)	16.5	16.0	15.7	16.2	16.7	15.6	15.5	15.7
USDA Grade	11.93	11.80	11.13	12.20	11.40	11.35	11.13	11.13
Feed Consumption								
Oats	1283.0	1328.0	1548.00	1077.0	1375.00	1382.0	1255.0	1097.00
Wheat	2587.0	2682.0	3122.00	2163.0	2775.00	2792.0	2537.0	2213.00
Alfalfa	4720.0	5110.0	5560.00	4340.0	5250.00	5225.00	4940.00	4010.00
Total Feed	8590.0	9120.0	10230.00	7580.0	9400.00	9400.00	8732.00	7320.00
Feed 1# Gain	9.82	9.31	11.38	8.49	9.29	10.92	9.93	9.36

LAMB FEEDING INCOME AND EXPENSE
(Per Lamb Basis)

	Pen 1 5 grm level	Pen 2 Cont. 0 grm level	Pen 3 30 grm level	Pen 4 20 grm level	Pen 5 5 grm level	Pen 6 Cont. 0 grm level	Pen 7 30 grm level	Pen 8 20 grm level
Feed Costs								
Oats @ 4.5¢/lb.	1.92	1.99	2.32	1.62	2.06	2.08	1.88	1.65
Wheat @ 4.0C/lb.	3.45	3.58	4.16	2.88	3.70	3.72	3.38	2.95
Alfalfa @ 2.5¢/lb.	3.93	4.26	4.63	3.62	4.38	4.40	4.12	3.34
Total Fed Cost	9.30	9.83	11.11	8.12	10.14	10.20	9.38	7.94
Feed Cost/lb. Gain Marketed	.361	.336	.418	.308	.334	.385	.374	.285
Wool Income								
Wool Wt.	3.93	4.40	4.70	4.53	4.13	4.13	4.23	4.13
Wool Inc. @ .83/lb.	3.26	3.65	3.90	3.76	3.43	3.43	3.51	3.43
Shearing Expense	.81	.81	.81	.81	.81	.81	.81	.81
Net Wool Income	2.45	2.84	3.09	2.95	2.62	2.62	2.70	2.62
Drug & Death Costs								
Drugs (Incl. vacc. & Drench)	.50	.50	.50	.50	.50	.50	.50	.50
Death Loss	.00	.00	.00	.00	.00	.00	.00	.00
Total Income								
Lamb sales	48.72	48.31	47.73	47.19	49.25	47.19	46.80	45.06
Wool sales	3.26	3.65	3.90	3.76	3.42	3.43	3.51	3.43
Total	51.98	51.96	51.63	50.95	52.67	50.62	50.31	48.49
Expenses								
Purchase	35.70	34.03	34.74	34.25	34.17	34.02	33.96	33.78
Feed Costs	9.50	9.83	11.11	8.12	10.14	10.20	9.38	7.94
Shearing Expense	.81	.81	.81	.81	.81	.81	.81	.81
Drug Costs	.50	.50	.50	.50	.50	.50	.50	.50
Death Loss	.00	.00	.00	.00	.00	.00	.00	.00
Trucking to Sioux Falls	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Total	47.31	46.16	48.16	44.68	46.62	46.53	45.65	44.03
Return to Labor & Management	4.67	5.80	3.47	6.27	6.05	4.09	4.66	5.46

PRODUCTIVITY OF AGED WESTERN WHITEFACED EWES UNDER NORTH DAKOTA CONDITIONS

Timothy C. Faller

Introduction and Objective

What can you afford to pay for short term ewes? What lambing percents can be expected of aged western ewes? How long will short term ewes stay Productive?

These and many similar questions stimuated the following cost accounting to get a handle on the levels of productivity income, and expenses that could be expected from short term ewes purchased from the western range area and subjected to North Dakota's time grasses and climatic conditions.

Procedure

100 western ewes were purchased in August 1977 and bred to lamb during March. Records will be kept concerning expenses and income origination 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, 1980	7
No. ewes died June 1, 1978 to present	6
No. ewes culled and sent to market as unproductive	22
No. ewes bred to lamb in 1979	65
Original purchased price of ewes	2,000.00
Trucking	165.00
Ewe feed from August 20, 1977 to August, 1978	3,000.00
Lamb feed to finish lambs to market	1,200.00
Expenses	$6,365.00

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	940.00
Income	$7,972.00

Returns above purchased price, trucking and feed $1,607.00

1979 Report

No. ewes bred to 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 Aughts 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

Ewes feed - August 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
Expense	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
Income	5,048.44

1979 returns over direct costs 2,114.94

1980 REPORT

No. ewes bred to lamb 1980	34
No. ewes lambing	28
Lambs born	43
% born per ewe bred	126.5
% born per ewe lambing	153.7
Lambs weaned	41
% lambs weaned per ewe bred	120.6
% lambs weaned per ewe lambing	146.4
Ave. wool production (12 month fleece)	10.7#
No. ewes died July 1, 1979 to June 1, 1980	2
No. ewes culled and sent to market June 1	32

EXPENSES

Ewe feed July 1, 1979 to June 1, 1980	1,300.86
Lamb feed weaning to market (40-103#)	697.41
Shearing 32 x 1.30	41.60
Expense	2,039.87

INCOME

Sale of 41 lambs at 103# and 64¢/lb.		2,702.72
Sale of 32 ewes culled at 127# and 13.5¢/lb.		548.64
Sale of wool including incentive 343.1 x 1.21/lb.		415.15
	Income	3,666.51
1980 returns over direct costs		1,626.64
Total Direct Expenses (3 years)		11,038.37
Total Income (3 years)		16,687.45
Net Income over direct costs for 3 years		5,649.08

* 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 month 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 60 dollars per head or even higher in 1979 and then fell to $35-40 in 1980 depending on the quality and time of purchase.

6. No attempt was made to eveluate labor, veterinarian cost, building, depreciation, etc.

SUMMARY

The ewes in this accounting were bred for use in other research projects and this cost accounting results from numerous request 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 and finally in January of 1980. The ewes were traditional May lambers in Wyoming and

this may have contributed to lowered fertility as 11% remained open. The severity of the winter of 1977-78 affected lamb survival. The ewes had adequate milk productions, 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 appeared that the milder winter of 1979-80 improved total performance of these aged ewes over previous years, especially considering their advanced age.

Ewes of the age, type, and quality of those involved in this cost accounting would probably perform at a higher level if subjected to a management program specifically designed for 6-9 year old gummer ewes. The ewes involved were managed in traditional systems going to tame grass pastures during summer and being confined from flushed till lambs were weaned.

It would appear that you could expect 2 lambings for each ewe purchased when purchasing <u>good quality</u> aged ewes and that intital price of the ewe would be major determinate of profitability under similar price situations, (for feed, lamb, and wool) as those experienced during the course of this accounting.

ND 3707 PRODUCTIVITY OF SELECTED SHEEP BREEDS AND CROSSES UNDER NORTH DAKOTA CONDITIONS (1977 Report)

The most important factor to a profitable sheep enterprise is the number of lambs marketed per ewe exposed. Many factors influence the percent lamb crop marketed. Of these, selection of parental stock having the genetic capability of conceiving and bearing large numbers of offspring is of primary importance.

An experiment was initiated in 1965 to determine the potential of crossbred offspring of two breeds not commonly raised in North Dakota or other parts of the United States, the North Country Cheviot and the Border Leicester. These breeds are white faced, medium to large in size, clean faced and clean legged. They do not carry a reputation for being outstanding wool producers but are used extensively in the British Isles to sire crossbred commercial ewes. Rams of these two breeds were mated to Columbia and Rambouillet ewes and these crossbred offspring are being compared with each other and with straightbred Columbia and Rambouillet ewes and also with Columbia x Rambouillet crossbreds.

Experimental Procedure

The Hettinger Branch Experiment Station contracted with a commercial Columbia sheep producer and with a commercial Rambouillet producer to produce the experimental females for this experiment. Each producer randomly allotted his ewes into four groups of about 40 each. Each group was then mated to either a Columbia, Rambouillet, North Country Cheviot or Border Leicester ram considered to be of typical commercial quality. The initial mating were made in the fall of 1965 and the first delivery of eight breeds or breed combinations were made to the experiment station in the fall of 1966. All lambs were handled as a single unit during the winter and summer period that followed. Additional like matings were made in the fall of 1966.

These ewes lambs were delivered the fall of 1967 as the final ewes for evaluation.

The initial matings of the experimental ewes were made in the fall of 1967 to Hampshire and Suffolk rams. Ewe groups were randomly assigned to Hampshire and Suffolk ram groups and to February and April lambing groups.

In the fall of 1971 an additional 16 ewe lambs of each cross were contracted for, excluding the reciprocal crosses, and adding Finnish Landrace crosses. These ewes were added to check information already collected in the crossbreeding project, and to compare Finn crossbred ewes to the various crosses worked with. The new ewe lambs were to begin lambing the spring of 1973. Twenty-four each of Border Leicester-Rambouillet and Finn-Rambouillet crosses were added to begin lambing in 1974 and 13 additional Border Leicester-Rambouillet crosses were added to begin lambing in 1975.

The following is a summary of the production of the ewes added since 1973.

TABLE 1

EFFECT OF BREED OF SIRE ON EWE'S WOOL PRODUCTION

Breed of Sire	Grease Fleece Wt.	Staple Length (MM)
Rambouillet	10.4	78.00
Columbia	9.9	99.7
Border Leicester	10.7	116.9
North Country Cheviot	8.3	91.2
Finnish Landrace	8.8	97.6

TABLE 2

EFFECT OF BREED OF SIRE ON EWE'S BODY SIZE

Breed of Sire	Pre-Breeding Wt.	Pre-Lambing Wt.
Rambouillet	144.0	170.3
Columbia	139.3	166.3
Border Leicester	141.7	173.0
North Country Cheviot	142.5	162.3
Finnish Landrace	121.2	150.2

TABLE 3

EFFECT OF BREED OF SIRE ON LAMBING PERFORMANCE

Breed of Sire	Lambs Born	Lambs Weaned	Loss Percentage
Rambouillet	136.9	114.6	16.0
Columbia	142.8	118.8	16.8
Border Leicester	141.9	122.0	14.0
N. C. Cheviot	121.5	101.3	16.5
Finn-Landrace	191.6	155.6	18.8

1 - Includes only those lambs raised on dam.

TABLE 4

EFFECT OF BREED OF DAM ON EWES WOOL PRODUCTION

Breed of Dam	Grease Fleece Wt.	Staple Length (MM)
Rambouillet	10.1	94.3
Columbia	9.0	101.7

TABLE 5

EFFECT OF BREED OF DAM ON EWES BODY SIZE

Breed of Dam	Pre-Breeding Wt.	Pre-Lambing Wt.
Rambouillet	140.8	169.6
Columbia	134.7	158.4

TABLE 6

EFFECT OF BREED OF DAM ON LAMBING PERFORMANCE

Breed of Dam	Lambs Born	Lambs Weaned	Loss Percentage
Rambouillet	154.9	130.5	15.8
Columbia	129.7	106.9	17.6

TABLE 7

CROSSBRED EWE PRODUCTION (1973-76)

Cross	Grease Fleece Wt. Lbs.	Staple Length (MM)	Pre-Breeding (lbs.)	Lamb wt. lbs.	Lamb Born/ 100 ewes	Lambs Weaned/ 100 ewes
Ramb. x Ramb.	10.53	77.31	142.4	168.7	136.7	112.2
B. L. x Ramb.	11.26	112.25	145.5	179.8	149.7	133.1
N.C.C.x Ramb.	8.76	86.58	146.5	167.7	130.5	111.0
Finn x Ramb.	9.01	95.17	122.9	154.2	200.0	159.6
Col. x Col.	9.54	92.44	132.4	160.6	134.7	112.0
B. G x Col.	9.40	126.57	134.3	159.1	127.5	98.6
N.C.C.x Ramb.	7.69	96.86	137.5	155.0	110.5	89.6
Finn. x Col.	7.73	107.17	114.8	134.7	160.0	140.0

TABLE 8

LAMB PERFORMANCE

Cross	Birth Wt. Lbs.	Wean Wt. Lbs.	Wean Age Days	Mkt. Wt. Lbs.	Market Age Days
Ramb. x Ramb.	11.09	48.66	68.25	100.28	173.25
B. L. x Ramb.	10.56	49.62	75.55	102.21	177.33
N. C. x Ramb.	11.01	48.06	68.45	100.62	174.17
Finn x Ramb.	8.13	42.71	71.76	97.77	197.33
Col. x Col.	10.84	51.57	70.99	100.42	165.82
B. L. x Col.	9.56	46.47	69.75	99.20	177.93
N. C. x Ramb.	10.19	44.11	66.68	101.80	181.76
Finn x Col.	7.99	37.46	65.22	99.26	189.36

RESULTS

It would appear at this time that reproductive performance of all ewes purchased after 1973 was lower than the original ewes purchased on 1966 and 1967; however, the same trends are evident. The use of Border Leicester rams to produce white faced crossbred ewes made significant improvements in prodtivity when used on Rambouillet ewes and decreased productivity when mated to Columbia ewes and finns were retained for replacement. The use of Finnish Landrace rams to produce crossbred ewes appears to be a profitable practice primarily if your goal is to increase lamb production. In all cases F, finn cross ewes were more prolific than their dams. Lambs sired by blackfaced rams from F, Finn-cross ewes required 10 to 14 additional days to reach acceptable market weight. The use of Border Leiscester rams did slightly increase the grease fleece wts. of resulting F, crossbred ewes, and crossbred ewes resulting from North Country Cheviot and Finnish Landrace crosses reduced wool production.

Project: N D 3719

Title: Field Evaluation of a Repellant to Reduce Coyote Predation in Sheep

Objectives:

1. To test the effect of cynamic aldehyde on coyote predation of sheep.
2. To test the effect of a collared repellant on lamb growth.
3. To test the lifespan of collars - when applied to sheep.

Methods:

Collars containing cynamic aldehyde were put on 610 lambs and 609 lambs without collars were utilized on control animals at five ranches. The five ranches involved were in distinctly different topographical locations. Twenty-five each of the treatment and control lambs were randomly selected, weighed, and marked for identification at each ranch. Information concerning the numbers of lambs born and death causes prior beginning the project was obtained from each ranch site. Regular weekly visits were made to each ranch for observation. When losses occured at any site trained personnel went to that site and determined the cause of death. Information concerning and pictures were obtained as each loss occured.

TABLE I

Effect of Collars on Weight Test Lambs (5 ranches)

	Collared Lambs	Non-Collared
Initial Number	125	125
Lambs Lost to Coyotes	2	8
Lambs Lost to Coyotes %	1.6	61.4
Lambs Lost to Other Causes	13	16
Lambs Lost to Other Causes %	10.4	12.8
Total Lambs Lost	15	24
Total Lambs Lost %	12.0	19.2
Average Daily Gain (lbs.)	.3260	.3269

TABLE II

Ranch Differences on Weight Test Lambs

	Ranch 1	Ranch 2	Ranch 3	Ranch 4	Ranch 5
Initial No.	50	50	50	50	50
Lambs Lost to Coyotes	6	4	0	0	0
Lambs Lost to Coyotes %	12.0	8.0	0	0	0
Lambs Lost to Other Causes	9	12	6	0	0
Lambs Lost to Other Causes %	18.0	24.0	12.0	0	4.0
Total Lambs Lost	15	16	6	0	2
Average Daily Gain (lbs)	.254	.3235	.386	.438	.2322

TABLE III
Total Lamb Losses

	Ranch 1	Ranch 2	Ranch 3	Ranch 4	Ranch 5
Breeding Ewes	50	330	275	90	225
Lambs Born	142	480	325	95	340
Lambing Percent	94.6	145.5	118.2	105.6	151.1
Lambs Lost in Lambing Season	6	48	13	15	81*
Lambs at Beginning of Test Period	136	432	312	80	259
Lambs Lost to Coyotes	15	61	1	0	0
Lambs Lost to Other Causes**	17	43	26	0	15

*A large number of lambs (½) were bummed and sold(triplets).
**Some may have been due to coyotes but could not be verified.

TABLE IV
Causes of All Lamb Losses (5 Ranches)

Death Causes	Number	Percent
Stillborn Lambs	45	15.05
Poisonous Plants	1	.33
Coyote Predation	77	25.75
Entrotoxemia	26	8.70
Starvation	44	14.72
Unknown Causes	106	35.45
Total	299	100.00

TABLE V
Effect of Collaring Lambs with Cynamic Aldehyde on Coyote Predation

Death Cause	Collared	Non-Collared
Poisonous Plants	00	1
Coyote Predation	27	50
Entrotoxemia	11	12
Unknown Causes	36	41
Total	74	104

Summary:

The following information is offered concerning comparisions from field tests of a collared repellant. The use of collars on lambs had no effect on gains of lambs. Of the lambs selected for the weight test 1.6% of the collared lambs were lost to coyote predations as opposed to 6.4% of the non-collared lambs. 8.2% of the total non-collared lambs were lost to coyote predation as compared to 4.4% of the collared lambs. 43.3% of the lambs lost during the test period were lost to coyote predation. 25.8% of all losses including those prior to the test period were lost to verified coyote predation. Five percent of the total lambs born on the five ranches involved were lost to coyote predation. The losses of lambs to coyote predation may or may not have been greater, as some of the lambs lost for unknown causes could have been the result of coyote predation.

Conclusion:

It was found that a significant number of all lambs born were lost to coyotes and collared cynamic aldehyde did decrease the loss. It should be noted that more lambs were lost to other causes than were lost to coyote predation.

ESTRUS CONTROL IN SHEEP

Jim Tilton

Control of reproduction in ewes has been attempted many times and by many different means during the past two decades. Progress in this area was aided by the development of a compound which could be given orally for a limited period of time, then withdrawn. This was followed by a large percentage of the females exhibiting sexual desire. The compound to first undergo extensive study was Provera (6-methyl-17-acetoxyprogesterone). It was definitely successful in synchronizing the occurrence of estrus but its use was limited because many were dissatisfied with the fertility levels subsequent to its use.

Another area of interest to the sheepmen was work initiated to stimulate out of season breeding activity. This also has not been successful to the extent desired. Certain breeds do show some response to hormonal stimulation, but those responding are breeds that naturally exhibit a limited amount of estrual activity at times when sheep are considered anestrus, or non-breeders.

Trial I:

Work at Fargo and Hettinger stations in recent years has involved two different compounds, one given orally and one absorbed intravaginally. Work involving melengestrol acetate was initiated both at Fargo and Hettinger and was mentioned at this sheep day two years previous. Melengestrol acetate was developed to control heat in feed-lot heifers, but because less material is needed for estrus control it was decided to study its effectiveness in sheep. The compound was group-fed 14 days at a level of 0.2 mg. per head per day. At Hettinger one group also received a 500 I.U. injection of HCG two days post-treatment to increase the chance of occurrence of ovulation. Results of its initial use are presented in Table 1.

Synchronizaion was good but first service conception was slightly reduced. The Columbia ewes at Hettinger responded to the treatment but differences were not meaningful because of an exceptional group of control ewes. Trends indicated a slight reduction in fertility in all MGA treated groups with an advantage in lambing and weaning percent for the control group. Average weaning weight was similar in all groups.

Trial II:

The following spring MGA was used to study any possible effect it might have on stimulating out-of-season mating. Four breeds of ewes were treated with combinations of 0.Z mg MGA, 500 I.U. of pregnant mare serum (PMS) or 500 I.U. of human chorionic gonadotropin (HCG). Some response was attained in all breeds where MGA was given alone or followed by a PMS injection. None of the other treatments were followed by any noticeable influence on estrus of fertility (Table II).

The Rambouillet and Dorset ewes did respond to treatments imposed in this trial. Of the 36 ewes treated in these two breeds, 20 ewes were observed in estrus. Note should be taken that these figures include 4 or 5 controls in estrus. Lambs weaned per ewe bred were much improved in the Rambouillet and Dorset ewes as compared to the Hamphires and Suffolks. Of the 20 Dorset and Rambouillet ewes exhibiting estrus, 17 lambed. Of the Suffolk and Hampshire ewes in estrus (21) only eight lambed.

Ewes which normally exhibit some expressions of estrus in spring responded slightly to our treatments. The normally anestrou ewes responded to only very limited degree. Another indication of this observation is the response of the control Suffolk and Hampshire ewes in estrus (1 of 10) versus the control Rambouillets and Dorsets (4 of 5).

TABLE 1

SYNCHRONIZATION AND FERTILITY RESULTS
WITH MELENGESTROL ACETATE (MGA)

	Fargo Ewes			Hettinger Ewes	
	Treated	Control	Control	MGA	MGA+HCG
Number	37	37	25	24	25
Mean Interval from Treatment to Estrus	2.6	4.9	8.3	3.0	5.7
Percent Synchronized	78.4	---	--	91.7	76.0
Mean interval from Treatment to Conception	12.3	9.8	8.3	6.0	6.0
First Service Conception Rate (%)	55.9	64.9	100.0	87.5	96.0
Percent Conceived Twenty Days Post-Treatment	88.9	83.8	100.0	87.5	88.0
Percent Open Ewes	11.8	14.7	0	12.5	4.2
Lambing Percent/Ewes Bred	144.0	152.9	164.0	133.3	162.5
Lambing Percent/Ewe Lambing	163.3	179.3	164.0	152.4	169.6
Percent Lambs Weaned Per Ewe Bred	91.2	102.9	144.0	108.3	158.3
Percent Lambs Weaned Per Ewe Lambing	103.3	120.7	144.0	123.8	165.2
Percent Lamb Mortality	36.7	32.7	12.2	15.4	2.6
Ave. Weaning Weight (lb.)	71.8	74.8	73.7	74.6	73.7

INFLUENCE OF VARIOUS COMBINATIONS OF PROGESTINS AND PLACENTAL GONADOTROPINS ON ESTRUAL BEHAVIOR AND LAMBING RESPONSE

Breed of Ewe	TREATMENTS: MGA PMS HCG	MGA PMS	MGA HCG	PMS HCG	MGA	PMS	HCG	D	TOTAL
Suffolk									
No. Treated	9	8	7	7	7	7	9	5	59
No. in Estrus	2	2	2	1	3	0	0	00	10
No. Synchronized	1	1	1	1	3	0	0	-	7
Percent Synchronized	11.1	12.5	14.3	14.3	42.9	0	0	-	11.9
No. Lambing	1	2	1	0	1	0	0	0	5
Percent Lambing	11.1	25.0	14.3	0.0	14.3	0.0	0.0	0.0	16.9
Lambing Rate/Ewe Bred	50.0	100.0	100.0	0.0	33.3	0.0	0.0	0.0	70.0
Lambing Rate/Ewe Lambing	200.00	100.0	200.0	0.0	100.0	0.0	0.0	0.0	140.0
Lambs Weaned/Ewe Bred	50.0	100.0	100.0	0.0	33.3	0.0	0.0	0.0	60.0
Lambs Weaned/Ewe Lambing	100.0	100.0	200.0	0.0	100.0	0.0	0.0	0.0	120.0
Hampshire									
No. Treated	12	6	6	8	7	6	8	5	58
No. in Estrus	3	2	0	1	3	1	0	1	11
No. Synchronized	1	0	0	0	0	1	0	-	2
Percent Synchronized	8.3	0.0	0.0	0.0	0.0	16.7	0.0	-	3.4
No. Lambing	1	0	0	0	2	0	0	0	3
Percent Lambing	8.3	0.0	0.0	0.0	28.6	0.0	0.0	0.0	5.2
Lambing Rate/Ewe Bred	50.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	27.3
Lambing Rate/Ewe Lambing	100.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	100.0
Lambs Weaned/Ewe Bred	33.3	0.0	0.0	0.0	66.7	0.0	0.0	0.0	27.3
Lambs Weaned/Ewe Lambing	100.0	0.0	0.0	00.0	100.0	0.0	0.0	0.0	100.0

Table 2 (continued)

INFLUENCE OF VARIOUS COMBINATIONS OF PROGESTINS AND PLACENTAL GONADOTROPINS ON ESTRUAL BEHAVIOR AND LAMBING RESPONSE

Breed of Ewe	TREATMENTS								
	MGA PMS HCG	MGA PMS	MGA HCG	PMS HCG	MGA	PMS	HCG	C	Total
Dorset									
No. Treated	2	2	1	2	2	2	2	3	15
No. in Estrus	2	0	1	1	1	1	0	2	8
No. Synchronized	1	0	1	0	0	0	0	-	2
Percent Synchronized	50.0	0.0	100.0	0.0	0.0	0.0	0.0	-	13.3
No. Lambing	1	0	1	1	0	1	0	1	5
Percent Lambing	50.0	0	100.0	50.0	0.0	50.0	0.0	33.3	33.3
Lambing Rate/Ewe Bred	100.00	0.0	100.0	100.0	0.0	100.0	0.0	100.0	87.5
Lambing Rate/Ewe Lambing	200.0	0.0	100.0	100.0	0.0	100.0	0.0	200.0	140.0
Lambs Weaned/Ewe Bred	100.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	75.0
Lambs Weaned/Ewe Lambing	200.0	0.0	100.0	100.0	0.0	100.0	0.0	100.0	120.0
Rambouillet									
No. Treated	3	3	3	3	2	2	3	2	21
No. in Estrus	3	2	1	1	0	1	1	2	12
No. Synchronized	1	2	1	0	0	0	0	-	4
Percent Synchronized	33.3	66.7	33.3	0.0	0.0	0.0	0.0	-	19.0
No.Lambing	3	3	1	1	0	1	1	2	12
Percent Lambing	100.0	100.0	33.3	33.3	0.0	50.0	33.3	100.0	57.1
Lambing Rate/Ewe Bred	166.7	166.7	200.0	200.0	0.0	200.0	200.0	150.0	175.0
Lambing Rate/Ewe Lambed	166.7	166.7	200.0	200.0	0.0	200.0	200.0	150.0	175.0
Lambs Weaned/Ewe Bred	166.7	133.3	200.0	100.0	0.0	100.0	0.0	33.3	116.7
Lambs Weaned/Ewe Lambed	166.7	133.3	200.0	100.0	0.0	100.0	0.0	33.3	116.7

Trial III.

Results obtained with MGA were not different enough from Provera to continue work with that compound. It was therefore decided to shift our efforts to another material called cronolone. The mode of administration of this compound was quite different and found to be more desirable. The compound was impregnated in a sponge which was inserted about 3 - 5 inches into the vagina. The material was slowly absorbed through the walls of the vagina and thus inhibited the occurrence of estrus. The sponge was left in place approximately 12 days and then removed. The ewes then began coming in estrus and mating occured.

Vaginal pessaries were first used in a group of ewes to test their effectiveness in controlling estrus during treatment, ease of insertion and removal, degree of sychronization, and fertility of the ewes after insertion.

Results of this pilot trial are presented in Table III. Sychronization in the three breeds of ewes used was excellent. The interval from treatment to occurrence of estrus was short and first service conception in the Hampshire and Cheviot ewes was very good. Apparently, there were ram fertility problems in the two Suffolk lots. Nearly 40 percent of these ewes were open at the end of the breeding season. Lambing percents were excellent with high lamb mortality in the Hampshire a major factor reducing percent lambs weaned per ewe bred or lambing.

Results of this trial would indicate excellent sychronization with good fertility and lambing production data following use of vaginal pessaries to control mating activity. These pessaries were used, however, when breeding activity would be expected to be maximal.

TABLE III

REPRODUCTIVE RESPONSE IN EWES
TREATED 12 DAYS WITH VAGINAL PESSARIES

	Breed of Ewe		
Criteria	Hampshire	Suffolk	Cheviot
No. Treated	32	35	9
No. Synchronized	31	34	9
Percent Synchronized	96.9	97.1	100.0
Mean Interval from Trt. to Estrus (days)	3.7	2.6	2.6
First Service Conception Rate (%)	76.0	34.5	88.9
Percent Conceived Twenty Days Post-trt.	88.0	62.1	100.0
Percent Open Ewes	12.0	37.9	0.0
Lambing Percent/ Ewe Bred	152.0	93.1	162.5
Lambing Percent/ Ewe Lambing	172.7	150.0	162.5
Percent Lambs Weaned/ Ewe Bred	96.0	86.2	150.0
Percent Lambs Weaned/ Ewe Lambing	109.1	138.9	150.0
Percent Lamb Mortality	40.0	7.4	8.7
Ave. Weaning Wt. (lb.)	80.0	80.1	69.7

Trial IV.

Vaginal pessaries and PMS were used alone or in combination to study any possible stimulatory influence they might have on out-of-season reproductive behavior. Again four breeds were used. The pessaries were inserted for 12 days and then removed. Immediately following removal the PMS (1000 I.U.) was given to approximately half of the ewes that had a pessary and half to the control ewes.

Mating to fertile rams began in May. Some synchronization of estrus was observed in all breeds expecially where pessaries alone or with PMS were administered. The ewes that did respond were observed to exhibit estrus once; however; inititation of further cycles did not occur. Therefore, if conception did not occur at this first mating, no lambs were produced. Of the ewes receiving the pessary, 46 or 82 were observed in estrus. However, only 19 of these later produced a lamb. In the control ewes or those not having the pessary, 21 of 77 were in estrus and 11 subsequently lambed.

The use of PMS was of some value in increasing the percent lambing in the ewes treated with pessaries but not in the control ewes. It also increased lambing rate both in the pessary and control treated groups.

TABLE IV

SYNCHRONIZATION AND FERTILITY WITH VAGINAL PESSARIES IN A FALL LAMBING PROGRAM

Breed of Sheep	No.	No in Estrus	Int. from trt. to Estrus	Percent Synchronized	Percent Lambing	Lambing Rate
Suffolk						
P	18	12	3.8	66.7	11.1	100.0
P+PMS	17	8	3.9	47.1	23.5	100.0
C	15	3	9.0	----	0.0	0.0
C+PMS	19	7	5.3	----	0.0	0.0
Hampshire						
P	14	6	4.3	42.9	7.1	100.0
P+PMS	18	8	4.5	47.1	23.5	175.0
C	13	2	5.5	----	15.4	100.0
C+PMS	15	3	7.7	----	13.3	150.0
Rambouillet						
P	3	1	2.0	33.3	0.0	0.0
P+PMS	4	4	6.8	100.0	75.0	166.7
C	3	3	11.0	----	100.0	133.3
C+PMS	5	2	4.0	----	20.0	200.0
Dorset						
P	4	3	4.0	75.0	50.0	150.0
P+PMS	4	4	2.5	75.0	75.0	100.0
C	4	0	0	----	50.0	100.0
C+PMS	3	1	6.0	----	33.3	100.0
Overall	159	67	5.4	----	18.9	130.0
P	39	22	3.5	56.4	12.8	120.0
P+PMS	43	24	4.4	55.8	32.6	135.7
C	35	8	8.5	----	20.0	114.3
C+PMS	42	13	5.8	----	9.5	150.0

a Pessarys removed May, 1968

TIME OF LAMBING

One of the major decisions a sheep producer must make is to set his lambing date. Many considerations relative to availability of winter feed and summer pasture, seasonal availability of labor and available housing and markets must be made.

This trial was designed to compare the results obtained in terms of monetary return and the costs involved when lambing ewes at various times of the year. Results are to be used as guides to producers when establishing their own management systems.

EXPERIMENTAL PROCEDURE

Sixty three commercial Columbia ewes were divided equally as to weight and age into three groups. Group I started lambing on February 1. The lambs were creep fed, weaned and placed on the early market as fat lambs. Group II started lambing on March 13. These lambs were not creep fed, but were allowed to graze early crested wheat grass, then alfalfa and then native pastures. At weaning time, they were weighed and priced as feeders and then fed out and sold as fat lambs. Group III started lambing May 1 on grass. These lambs were handled in the same manner as those in Group II. All groups were bred to the same Suffolk rams.

TABLE I: Basic Information

Feed Prices

Corn	$ 1.35 per bushel
Oats	.60 per bushel
Barley	.90 per bushel
Two year old alfalfa hay	15.00 per ton
New alfalfa hay	18.00 per ton

Pasture Charges

Crested and native pasture	$ 2.50 per A.U.M.
Alfalfa pasture	4.00 per A.U.M.

Animal Unit Conversion Rates

5 ewes with lambs = one animal unit or 150 sheep days - one A.U.M.
7 dry ewes = one animal unit or 210 sheep days - one A.U.M.

Cost considered constant between all groups

Sires	Shearing
Veterinary	Fencing
Ewe replacement	Salt and mineral
Drenching	

Cost considered constant between February and March lambs

Bedding - Housing - Labor

Selling Costs

Shrink - 6% to St. Paul Market
Shrink - 2% to local market
Commission and trucking to St. Paul - $2.00 per head
Commission to local market - .50 per head

Fleece

11.0 pound average per ewe @ 71¢ or	$ 7.81
Estimated federal subsidy	1.25
	$ 9.06

TABLE II: Summary of Four Years Data:

		Feb.1 Group 1	Mar. 15 Group 2	May 1 Group 3
Number of ewes involved	1963	19	21	19
	1964	19	16	18
	1965	21	21	21
	1966	21	21	21
Total		80	79	79
Lambs dropped (per cent)	1963	157.9	157.1	126.3
	1964	152.6	131.3	133.3
	1965	142.9	181.0	133.3
	1966	157.1	109.5	133.3
Average		152.6	144.7	131.6
Lambs weaned (per cent)	1963	131.6	123.8	100.0
	1964	147.4	112.5	122.2
	1965	142.9	161.9	119.5
	1966	142.9	109.5	114.3
Average		141.2	126.9	114.0
Days of age @ weaning	1963	81.4	138.8	123.7
	1964	93.6	116.3	149.4
	1965	81.5	123.4	131.6
	1966	84.5	131.2	136.9
Average		85.3	127.4	135.4
Average weaning weight	1963	67.4	81.7	66.5
	1964	64.3	69.7	80.5
	1965	70.8	84.5	62.1
	1966	68.9	89.0	92.7
Average		67.9	81.2	75.5
Lambs marketed (per cent)	1963	131.6	123.8	94.7
	1964	147.4	112.5	122.2
	1965	138.1	161.9	119.5
	1966	142.9	109.5	114.3
Average		140.0	126.9	112.7
Days of age @ market	1963	130.9	188.7	232.6
	1964	149.8	193.8	207.9
	1965	143.4	175.2	218.2
	1966	152.0	161.4	156.2
Average		144.0	179.8	203.7
Average market weight	1963	94.2	103.4	113.8
	1964	93.8	109.3	108.1
	1965	100.4	105.0	104.2
	1966	103.6	100.7	98.9
Average		98.0	104.6	106.3
Annual Feed Cost per ewe (not including lamb feed)	1963	9.09	9.36	8.58
	1964	11.25	10.89	9.69
	1965	13.77	14.37	12.30
	1966	13.94	12.81	10.13
Average		$12.01	$11.86	$10.18

TABLE II (cont'd)

		Group1	Group 2	Group 3
Lamb feed cost per lamb	1963	3.95	2.40	4.54
	1964	4.91	4.29	3.08
	1965	5.84	3.40	6.41
	1966	5.57	1.60	1.01
Average		$ 5.07	$ 2.92	$ 3.76
Return per ewe over feed cost if lambs sold as feeders	1963		17.20	11.89
	1964		13.41	17.43
	1965		22.55	10.58
	1966		16.51	20.49
Average			17.42	15.10
Return per ewe over feed cost if lambs sold as fats	1963	20.24	18.06	15.19
	1964	19.61	16.87	19.92
	1965	15.70	23.66	16.00
	1966	16.59	16.84	19.91
Average		18.04	18.86	17.47

Summary

After four years of this trial it is apparent that the number of lambs weaned and marketed is the most important factor influencing the relative profits from the three lambing groups.

The February and March lambing groups had a small advantage in return per ewe over feed cost. Return per ewe was not consistent over the four years, however, with differences between years being more important than differences between lots.

Because there is not a clear cut difference in the relative profits of the three lambing groups, other factors, such as availability of shelter and labor, have to be considered when deciding when to lamb.

Title: EFFECTS OF FALL SHEARING ON LAMB PRODUCTION

Objective: To determine if shearing ewes prior to breeding has a beneficial effect in terms of increased twinning or more rapid and uniform conception rates due to fewer ill effects from warm fall weather.

Procedure: A flock of 42 purebred Suffolk ewes was divided into two lots of equal age and weight. One lot was shorn approximately 2 weeks before breeding and the other left unshorn. Both lots were handled as a single flock except for shearing. One ram was turned with the flock nights only.

Records were kept on ewe weight changes during the breeding season, gestation and lactation, number of lambs born and their 30 day and weaning weights.

SUMMARY OF A FOUR YEARS DATA:

		Not shorn Lot 1	Shorn Lot 2
Percent lambs born per ewe bred	1963	135.0	160.0
	1964	171.4	145.0
	1965	190.4	133.3
	1966	123.3	185.7
Average		155.0	156.0
Percent Lambs Weaned per ewe bred	1963	105.0	125.0
	1964	166.6	120.0
	1965	161.9	123.8
	1966	123.3	166.6
Average		139.2	133.9
Pounds of Lamb Produced per ewe at 120 days of age.	1963	80.9	95.1
	1964	120.8	90.3
	1965	136.3	93.6
	1966	109.4	141.8
Average		111.9	105.2

Summary:

After the fourth and final year of this trial the four year averages show that shearing ewes prior to breeding is a negative practice in North Dakota in terms of percent lambs weaned and pounds of lamb produced per ewe.

The results of this trial were not consistent from year to year. In those years, such as 1966, that weather during the breeding season was very mild, fall shearing did produce a large positive effect in percent lambs dropped and consequently, in pounds of lamb produced per ewe. However, because the weather in the Northern Plains is not predictable from month to month, fall shearing could no be recommended for this area.

EFFECTS OF INJECTABLE VITAMINS ON LAMB PRODUCTION

Objective: To determine if Vitamin A administered as a single injection will give a positive response in lamb production and which level will give the greatest response.

Procedure: A flock of 42 purebred Suffolk ewes were divided into three lots of equal age, weight and management background (one half of the ewes were fall shorn). Lot 1 ewes were given a single injection of 500,000 I.U. of Vitamin A about two weeks before the beginning of breeding season. Lot 2 received an injection of 250,000 I.U. of Vitamin A at the same time. Lot 3 was used as a control lot, receiving no vitamin injection.

SUMMARY OF DATA FOR THREE YEARS:

		500,000 Lot 1	250,000 Lot 2	Control
No. ewes in trial	1964	32	32	32
	1965	35	35	35
	1966	35	35	35
Total		102	102	100
Lambs dropped/ewe bred	1964	159.4	153.1	143.3
(Percent)	1965	154.3	154.3	157.1
	1966	122.8	151.4	151.4
Average		145.1	153.9	151.0
Lambs weaned/ewe bred	1964	143.8	137.5	123.3
(Precent)	1965	140.0	142.9	142.9
	1966	111.4	140.0	142.8
Average		131.4	140.2	137.0
Percent born 1st 17	1964	92.2	72.3	62.8
days of lambing	1965	64.5	72.7	72.7
	1966	83.7	79.2	84.9
Average		80.1	74.7	73.5
Pounds of Lamb Produced	1964	104.7	105.9	96.4
per ewe at 120 days	1965	116.1	123.3	117.9
	1966	97.7	118.6	121.4
Average		106.2	116.2	112.7
Death loss of lambs	1964	9.8	10.2	14.0
Percent)	1965	9.3	9.1	9.1
	1966	9.3	7.5	5.7
Average		9.5	8.9	9.3

Summary:

After the third and final year of this trial, no distinct pattern of response to injectable Vitamin A can be seen.

In 1966 a consistently lower lambing percentage was observed for the lots receiving 500,000 units of Vitamin A. This response was not consistent over the three years, however. No consistent patterns were observable for data concerning lamb weights.

Data averaged over the three years shows an advantage in lambing percent, death loss and pounds of lamb produced at 120 days for the lots receiving 250,000 units of Vitamin A. Because of the variable response, however, the use of injectable Vitamin A can not be recommended for ewes being handled under similar conditions.

It must be remembered that these ewes were wintered on good quality alfalfa hay. The response to Vitamin A may be different under different conditions.

Efforts to curtail disease losses for 1966-67 have included the use of an antogenous bacterin, the alternate use of phenothiazine and thiobendazole drenches 6 times yearly and the daily feeding of a supplement containing aureomycin (60 mg/ew/day) and vitamins A and D. In addition, our sheep are fed Morton's Tm 6 mineral mixture which also contains A & D. Each ewe will be injected with 600 mg of terramycin intermuscularly immediately following parturition. Fifty mg. of terramycin will be injected intermuscularly into each living lamb immediately following birth. Observations on lambs from College non NC50 ewes which are now lambing indicate that lambs from treated ewes are very strong at birth and that ewes are milking excellently. N.D.S.U. preventative measures also include vaccination against contagious ecthyma, vibrionic abortion, listeriosis and enterotoxemia approximately 6 weeks to 2 months prior to parturition.

Breeding Data: N.D.S.U. used ram lambs for the breeding season of 1965. Results of their use are shown in Table 3.

Table 3 - Ram Performance

Ram Group	N.D. COL.	OHIO COL.	N.D. SUFF.	ILL. SUFF.	AVE.
% Ewes Lambing	79.22	80.95	80.88	87.71	81.4
% Lamb/ewe lambing	1.49	1.49	1.55	1.56	1.49
% Lambs/ewe exposed	1.12	1.19	1.25	1.34	1.25

In no instances were there ram lambs that failed to impregnate ewes in their breeding pens. The conception rate for three heat cycles varied from 100% to 60%. The overall flock fertility level is not good. A lambing rate of 1.25 lambs per ewe exposed, plus a loss of lambs to weaning that exceeds 20% makes progress in generation turnover something less than spectacular.

Carcass Traits of Columbia, Suffolks and their Reciprocal Crosses

Eighty lambs representing the various possible crosses were slaughtered at N.D.S.U. during 1966. These following data were taken on all lambs.

Data Collected

1. weight weighed off
2. shrunk weight
3. hot carcass weight
4. cold carcass weight
5. USDA grade
6. conformation score
7. maturity score
8. quality score
9. over all score
10. loin eye area
11. fat thickness
12. thickest point of fat (rib)
13. fat 4-5 lumbar junction
14. shoulder width
15. leg width
16. leg circumference
17. % of rack
18. % of trimmed hind saddle
19. kidney knob
20. conformation
21. back conformation
22. feet and legs
23. pasterns
24. wrinkles
25. face covering
26. face color
27. horns
28. neck
29. shoulder
30. back
31. loin
32. condition - USDA grade
33. rump
34. leg
35. grade
36. uniformity
37. black fiber
38. length of point of shoulder to hip
39. length of point of shoulder to pin
40. length from hip to pins
41. age in days
42. hind saddle index

Carcass Data

Carcass data were collected on eighty lambs during this past year. Simple averages of some of the carcass traits are presented in Table 2.

Table 2 - 1966 NC-50 Carcass Traits

Type mating[1]	44	55	66	77	46
No. Lambs	10	13	5	7	9
Age at Slaughter	174.3	157.5	154.4	185.3	165
Live wt. lbs.	93.5	104.7	105	88.0	103.3
Carcass wt.	45.6	55.4	56.3	44.5	53.8
USDA Grade[2]	10.2	12.1	11.4	10.4	11.4
Conformation Score	10.6	12.6	12.8	10.7	12.3
Loin eye area	1.79	2.20	2.55	1.75	2.09
% Rack	51.1	51.2	50.7	51.4	51.1
% Hind Saddle	48.9	48.8	49.3	48.6	48.5
Hind Saddle Index	106.2	154.1	160.4	104.2	142.6

1 - 44=Ohio Col., 55= Ill. Suff., 66= N.D. Suff., 77= N.D. Col., 46= Ohio Col. x N.D. Suff.

2 - 15= p^+ 14= p^o 13= p^-

Table 2 - 1966 NC-50 Carcass Traits (cont.)

Type Mating[1]	64	57	75	64x4	46x6
No. Lambs	5	1	9	16	5
Age at Slaughter	164.4	153.	151.1	181.8	146.4
Live wt. lbs.	100.2	109.	102.8	99.5	109.0
Carcass Wt.	50.9	55.	51.9	50.4	57.2
USDA Grade[2]	11.2	11.0	11.7	10.9	11.6
Conformation Score	11.8	12.0	12.0	11.1	12.6
Loin eye area	2.01	1.99	2.09	1.92	2.22
% Rack	51.5	52.7	50.8	50.8	50.9
% Hind Saddle	48.9	47.3	49.2	49.2	49.1
Hind Saddle Index	133.9	145.8	140.7	130.3	158.5

64=N.D. Suff x Ohio Col. 57=Ill. Suff x N.D. Col. 75= N.D. Col. x Ill. Suff.
2 - 15=p^+ 14= p^o 13= p^- These data indicate wide breed differences in carcass characteristics.

Analysis of these data show that significant differences between breeds were found characteristics except 11, 12, 13, 17, 18, 21, 22, 27, 36, and 39.

Selected data concerning carcass characteristics are presented in simple averages in table 2.

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The Effects of Shearing on Suffolk Ewes

Merle R. Light, Timothy C. Faller, and C. LeRoy Johnson

Information has been presented on shearing ewes prior to breeding. Shearing ewes prior to breeding in North Dakota may or may not be advantageous, depending upon the climatic conditions that prevail during the breeding season and the management employed.

Shearing ewes and rams has been advocated as a management practice to increase the number of lambs dropped per ewe and the fertility of rams. Rams commonly are shorn several weeks prior to the breeding season, particularly if ewes are mated in August or September. Ewes are not commonly shorn in North Dakota prior to the breeding season.

This study was initiated in the fall of 1963 at the Hettinger Branch Experiment Station to determine the effect of fall shearing on Suffolk ewe productivity.

Procedure

A flock of 42 purebred Suffolk ewes was divided into two lots according to weight and age. They were reallotted annually for the duration of the experiment. One lot was shorn in late August, approximately two weeks prior to breeding, and the other was left unshorn. Both lots were managed together as a single unit except for the shearing process. One ram was turned with the flock nightly from September 6 through October 17, and rested during the hot part of the day.

Data were collected on ewe weight changes during the breeding season, gestation and lactation, number of lambs born, weaned and their 30-day and weaning weights. Annual wool production was also recorded.

Results and Discussion

Average ewe weights are shown in Table 1. Pre-breeding weights were remarkably uniform throughout the duration of the experiment. On the other hand, weight gains during mating were variable. They appeared to be influenced by climatic conditions during individual seasons. There were like differences in weight changes between groups during seasons when temperatures were mild. However, during cooler seasons the unshorn ewes gained from 32 to 46 per cent more (Table 3). Pooled data for the entire experiment reveals no significant differences for average weight gains during breeding.

It was not determined whether the lower rate of lamb drop was due to lower rate of ovulation or because of embryonic mortality.

Light is professor, Department of Animal Science; Faller is superintendent, Hettinger Branch Station; and Johnson is former superintendent, Hettinger Branch Station.

Table 1. Ewe Weight Information by Year and Four-Year Average

	1963		1964		1965		1966		4 Yr. Ave.	
	S[1]	NS[2]	S[1]	NS[2]	S[1]	NS[2]	S[1]	NS[2]	S[1]	NS[2]
Pre-breeding wt. (lbs.)	150.5	146.3	152.2	149.7	146.5	145.9	155.5	155.3	151.2	149.3
Post-breeding wt. (lbs.)	165.1	161.6	157.8	158.0	154.0	159.9	161.9	162.6	159.7	160.5
Ewe wt. change during breeding	14.6	15.3	5.6	8.3	7.5	14.0	6.4	7.3	8.5	11.2
Fleece wt. (lbs.)			6.0	5.3	6.2	5.7	5.7	5.9	6.0	5.6

[1] *S - designates fall shorn*
[2] *NS - designates not fall shorn*

Table 2. Lamb Weight Information by Year

	1963		1964		1965		1966		4 Yr. Ave.	
	S[1]	NS[2]	S[1]	NS[2]	S[1]	NS[2]	S[1]	NS[2]	S[1]	NS[2]
Birth wt (lbs.)	11.0	9.4	10.4	10.5	11.2	10.5	10.1	10.9	10.7	10.3
30-day wt. (lbs.)	27.1	27.4	25.2	25.6	32.2	31.1	29.6	31.8	28.5	29.0
Weaning wt. (lbs.)	85.6	78.2	64.4	64.1	94.3	96.9	84.4	90.3	82.2	84.6
Age at weaning (days)	135.0	135.8	102.7	106.1	133.7	138.2	119.1	122.2	122.6	125.6
Lbs. lamb at 120 days (lbs.)	95.1	80.9	90.3	120.8	93.6	136.2	141.8	109.4	105.2	111.5

[1] *S - designates fall shorn*
[2] *NS - designates not fall shorn*

The incidence of dry ewes and ewe death losses was recorded during this experiment. There were no significant differences between groups.

Birth, 30-day and weaning weights of lambs are presented in Table 2. There were no significant differences between groups for these characteristics. There was a trend for lambs from unshorn ewes to be somewhat older at weaning in each of the years. Reasons for this are not clear.

In those seasons when temperatures were high during the breeding period (above 60 degrees), the number of lambs dropped per ewe bred from shorn ewes was significantly higher. In years when temperatures were average or below, the unshorn ewes dropped more lambs. These observations agree with those of Dutt and Bush (1955) and Dutt et al. (1956) who demonstrated the harmful effects of high environmental temperatures on embryonic survival. Dutt et al. (1956) and Whiteman and Brown (1959) also demonstrated that shearing ewes prior to breeding had a positive effect on initiation of estrus and alleviated the effects of high temperatures.

Although there were significant yearly differences between groups in lambs dropped, combined data show non-significant differences between groups. These observations made possible the following recommendations to North Dakota sheepmen:

1. There is no advantage for shearing ewes prior to breeding if they are bred later than September.
2. Ewes to be bred in August, particularly, and possibly in September should benefit from shearing provided that (a) adequate protection is available in unseasonally cool falls, and (b) additional feed can be provided during breeding.

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Table 3. Air Temperatures, Lambing Percentages and Weight Changes of Ewes During Breeding Seasons

Year	Average Air Temp[3]	Shorn	Gain Lbs.	Unshorn	Gain Lbs.
1963	63.8	160.0	14.6	135.0	15.3
1964	55.1	145.0	5.6	171.4	8.3
1965	46.6	133.3	7.5	190.4	14.0
1966	60.4	185.7	6.4	123.3	7.3

[3] *Temp - designates degrees Fahrenheit from September 5 through October 17*

Project No: H-7-20

Title: Confinement Sheep Production

Objectives:

1. To determine the effects of sheep management systems on relative costs of production, effects on health, and effects on productivity.

Procedure:

The sheep in this project are divided into three management groups to study the various aspects of three systems of management on farm flock sheep production. Management systems to be compared are: (a) total confinement, (b) January to February lambing with ewes pastured during grazing season, and (c) April and May lambing with ewes and lambs grazed during the summer and fall months.

The date of initiation of this project was November 9, 1965, when the University flocks of Hampshires and Suffolks were assigned to this study. Due to the late date of the project initiation, all ewes were bred for early lambs and consequently the late lambing group was not included.

The plan of management was to feed the confined group a maximum of whatever silage was available. Corn silage and alfalfa silage was fed during the year. Hay was fed to this group during a time when the silage system failed. Ewes were fed oats six weeks prior to lambing and until lambs were weaned. All lambs were creep fed and were topped out and marketed when they weighed between 95 and 105 pounds.

Ewes not confined were wintered on alfalfa hay and were fed oats as indicated for the confined group. This group was pastured for 191 days.

Results:

Average rations fed to ewes and costs are presented in Table 1.

TABLE I

	Confined Groups		Early Lambing Pasture Groups	
Ave. Feed/day	Hampshires	Suffolks	Hampshires	Suffo'ks
Silage	6.02 lbs.	6.29 lbs.	-------	-----
Alfalfa Hay	2.44 lbs.	2.22 lbs.	2.38 lbs.	2.38 lbs.
Oats	.45 lbs.	.43 lbs.	.838 lbs.	.838 lbs.
Pasture Days	--------	---------	191	191
Total Costs	$18.81	18.45	11.84	11.84

Feed costs used: Silage @ $8.00 a ton, Alfalfa hay @ $15.00 a ton, Oats @ $2.00/cwt, Pasture @ $2.50 per animal unit.

In addition to these feed costs, each lamb consumed 240 pounds of creep feed costing .025 cents per pound for a total cost of $5.00 per lamb.

All ewes assigned to this experiment were drenched for internal parasites at the beginning of this project. The ewes which were pastured were drenched in June, and again in November. Confined ewes and lambs have not been drenched since allotted and fecal examination has indicated that this group is relatively parasite free and drenching has not been necessary.

The general health of ewes confined to dry lot has been excellent and is not noticeably different for those pastured during the summer and fall months. The long term effects are unknown, however at this time.

Replacement ewe lambs for each group will be provided from each management group. Each group will be grown out under the same management regime under which ewes are maintained.

Work Planned for Next Year:

The project will continue as outlined, 1966 will mark the first year in which all groups will lamb as indicated. The confined and early lambing pasture groups are now lambing and the late lambing groups was bred to lamb beginning in May. Comparative figures will be available for all groups in 1966.

Prepared by: Merle R. Light

CREEP FEEDING LAMBS ON PASTURE - DOES IT PAY?

Merle R. Light & C. N. Haugse[1]

The creep feeding of commercial lambs on pasture is not widely practiced in North Dakota. Because it is highly desirable to grow lambs quickly to take advantage of higher market prices which usually prevail early in the season, experiments were designed to test the effects of creep feeding on gains of grazing lambs. Trials were conducted during the 1963 and 1964 pasture seasons.

Experimental Procedure -

Trial I - 1963 - Forty-two ewes and their lambs were allotted into two groups according to age, sex, and birth type of lambs. Lot 1 served as the control group and Lot 2 was creep fed during the grazing period. The creep feed consisted of 50% whole oats and 50% whole corn and was fed in calf creep feeders that were modified for use by lambs. The creep feeders were located near the water supply and no particular problems were noted in getting lambs to consumed feed.

The creep feeding period began on May 17, 1963 and was completed when all lambs were weaned on August 5th.

All lambs were drenched and reallotted after weaning to determine the feasibility of finishing lambs on pasture as compared to finishing in dry lot. One half the lambs from each lot were assigned to dry lot or to pasture finishing groups and were fed a ration consisting of 50% oats and 50% corn plus one pound of alfalfa pellets per day.

Trial II - 1964 - Sixty ewes and their lambs were alloted into four groups to test the value of creep feeding on pasture. Each group was equallized as far as possible according to sire, sex, and birth type of lambs. Lot 1 and 3 were creep fed and Lots 2 and 4 served as control groups.

The creep feeding period began May 8, 1964 and was completed on July 24, 1964 when all groups were weaned and placed in dry lot for finishing to market weight.

The rations for creep feeding and finishing were pelleted and formulated as shown in Table I.

Table I -- 1964 Ration Composition

Ingredient	Ration 1	Ration 2[2]
Corn	500	540
Oats	185	400
SBOM	100	50
Alfalfa	200	
Dicalcium phosphate	5	5
TM Salt	10	5

Vitamin A was added at the level of 1,000 I.U./lb.
Vitamin D was added at the level of 200 I.U./lb.
By analysis ration 1 contained 15% protein.
Ration 2 contained 13.9% protein.

[1] The authors gratefully acknowledge the able assistance of Sig Hendrickson in the care and management of the animals during these trials.

[2] Fed June 6 until lambs were weighed off and marketed.

Results and Discussion

The results of the 1963 pasture creep feeding trial are shown in Table II.

Table II -- Creep Feeding vs. No creep -- 1963

Treatment	Creep fed	Non-Creep fed
No. lambs	24	29
No. days	77	77
Av. Gain lbs.	52.9	44.6
ADG	.463*	.402
Av. Daily Feed Consumed	.65	----

The creep fed lambs consumed a total of 2108 pounds of feed during the creep feeding period. Creep fed lambs had noticeably more "bloom" when weaned. If grain is figured at 2¢ per pound and lamb prices were assumed to be $21.50, then the cost for feed and the advantage of gain almost exactly counter balance one another.

The results of pasture finishing as compared to dry lot finishing lambs after weaning are presented in Table III.

Table III -- Dry lot vs pasture finishing

Lots No.	1	2	3	4
Treatment	Pasture & Grain	Dry Lot	Pasture & Grain	Dry Lot
Initial wt. (lbs.)	53.4	46.4	49.3	46.6
Final wt. (lbs.)	93.3	106.5	98.9	107.3
No. Days	98	98	98	98
ADG (lbs.)	.316	.508*	.335	.461**
Feed/lb gain	10.3	6.2	8.0	5.76
Feed cost lb/100 gain	$18.06	$10.81	$15.02	$10.83

The superiority of finishing lambs in dry lot as compared to pasture is clearly evident. Even though fall pasture and weather conditions were considered adequate, the performance of lambs on pasture was inferior under the conditions of this trial.

The 1964 creep feeding summary is shown in Table IV.

Table IV -- Creep Feeding on Pasture - 1964

Lot. No.	1	2	3	4
Treatment	Control	Creep Fed	Control	Creep Fed
Initial Wt.	29.5	31.4	30.6	32.1
Weaning Wt.	68.2	72.8	60.3	75.8
Days	77	77	77	77
ADG (pasture)	.498	.537	.383	.559

The average gain for creep fed lambs was 42.1 lbs. as compared to 34.1 lbs. for non-creep fed lambs or 19% faster. The creep fed lambs were, as in 1963, fatter and had more bloom. The creep fed lambs consumed 1.04 lbs. of creep feed per day during the 1964 trial. Using the same figures of 2¢ per pound for feed and $21.50 as the price of lambs, the cost of gain is quite similar to the value of the gain ($1.60 vs. $1.72).

Following weaning, all lambs were finished for market in dry lot. The ration fed was ration 2 shown in Table V.

* Significant at the 5% level .
** Significant at the 1% level.

Table V -- Dry Lot Performance - 1964

Lot No.	1	2	3	4
Prior Treatment	Control	Creep Fed	Control	Creep Fed
Initial Wt.	68.2	72.8	60.3	75.8
Final Wt.	104.0	101.2	97.3	103.4
Days	76	48	76	48
ADG	.471	.592	.487	.576

Summary of Performance - 1964

Table VI

Treatment	Creep Fed	Control
No. Lambs	39	43
Av. Initial Wt.	31.3	30.0
Av. Final Wt.	102.2	100.6
Total Creep Feeding	3130	-----
Total Finishing Feeding	7129	12,822
Total Gain Lbs.	2737	3,020
Lbs. feed/lb. gain	3.74	4.25

A point of particular interest is the length of time required to bring the lambs to market weight. Creep fed lambs were finished for market 28 days more quickly than non-creep fed lambs. Each group of lambs sold for top market prices on the day when sold. The creep fed lambs sold for $2.00 more per hundred pounds than the non-creep fed lambs due to the fact that they were marketed on September 14th as compared to October 12th for non-creep fed lambs. The actual total feed required to finish pasture fed lambs is not far different for either group but is in favor of creep fed lambs. The practice of creep feeding lambs on pasture under the conditions of this trial was advantageous from the standpoint of time and feed required to finish the lambs.

Summary:

1. Dry lot finishing after weaning was superior to pasture finishing in terms of rate of gain and in cost of gain.
2. Creep fed lambs gained significantly faster than non-creep fed grazing lambs.
3. Cost of gains for creep fed lambs was approximately equal to the increased value of the lamb when weaned.
4. Creep fed lambs outperformed non-creep fed lambs in the finishing lot.

SYNCHRONIZING ESTRUS AND STIMULATING EWE FERTILITY BY HORMONE ADMINISTRATION

Light, M. R., C. N. Haugse and M. L. Buchanan [1] [2]

No one factor is more important to profitable sheep production than the marketing of a high percentage of lambs per ewe bred. A high precentage of lambs raised is possible only when a large number of lambs are dropped per ewe lambing. An important factor in the number of lambs born is the number of fertile ova produced by the ewe at the time of mating.

Palsson (1956) reportedly increased the number of lambs dropped by 65% in a group of Icelandic ewes by intramuscular PMS administration. Recent experiments by Combs (1961) and Hinds (1961) demonstrated that the estrus cycle of sheep could be synchronized.

This experiment was designed to determine the possibility of synchronizing estrus and increasing fertility levels as determined by the number of lambs dropped.

EXPERIMENTAL PROCEDURE:

Forty-two actively cycling ewes of uniform age and of Columbia extraction were randomly assigned to four lots. The experimental design was a 2 x 2 factorial to test the effects of medroxyprogesterone acetate on heat synchronization and the effects of intramuscularly administered PMS on the reproductive performance of ewes.

All ewes were fed 5 pounds of poor quality alfalfa hay daily. One pound per head of grain pellets (75% barley + 25% SBOM) was fed daily for a seven day conditioning period prior to the feeding of medicated grain pellets. Grain supplementation was continued throughout the breeding season. Medroxyprogesterone acetate (Repromix) was mixed with the grain in an amount calculated to provide 60 mg. per pound of feed. Medicated feed was fed to lots 1 and 3 at a level of one pound per head daily for 14 days. A vasectomized ram with a marking harness was turned with the ewes to determine the effectiveness of Repromix in stopping heat manifestation. Five-hundred I.U. of PMS was injected intramuscularly into the ewes in lot 3 on the 14th day of the heat synchronization period and a fertile ram was turned with them. Breeding dates were recorded.

Lots 2 and 4 served as control groups for lots 1 and 3. Heat was not synchronized but the day of heat was determined by use of a vasectomized ram. On the 14th day following heat each ewe in lot 2 was intramuscularly injected with 500 I.U. of PMS. The ewes were grouped with the lot 4 ewes and following PMS administration, a fertile ram was placed with them.

RESULTS AND DISCUSSION:

The feeding of Repromix was effective in suppressing estrus and synchronizing estrus. Breeding marks were recorded for three of twenty-one ewes during

[1] The authors are indebted to the Upjohn Co., Kalamazoo, Michigan for their donations of Repromix and Gonadagen.

[2] Sigvaard Hendrickson ably assisted in the experiment and managed the ewe flock.

the period of Repromix medication. It is thought that this might be expected since ewes were group fed. Uniform feed consumption by all ewes is impossible under group feeding conditions. Two-thirds of the ewes mated within a three day period following the withdrawal of Repromix from the grain mixture.

The results of PMS administration on the last day of Repromix feeding or on the 14th day post-estrus are shown in Table 1.

Table 1. Effect of PMS on Lamb Production with Synchronized or Naturally Cycling Ewes.

Treatment	Synchronized 500 Mg. PMS	Synchronized NO PMS	Natural cycle 500 Mg. PMS	Natural Cycle NO PMS
Lot No.	1	2	3	4
No. Ewes	11	10	11	10
No. Ewes Lambing *	11	10	8	7
No. Lambs Dropped	23	15	18	11
% Lamb Crop Dropped Per Ewe Lambing	209	150	225	157
% Lambs Per Ewe Bred	209	150	164	110

*One ewe was removed from lot 3 for failure to exhibit estrus. Two ewes failed to lamb in lot 3 and 3 failed to lamb in lot 4.

Estrus synchronization by the feeding of Repromix may promote ewe conception. These limited data reveal that all ewes in the synchronized groups conceived and lambed. Only 15 of 21 ewes lambed in the normal cycling groups. Further investigation of this observation is indicated.

The conception rate to first mating, as indicated by the average length of the lambing season, was not affected by estrus synchronization. The average length of the lambing period for the synchronized groups was 4.5 days. The average duration for non-synchronized groups was 13.4 days.

Intramuscular administration of 500 I.U. PMS on the 14th day of Repromix feeding or on the 14th day post-estrus was equally effective in increasing ewe fertility. The combined data shows a 63% increase in the number of lambs born to ewes that lambed that had received PMS. The increases in lamb numbers is in accord with the reported work of Grant *et al* (1959) and Palsson (1956).

SUMMARY:

The feeding of Repromix to cycling ewes was effective in synchronizing the estrus cycle and materially shortened the lambing period. The intramuscular administration of 500 I.U. of PMS on the last day of Repromix feeding or on the 14th day after they had been marked by a vasectomized ram resulted in an increase in the number of lambs dropped per ewe lambing.

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FARM FLOCKS OF SHEEP ON WESTERN NORTH DAKOTA FARMS

Objective: To determine whether or not sheep porduction might be considered by farmers in this area who have limited amounts of pasture available. Many farmers in this area have several factors which might well be considered for use in a sheep production program: 1.) Most of them have a certain amount of land that is too steep, rocky, or sandy to be cultivated. The native grass that does grow on these areas is probably not lush enough in most years to produce top feeder lambs. However, it is felt that it will maintain dry eves through the summer. 2.) Many of these same farms have several acres of crop land that is farmed in strips. There is always a certain amount of grain that is left in the field after combining. Sheep will pick up most of this plus any weed growth present. These strips might well be used for "flushing" a ewe flock during breeding season. 3.) Many of these same farmers have some extra time available during February and March before they must start their spring field work. 4.) The lamb market is almost always at its peak in the spring or early summer.

Considering these factors, it is thought that many farmers might include a sheep flock in their program by lambing before field work starts, weaning when the grass is ready, and full feeding their lambs from birth to finish, thus taking advantage of the early higher market.

Procedure: The first year of trial, 30 unregistered Columbia ewes of mixed ages were used. The following two years, the flock was made up of 40 ewes. They represent quite closely the quality of ewes that are available for purchase in this area almost every year. They were bred to Hampshire ram lambs to start lambing on January 15 one year and February 1 the other two years. A pole type shelter was constructed which served as housing all winter with no specially heated lambing quarters. Heat lamps were used. Lambs were creep fed until weaned and continued on full feed to market. Complete records were kept of cost and returns. The only cost not included is the value of the native grass pasture and the labor required during a normally slack season. This will vary a great deal from farm to farm. Lambs were marketed in two groups as they reached desirable market weights and choice grades. The first marketings were in June and the second in July.

Data: Feed prices varied greatly as to availability from year to year. Alfalfa hay varied from $20.00 to $30.00 per ton, oats from 45¢ to 65¢ per bushel, barley from 75¢ to 86¢ per bushel and corn from $1.15 to $1.20 per bushel. Based on the relative cost of TDN in the feeds, barley was used as the finishing feed for two years and corn one year.

The starting creep ration which was ground and mixed varied slightly from year to year but was essentially:

Corn or barley	800#
Oats	800#
Soybean Oil Meal	200#
Wheat Bran	200#
Salt (TM)	40#
Aureomycin	40 gm.
Vitamin A	2,000,000 I.U. (included the last year)

By May 1 each year, the lambs were weaned and were almost completely switched over from the mixed creep ration to whole grain and alfalfa hay.

Annual Fixed Costs were as follows:

Ram @ $80.00 (plan to use average of 3 years)	$ 26.66
40 ewes @ $20.00 (estimated annual replacement cost of 20%)	160.00
Housing (pole barn) @ $525.00 depreciated 20 years	26.25
Shearing @ 40¢	16.00
Veterinary expense including drenching and vaccination and prorated cost of tools, etc	40.00
Bedding (estimated)	25.00

Averages for the three year trial:

	Winter feed cost per ewe	Average selling Price	Percentage of lambs marketed	Profit or loss per ewe
1959-60	$15.05	$21.62	90.0	- $3.39
1960-61	10.52	18.75	120.0	+ 4.17
1961-62	12.40	22.25	142.5	+ 9.49
3 yrs. ave.	12.66	20.87	117.5	+ 3.42

Summary: In the first year of trial, some lambs were lost from overeating, disease, and urinary calculi. These problems were remedied partially in subsequent years by vaccinating the ewes and including salt in the creep ration. It should be noted that large variations in feed costs, lamb prices and percentages of lambs marketed were encountered. It is felt that the average results of these three years are indicative of the results farmers in the area might expect when using this early lambing and straight to market system. Experienced sheep producers are aware that some fluctuations in feed prices, lamb prices, and lambs marketed are to be expected. There seems to be "good years" and "bad years" in most operations.

When inspected closely, many costs applied to these trials could be lowered such as housing if certain farms should have some used buildings available. Or, perhaps the cost of replacement ewes could be lowered by careful buying.

On the basis of these three trials, it is concluded that many farmers in the Western Dakota could include this type of sheep production program profitably.

FEEDLOT CONFINEMENT OF EWES DURING BREEDING SEASON

Purpose: This station has had considerable trouble over the years with a large percentage of dry ewes. There have been mixed reports from sheepmen in the area concerning this problem. We have noted the conditions under which we must handle our ewes during breeding season. They must travel over two miles to their pasture area each morning and come home each evening for water and sorting into their respective breeding pens. It is felt that perhaps this long walk could bring about a reabsorption of fertilized eggs or embryonic death. This trial was designed to determine whether or not it would be economically feasible to confine the ewe flock during breeding season and feed them alfalfa hay and a small amount of grain.

Procedure: Our flock of 40 unregistered Columbia ewes were divided into two groups giving each group as nearly as possible, equal distribution of age and weight. One group made the daily trip to pasture and were fed no extra grain or roughage. The other group was placed in a large corral and fed 5 pounds per head per day of alfalfa hay plus ½ pound per head per day of oats.

Two Hampshire rams were used. They were turned in with the ewes nights only and alternated between the two lots every other night. The two flocks were turned together early in November and handled as one flock until weaning.

Results: Feed cost for ewes in dry lot were $4.51 per ewe in 1961 and $4.00 per ewe in 1962.

	Pasture			Dry Lot		
	1961	1962	Average	1961	1962	Average
Percent lambs dropped....	130.0	160.0	145.0	145.0	185.0	164.0
Percent lambs weaned.....	120.0	150.0	135.0	130.0	155.0	142.5
Percent lambs marketed....	115.0	140.0	127.5	120.0	145.0	132.5
Percent dries and dead...	15.0	0.0	7.5	10.0	0.0	5.0
Average weight of lamb produced per ewe at 120 days*.....	122.98	147.96	135.47	123.5	134.48	128.99

*Average pounds of lamb produced per ewe at 120 days obtained by multiplying average weight of the lambs per day at weaning x 120 days x percent lambs weaned.

Summary: It must first be noted that there were no problems such as difficult lambing or pregnancy disease that could be attributed to the relatively small amount of exercise allowed to those ewes in dry lot from the beginning of breeding season through weaning. In both years of this trial, the ewes fed in dry lot during breeding and on, dropped more lambs, weaned more lambs and marketed more lambs than those that were pastured during the same period. However, those ewes that were not in dry lot produced an average of 6.48 pounds of lamb more per ewe bred than those fed in dry lot. A slight increase in wool production was noted in both trials from ewes that were fed in dry lot. It seems apparent from these two trials that there is no advantage in dry lotting ewes during breeding season if reasonably good pastures are available.

SUPPLEMENTARY FALL FEEDING OF EWES DURING BREEDING SEASON

Many successful sheepmen feel that the feeding program followed during breeding season and two weeks following is a very critical period as far as increased lamb production is concerned. Many producers increase the energy intake of their ewes during this time. This practice is ofter called "flushing". It is also felt that there might be some chance of fertilized eggs becoming more firmly established in ewes that are on a higher level of nutrition. This might be especially true in cases of rather rigorous conditions.

Our flock of 100 purebred Columbia ewes was divided into two groups giving each group as nearly as possible equal influences of age, weight and sires as well as equal influences of other trials being conducted simultaneously. The first year, one group was fed ½ pound of oats and ¼ pound of Soybean Oil Meal per head daily. The second year this group was fed ½ pound of oats, ¼ pound of Soybean Oil Meal and 1 pound of good quality alfalfa hay per head daily. Grazing was on native pasture and stubble fields. Feeding was carried on for 60 day period beginning the day the rams were turned with the ewes. Supplemental feed costs were $1.11 per head the first year and $1.78 per head the second year.

Results:

	With Fall Feed			No Fall Feed		
	1960	1961	Average	1960	1961	Average
Percent lambs dropped	122.45	138.0	130.22	129.78	130.0	129.89
Percent lambs weaned	102.04	114.0	109.02	106.38	116.0	111.19
Percent dries and dead ...	10.2	12.0	11.1	8.51	12.0	10.25
Average weight of lambs produced per ewe bred at 120 days*	77.59	81.26	79.42	84.13	84.35	84.24

*Average weight of lamb produced per ewe at 120 days obtained by multiplying average weight of lamb per day of age at weaning x 120 days x percent of lambs weaned.

Summary: Production differences between years can be accounted for by noting that in the fall of 1959, the native pastures and stubble fields used were very poor while in the fall of 1960, these were quite good.

There was an average difference of 4.82 pounds of lamb per ewe bred in favor of the ewes that were not given additional feed. Before making hasty conclusions, it should be noted that in both years, the ewes were weaned at least 6 weeks prior to breeding. They were in relatively good condition. If the ewes had been thin, at the time of breeding, it is quite conceivable that the results might be different. However, from information collected, these two consecutive years, it appears conclusive that for ewes in good flesh, we can expect no increase in lamb production from feeding additional concentrates.

CREEP FEEDING EARLY LAMBS UNTIL PASTURES ARE AVAILABLE

Purpose: Many sheep producers in the area do not finish their lambs for market, but rather, market grass through the production of feeder lambs. Also, many of these producers like to lamb in March so that the majority of their lambing work load is over when spring field work starts. This test was designed to determine whether or not creep feeding early lambs until pastures are available is a profitable practice.

Procedure: Our purebred flock of 100 Columbia ewes was divided at lambing time into two groups of similar management background. That is, both groups has as nearly as possible equal representation of influences from other trials and sires as well as age and weight of ewes. One group of lambs was creep fed and one was not. The first lamb was born on January 16 and all lambs were placed on creep at about one week of age. Lambs and ewes went to pasture May 4; were weaned June 15. Creep rations used:

First ration:
250 lbs. Corn
800 lbs. Oats
550 lbs. Barley
200 lbs. Soybean Oil Meal
200 lbs. Wheat bran
40 lbs. Trace mineralized salt
100 lbs. Vitamin supplement
40 gms. Aureomycin

Second ration:
500 lbs. Corn
1000 lbs. Barley
500 lbs. Oats

Cost including rolling - $36 per to

Cost including grinding & mixing - $56.45 per ton.

Whole oats was fed in separate feeders and alfalfa hay was available in the creep at all times.

Creep feed cost per lamb - $1.29

Results:	Lot 1 Creep Fed		Lot 2 No Creep
Number of ewes in lot	50		50
Number of lambs at weaning	57		58
Number of sets of twins at weaning	17		15
Average birth weight	11.1		11.2
Average 30 day weight	28.2		27.9
Average weight at pasture	60.2		20.2
Average weight of lamb per day at pasture	.70		.471
Average weight at weaning	80.9		73.3
Average at weaning	128.6		128.3
Average weight of lamb per day at weaning	.629		.571
Average weaning weight adjusted to 120 days.	74.48		68.52
Difference in gain per lamb at 120 days		6.96	
Average weight loss of ewes Jan. 13 to May 3	33.6		43.1

Average results for two years trials:

	Lot 1	Lot 2
Weaning weight of 120 days 1960	80.16	76.56
Weaning weight at 120 days 1961	75.48	68.52
Average of two years	77.82	

Summary: As would be expected, the lamb that were creep fed gained faster while on creep feed than those not creep fed. However, after being turned to pasture, the lambs that had not been creep fed seemed to "catch up". The break even prices or price of lambs necessary to pay for the extra feed was $16.40 per cwt. the first year and $18.53 per cwt. the second year. The second trial seems to prove more strongly than the first that although lambs on creep feed gain much more rapidly it is not a profitable practice if the lambs are to be turned to pasture without creep feed.

COBALT BULLETS FOR PREGNANT EWES

Cobalt is one of the mineral elements classified as a trace mineral, meaning that it is required in very small amounts to meet the nutritional requirements of the animal. The symptoms of cobalt deficiency in lambs are lack of appetite, anemia, lack of thrift and generalized weakness. In fact, when severely deficient, lambs will appear to "starve while standing in front of a full feed bunk". The symptoms of this disease show marked similarities to those in internal parasitism. On occasion, cobalt deficiencies have been confused with parasitism. The amount of cobalt required per lamb is very small and can be met adequately by feeding salt containing 0.1 ounce of cobalt (0.2 ounce of cobalt chloride) per 100 pounds of salt. Hays and pasture grasses containing 0.07 parts per million of cobalt on a dry matter basis have been shown to prevent occurrence of cobalt deficiency in sheep. North Dakota is not definitely know to have cobalt deficient areas. It is thought, however, that cobalt deficiency may occur sporadically. There has been some question as to whether or not the feeding of trace mineralized salt satisfied the needs for cobalt in sheep. Therefore, an experiment was designed to test the value of using cobalt "bullets" for lambs. Cobalt bullets are bullets that are orally administered. They lodge in the stomach and are said to dissolve slowly over a considerable period of time. Theoretically, this guarantees enough cobalt to meet nutritional requirements for an extended period. After obtaining no significant results from the use of cobalt bullets on lambx, it was decided to test the value of their use on pregnant ewes.

Procedure: Our purebred flock of 100 Columbia ewes was divided into two groups so as to have in each group, equal influences of sires, weight and age of ewes and equal distribution of ewes with different management backgrounds resulting from other trials being conducted on the same band of ewes. One group of 50 was given bullets in August of 1959 and 1960 - in 1961, bullets were given Sept. 7 to 40 head. The two groups were handled as one for feeding and management. Trace mineralized salt plus Dicalcium phosphate in a ratio of 3:1 was feed free choice.

Average results of three years of trial:

Average weight of lamb produced per ewe bred at 126 days.

	With Cobalt Bullets		No Cobalt Bullets
1960 lamb crop	85.68		78.87
1961 lamb crop	80.90		84.67
1962 lamb crop	93.00		90.60
Total	259.58		454.14
Average.	86.53		84.71
Average Difference		1.82	

Summary: In each of these trials, average weight of lamb produced per ewe was computed by taking the average weight per day of age at weaning of all lambs in the lot x 120 days x percent of lambs weaned in each lot. Throughout the three years of this trial, many factors such as percent of lambs dropped, percent of lambs weaned and weights of lambs at various ages have been compared. Increases in these factors eigher singly or in combination are essential to produce increases in over all lamb production. There were no consistent differences between lots in any of these factors. There were no significant differences noted in ewe gains and losses or in fleece production. Differences in total pounds of lamb produced per ewe were not consistent from year to year. The averages of the three years of this trial show that the ewes that received Cobalt Bullets produced 1.82 pounds of lamb more per ewe bred at weaning than those that received no extra cobalt. At 42¢ per bullet, lambs would have to be worth $23.08 per live cwt. to break even on the cost of the bullets. It seems quite apparent that when trace mineralized salt is fed free choice and is available at all times, sheep producers will receive no benefit from the use of cobalt bullets as a source of cobalt.

COBALT FOR LAMBS

Cobalt is one of the mineral elements classified as a trace mineral, meaning that it is required in very small amounts to meet the nutritional requirements of the animal. The symptoms of cobalt deficiency in lambs are lack of appetite, anemia, lack of thrift and generalized weakness. In fact, when severly deficient, lambs will appear to "starve while standing in front of a full feed bunk". The symptoms of this disease show marked similarities to those of internal parasitism. The amount of cobalt required per lamb is very small and can be met adequately by feeding salt containing 0.1 ounce of cobalt (0.2 ounce of cobalt chloride) per 100 pounds of salt. Hays and pasture grasses containing 0.07 parts per million of cobalt on a dry matter basis have been shown to prevent occurrence of cobalt deficiency in sheep. North Dakota is not definitely know to have cobalt deficient areas. It is thought, however, that cobalt deficiency may occur sporadically. There has been some question as to whether or not the feeding of trace mineralized salt satisified the needs for cobalt in sheep. Therefore, an experiment was designed to test the value of using cobalt "bullets" for lambs. Cobalt bullets are bullets that are orally administered. They lodge in the stomach and are said to dissolve slowly over a considerable period of time. Theoretically, this guarantees enough cobalt to meet nutritional requirements for an extended period.

Procedure; Thirty ewe and thirty ram lambs were paired and allotted into four groups. One group of each sex was given cobalt "bullets". The lambs were pastured together on typical western North Dakota range pastures of native and crested wheat grasses. Due to drought conditions, the pastures were extremely poor the first year of trial but would be considered very good for the second year of trial. A commercial trace mineralized salt was mixed with dicalcium phosphate and phenothiazine and was provided free choice. Lambs were weighed every 30 days. The results of the first 120 day trial are summarized in table 1. Results of the second 120 day trial are summarized in table 2.

Table 1. The effect of cobalt bullets on lamb gains (1959)

Lot number	1	2	3	4
No. lambs	15	15	15	15
Sex	Ewe	Ewe	Ram	Ram
Cobalt bullets	Yes	No	Yes	No
Av. initial wt. lbs	71.0	73.0	84.0	83.0
Av. final st. lbs	82.0	83.0	106.0	106.0
Av. gain per lamb lbs	11.0	10.0	22.0	23.0
Cost of bullets per lot	$6.30	6.30	6.30	6.30

Table 2. The effects of cobalt bullets on lamb gains (1960)

Lot number	1	2	3	4
No. lambs	15	15	15	15
Sex	Ewe	Ewe	Ram	Ram
Cobalt bullets	Yes	No	Yes	No
Av. initial wt. lbs	86.7	86.5	94.5	94.5
Av. final wt. lbs	106.2	107.9	125.2	122.6
Av. gain per lamb lbs	19.5	21.4	30.7	28.1
Cost of bullets per lot	$6.30	6.30	6.30	6.30

Summary: The use of cobalt bullets did not significantly affect rate of gain of lambs with the conditions under which the experiment was conducted.

THE INFLUENCE OF SELECTION ON MULTIPLE BIRTH IN SHEEP
(A progress report)

C. LeRoy Johnson and M. P. Botkin

University of Wyoming, Laramie

The number of lambs produced per ewe is the most important of all traits considered in sheep production. It is well recognized that the tendency for multiple births in sheep has a hereditary basis. However, most studies indicate that the heritability of multiple births is relatively low.

Since the mid to late 1960s, there has been considerable interest among sheep researchers and producers in the use of imported breeds such as the Finnish Landrace to increase prolificacy. With this in mind, a long term study was initiated in 1969 at the University of Wyoming Archer Substation near Cheyenne to investigate the progress that can be made toward increasing birth rate by selection in breeds of sheep presently used by American producers. The only stipulation as to breed was that they be "white-faced."

Primary selection was to be based on type of birth with secondary selection based on performance (growth rate and wool production). The goal was to establish a flock of approximately 200 ewes where as many as possible would be born as triplets or twins. However, primary purpose of the study was <u>not</u> to develop a flock of triplet producing ewes but rather to evaluate the progress that can be made toward increasing the proportion of twin births in the more widely used and readily available breeds by selection for an extreme (triplet birth).

Only triplet-born sires have been used in the project since the 1970 breeding season. The proportion of triplet born ewes in the flock has varied from 13.6% the initial year of the study to 65.8% in 1977 (table 1). Since 1977, all twin born ewes were from triplet dams by triplet sires.

A general trend for an annual increase in lambing rate has been observed throughout the study with an apparent plateau at about 200% reached in 1978 (table 1 and figure 1). Rate of change in lambing rate was consistent with expectations based on the estimated heritability of this trait and the selection differentials imposed.

Body weight at mating was shown as an important source of variation in birth rate. Triplet born ewes were consistently lighter at mating and produced fewer lambs than their twin born counterparts (figure 1).

These data suggest that lambing rate in western white-faced ewes can be increased significantly by selection.

Table 1. Average performance by ewe birth type and year.

Year lambed	Ewe birth type	Number of ewes	% of flock	Average age @ mating	Lambing rate %/ewes mated	Lambing rate %/ewes lambed	(Ewes) % dry or dead	Avg. wt. @ breeding
1970	Single	58	31.5	2.66	112	141	13.6	
	Twin	101	54.9	2.36	128	137	5.9	
	Triplet	25	13.6	3.48	156	170	12.7	
	Overall	184	100.0	2.69	132	143	9.3	
1971	Single	37	21.5	3.08	130	145	10.8	
	Twin	93	54.1	2.42	132	149	10.8	
	Triplet	42	24.4	2.81	145	165	11.9	
	Overall	172	100.0	2.66	135	152	11.0	
1972	Single	22	13.6	3.50	118	137	13.6	
	Twin	85	52.6	2.59	147	156	5.9	
	Triplet	55	33.9	1.59	124	141	12.7	
	Overall	162	100.0	2.36	135	149	9.3	
1973	Single	11	6.1	4.18	145	160	9.1	165.64
	Twin	92	50.8	2.97	163	172	5.4	149.2
	Triplet	78	43.1	2.06	159	170	6.4	137.0
	Overall	181	100.0	2.65	160	171	5.5	145.0
1974	Twin	80	43.7	3.30	173.7	182.9	5.0	157.6
	Triplet	103	56.3	2.34	147.6	158.3	6.8	139.1
	Overall	183	100.0	2.76	159.0	169.2	6.0	147.2
1975	Twin	67	36.8	3.27	162.7	165.2	1.5	149.0
	Triplet	115	63.2	2.78	148.7	152.7	2.6	139.2
	Overall	182	100.0	2.96	153.8	155.6	2.2	142.8
1976	Twin	72	39.1	2.93	173.6	178.6	2.8	148.7
	Triplet	112	60.9	3.24	159.8	161.3	.9	141.6
	Overall	184	100.0	3.12	165.2	167.9	1.7	144.4
1977	Twin	63	34.2	2.48	195.2	201.6	3.2	153.3
	Triplet	121	65.8	3.48	186.8	194.8	4.1	145.0
	Overall	184	100.0	3.14	189.7	197.2	3.8	147.8
1978	Twin	70	37.2	2.90	204.2	216.6	5.7	165.2
	Triplet	118	62.8	3.57	200.8	207.9	3.4	152.7
	Overall	188	100.0	3.32	202.1	211.1	4.3	157.3

Table 1. Average performance by ewe birth type and year. (Continued)

Year lambed	Ewe birth type	Number of ewes	% of flock	Average age @ mating	Lambing rate %/ewes mated	Lambing rate %/ewes lambed	(Ewes) % dry or dead	Avg. wt. @ breeding
1979	Twin	75	41.7	2.91	202.7	204.1	1.35	164.7
	Triplet	105	58.3	3.69	188.6	203.0	6.60	152.7
	Overall	180	100.00	3.36	194.4	203.5	4.44	157.6
1980	Twin	82	45.3	3.39	201.0	206.3	2.4	166.5
	Triplet	99	54.7	3.51	200.0	217.6	8.1	156.4
	Overall	181	100.0	3.45	201.0	212.3	5.5	159.2

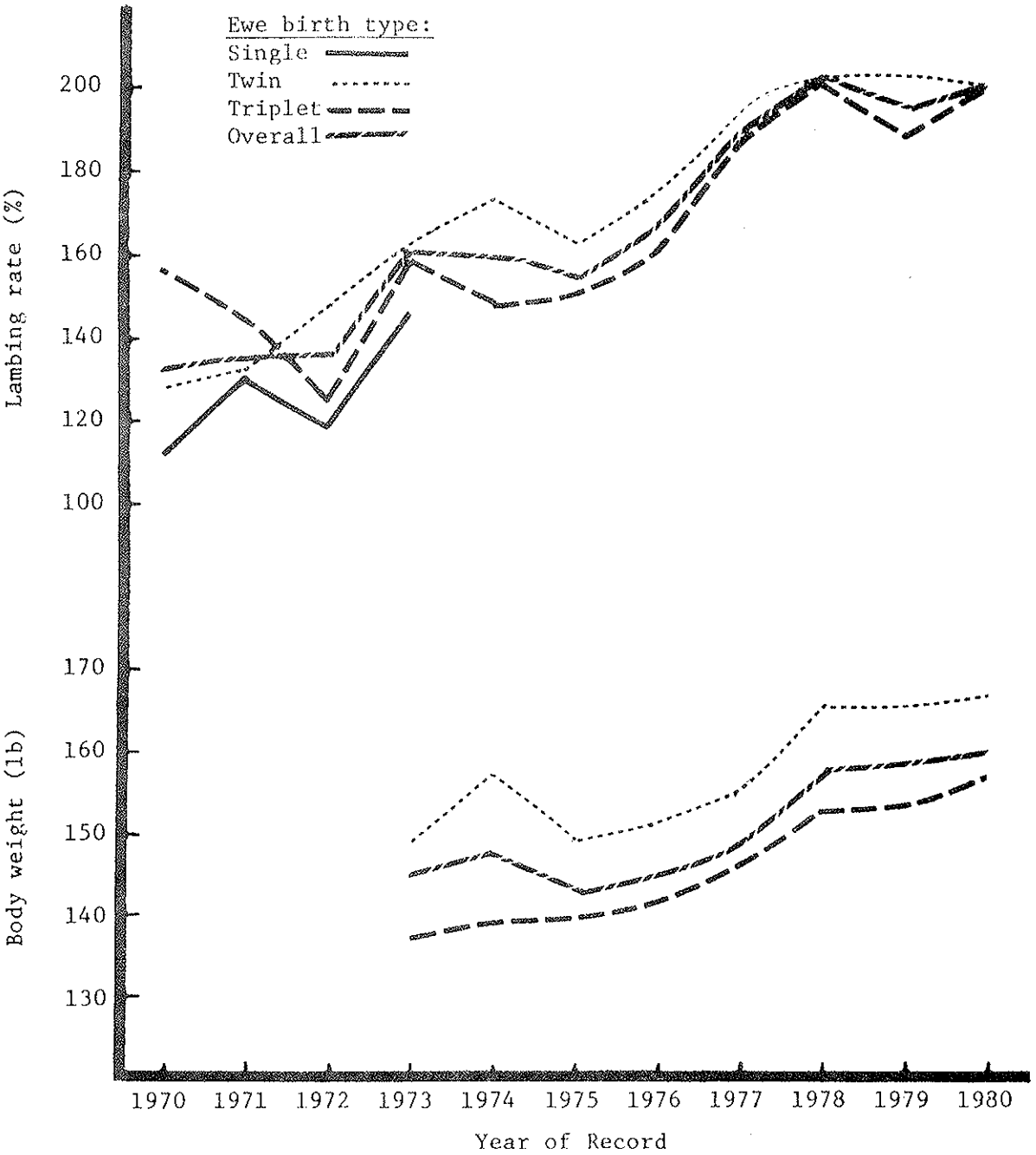

Figure 1. Average body weight of ewes at mating and percent lambs born by birth type of ewe and year of record.

SECTION III

REPORT ON

FOOT ROT CONTROL

Presented by

Dr. I.A. Schipper, DVM

with assistance from

Roger Haugen
Extension Animal Scientist
North Dakota State University

Timothy C. Faller
Superintendent

at the

25th Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

February 8, 1984

Ovine Footrot

Footrot in sheep is the result of synergistic reaction between two organisms one which is nearly always present in the livestock environment (Fusobacterium necrophorum) and the other which is believed to be specific for sheep and will survive for a maximum of two weeks if not on the sheeps hoof (Bacteroides nodosa).

S. necrophorum has also been associated with footrot and liver abscesses of cattle and calf diptheria. It is found universally in the livestock environment including feces. This organism colonized on the skin and tissues between the claws of sheep causing damage so that the B. nodosa can pentrate. The B. nodosa produces a powerful enzyme that destroys the tissues of the hoof and thus can migrate through the soft-tissues of the hoof to areas under the horn.

Factors that influence the incidence of footrot infection in sheep include genetic differences with in the family or breds, poorly managed yard or pasture that are always muddy, wet, low lying, or contain sharp objects that can cause foot injury. Footrot often occurs during the spring or other times of the year when pastures and yards are constantly wet. Rough concrete may cause injury or insufficient wear may result in curling under of the hoof thus - providing an ideal environment for the bacterial causing footrot.

Clinical Signs

Observations of one or more lame sheep is an indication of an oncoming problem, though foot injury may account for individual cases.

Examination of more advanced cases will usually reveal swelling, reddness, and moist areas between the claws which later become greyish yellow colored and are painful to the sheep upon application of pressure. On or more feet may be involved. If the problem is not attended to and particularly if both feet are involved the animal will often kneel while feeding or lay down and refuse to move about. Weight loss may be extensive.

Prevention

The prime aspect of footrot prevention is to maintain sheep on an environment where foot injury, excess exposure of the feet to moisture, mud, and feces are minimized and by drainage and filling of low areas in the yards. Close observation to detect the first signs of foot injury or lameness will aid in correcting a potential problem before it becomes serious.

Hoof health can best be maintained by annual hoof examination and trimming of all sheep in the flock. New additions to the flock should be selected from flocks that so not have chronic footrot problems and avoid flock replacements that pass through public auction markets.

Flock replacements should be kept away from the established flock approximately 30 days. The hoofs should be trimmed and dipped or treated for footrot before having contact with the established flock.

If any signs of lameness are detected in one or more sheep one must assume that the entire flock is infected and further problems can be avoided by examining and trimming the foofs of all sheep of the flock and treating them.

Vaccination has been attempted in a number of instances but thus far has not been successful. The vaccine has provided some protection but also cause abscesses at the sight of infection in 20% of the sheep vaccinated.

Treatment-Trim Hoofs, Trim Hoofs, and Trim Hoofs

Treatment may be by two approaches either individual sheep or the entire flock. Regardless of the treatment approach the initial action must be to trim hoofs to remove pockets of infection and to remove all barriers to medication in reaching the soft tissues or areas of infection. Hoof trimming is a tiring and tedious job but is the most essential procedure to successful prevention and or treatment of footrot in sheep.

In advanced cases hoof trimming must be drastic to remove all the dead tissue and pockets of infection. If this requires drawing blood it should be done because it will decrease the time and pain of healing.

Emergency or individual treatments may be the use of any of the preparations used for flock treatment but in more concentrated forms and apply to the hoofs for a greater period of time. When using individual treatment each foot should be exposed to the solution for at least 2 to 4 minutes to obtain maximum penetration of chemicals.

One preparation that appears to be very effective consists of the direct application of the 10% solution of chloromycetin (chloramphenicol) and 70% ethanol. This preparation has the greatest ability to penetrate the hoof of any of the treatments for footrot (0.21 to 2.38 mm per hour of contact). Alcohol only is of no demonstrable benefit in controlling footrot organisms.

If an exibition animal is lame from over trimming and/or footrot or an individual will not respond to other medication the involved feet may be placed in a saturated salt solution (stock or ice cream salt in warm water). The application should last for several hours thus a method of application for prolonged contact must be devised. Other treatments include intramuscular administration of long acting penicillin (procaine penicillin and/or benzathine penicillin plus dihydrostreptomcyin) at 15,000 to 20,000 units of pencillin per pound of body weight. This is usually comparable to 13 to 15 cc of penicillin per 200 pounds sheep. The pencillin preparation may also be administered between the claws of the involved hoof (approximately 3 cc).

A 4 to 7% tincture of iodine may also be effective if applied directly onto the newly trimmed hoof.

Other approaches to treatment of individual feet is a 20% formaldehyde solution, 30% copper sulfate solution, or 20% zinc sulfate solution. Copper sulfate may also be applied directly to the clean hoofed area in a preparation of two parts copper sulfate and one part pine tar.

Flock treatment by forcing the sheep to pass through walk through baths of medication is an effective method of treatment and or control of spread of the footrot orgainism. There are several solutions of medication that can be used.

Formaldehyde solution has been frequently employed and is usually an effective treatment. It should be applied by walk through bath in a 10% solution (1 gallon of 36% formaldehyde to 9 gallons of water). Sheep should be slowly walked through the solution. Higher concentrations or too many applications can result in foot irratation and cause foot problems. The concentration of formaldehyde will increase if the solution is left in the open as the water will evaporate more rapidly then formaldehyde. Feces, urine, dirt, and straw have little effect on the activity of formaldehyde. Formaldahyde is irratating to the eyes, skin, and the unused solution should not be discarded where it can enter drinking water sources, contaminate feed, or have contact with children or other animals as it is a poisonous chemical. Of the various compounds used for walk through baths, formaldehyde has the least ability to pentrate into the hoof (0.02 or less mm per hour of contact).

A 20% copper sulfate solution (blue vitriol, blue stone) is another effective walk through solution for ovine footrot control. It is prepared by adding 32 lbs. of copper sulfate to 20 gallons of warm or hot water. It has greater penetrating ability than a formaldehyde (0.05 to 0.38 mm per hour of contact). Copper sulfate solution has the disadvantages of staining wool, being corrosive to metals, it's effectiveness is decreased by manure, urine, straw, and it can be toxic to sheep if consumed. Like formaldehyde the unused solution should not be placed where it can enter water sources, feeds, or where children or other animals may have contact with it.

A 10% solution of zinc sulfate (8 lbs. of zinc sulfate to 10 gallons water) has been an effective as a control preparation for footrot.

It has also been suggested that feeding 1/2 to 3/4 grams of zinc sulfate per day to sheep will aid in preventing footrot. But under well controlled investigations this has been of no demonstrable value.

Treating involved feet with kerosine or cresol has been of no demonstrable value.

Sheep walking through wet grass or bedding often have foot problems. Bedding can be dried by the addition of supper phosphate (0-46-0).

Hydrated line (plasters lime) is very effective in destroying disease bacteria in yards and pens. It can be effective as a dry or walk through preparation alone or with powered copper sulfate. It is also effective if placed in areas where sheep congregate such is around water fountains, feed bunks, salt and mineral sources, or yard that has become heavily contaminated with the organism of footrot. It will however not totally replace trimming and the walk through foot bath solutions.

When one or more sheep exibit lameness or other signs of footrot one can only assume that the rest of the flock has become infected. The involved flock should be divided into two groups those exhibiting clinical signs of footrot and those appearing well.

The sheep exhibiting no signs of footrot should all be examined first and the hoofs trimmed. The sheep then should be slowly passed through a foot bath solution. These sheep should then be placed on a pasture where sheep have not been for at least 3 weeks to allow for the natural elimination of bacteria causing footrot. If possible rotating sheep onto new pastures at two week intervals will be helpful in controlling the footrot infections.

Infected sheep should have the hoofs trimmed extensively to provide good contact with the medication preparation. Medications can be directly applied to the involved feet. This may be done daily for several days and the initial medication may be followed by daily walks through the foot bath solutions at daily intervals for 4 to 5 days and then repeated at weekly intervals until all signs of the footrot has been eliminated.

SECTION IV

MANAGEMENT SECTION

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North Dakota State University

Timothy C. Faller
Superintendent

25th Annual Sheep Day

Hettinger Experiment Station
Hettinger, North Dakota

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SECTION IV

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HETTINGER BRANCH EXPERIMENT STATION

FLOCK CALENDAR - OUTLINE

PRIOR TO BREEDING

1. Bag and mouth ewes and cull those that don't meet requirements.

2. Replace culled ewes with top-end yearlings saved for replacements.

3. Drench ewes (Phenothiazine).

4. Evaluate Sires:

   a. Be sure they are vigorous, healthy and in good breeding conditions (possibly production tested).

   b. Allow 3 rams to 100 ewes under range conditions and 2 when pen breeding, as in small lots or pastures.

5. Crutch ewes.

6. Flush ewes (if in thin condition)

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

   b. Moving ewes to a better quality pasture prior to breeding will serve as an effective flush.

      * if ewes are overconditioned the effect of flushing will be lessened.

BREEDING

1. Test rams with marking harness or water color paint on brisket to see if they are getting the job done (change colors at the end of first 17 days).

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

3. 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.

LAST SIX WEEKS BEFORE LAMBING

1. Drench ewes (Thiabendazole).
2. Six-four weeks before feed 1/4 - 1/3# oats per ewe per day.
3. Shear ewes, trim hoofs, and vaccinate ewes for example: Exterotoxemia, Vibriosis, Soremouth.
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. Watch ewes closely as extra effort will be repaid with more lambs at weaning time.
2. Put ewe and lambs in lambing pen (jug) after lambing (not before).
3. Be available to provide assistance if ewe has troubles.
4. Disinfect lambs navel with iodine as soon after birth as possible.
5. Use heat lamps in cold weather.
6. Be sure both teats are functioning and lambs nurse as soon as possible.
7. Brand ewes and lambs with identical numbers on same side.
8. Turn ewes and lambs out of pen as soon as all are doing well. (24 hrs. - 6 days)
9. Bunch up ewes and lambs in small groups 4-8 ewes and then combine groups until they are in a workable size unit.
10. Castrate and dock lambs 1-2 weeks after birth.

SUPPLIES THAT MAY BE NEEDED DURING SEASON

1. Good disinfectant.
2. Forceps or Balling gun.
3. Syringe and needles.
4. Hoof trimmer.

5. Sulfa urea Boluses for ewes that were assisted in lambing.

6. Iodine for disinfecting navels.

7. Soap and mineral oil.

8. Tri-sulfa pills for treatment of early pneumonia symptoms.

9. Mastitis ointment.

10. Branding paint and irons.

11. Heat lamps for severe weather.

12. Docking and castrating tools.

13. Surgical scissors.

14. Needle and thread in case a suture is needed.

15. Crate for mothering-up lambs and adopting.

END OF LAMBING TO WEANING

1. Feeding practices will vary depending on the time that lambs were born.

   A. Dec. 15 - March 1 - Lambs are usually creep fed and not allowed to go on pasture before market.

   B. Lambs born after March 1 are usually not creep fed and allowed to go on pasture during summer.

2. Drench ewes before turning them on pasture (Phenathiazine).

   * try and drench according to a program that works for you, (don't wait until signs of worminess appear, it is too late then).

3. Rotate pastures if possible, this also is helpful in internal parasite control.

WEANING TO PRE-BREEDING

1. Time of rest for ewes.

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

ORPHAN LAMBS - MANAGEMENT IDEAS

1. Buy a good milk replacer, should be 30% fat. Good replacer available from:
   A. K & K Mfg., Rogers, Minnesota
   B. Land O'Lakes
   C. G T A
   It will cost approximately 50¢ per pound and each lamb will require from 15 to 20 pounds.

2. Use good equipment. NDSU has had good success with the LAMB Bar, K & K Mfg., sells a self priming nipple and tube assembly 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. Cold milk keeps better too.

5. There is a Formaldahyde solution commercially available that retards bacterial growth in milk (1 cc/gallon milk).

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

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

8. 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.

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

10. Provide colostrum milk for all orphans. Colostrum should be provided as quickly as possible. Colostrum milk is rich in fats, vitamins, and anti-body globulins to protect against disease organisms. Cow colostrum milk can be substituted for ewe colostrum milk. It can be kept frozen in 1-4 oz. containers.

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

12. Provide clean, fresh water.

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

LIST OF PLANS

Dexter W. Johnson
Extension Agricultural Engineer
North Dakota State University

NOTE: These and other plans are available through county agents or from Extension Agricultural Engineering, NDSU, Fargo, ND. The drawings show construction details and include a materials list for estimating. Due to changes in lumber sizes, lumber grades, plywood quality and other developments in building materials, some adjustments are required for older plans. (Present charge is shown or $1.00 per sheet.)

SHEEP BARNS & CORRALS

Plan No.	Plan Title	Sheets
MW 72050	Pole Utility Buildings	$1.50
MW 72505	Slatted Floor 40'x72' Feeder Lamb Barn	$2.50
MW 72506	240-Ewe and Lambing Barn, 40'x104'	$2.50
MW 72507	500-Ewe and Lamb Feeding Barn, 74'x256'	$2.50
MW 72508	12'x16' Portable Lamb Feeding Shed	$1.50
MW 72509	40-Ewe and Lambing Barn, 24'x32'	$1.50
Reprint No. 759	Practical Sheep Housing for North Dkaota	No Charge
USDA 6096	Shearing Shed & Corral Arrangement	1
USDA 6236	Portable Handling Corral for Sheep (Metal or Wood)	1
AED-19	Slip Resistant Concrete Floors	No Charge
MWPS-9	Designs for Glued Trusses	$4.00
MWPS-3	Sheep Housing & Equipment Handbook (This 116 page booklet was revised in 1982. It includes barn and layout planning plus plans for fences and sheep equipment.)	$5.00

FEED HANDLING & FEEDERS

USDA 5917	Fencing, Feeding and Creep Panels	1
Reprint No 409	Chopped Hay Feeder for Sheep	No Charge
Reprint	16 ft. Collapsible Fenceline Feedbunk for Sheep	No Charge
ND 872-1-1	Stationary Roughage Self Feeder for 70 Ewes or 160 Lambs	No Charge
ND 872-1-2	Portable Roughage Self Feeder for 40 Ewes or 80 Lambs	No Charge

Plan No.	Plan Title	Sheets
MW 73110	24 Ft. Wide Clearspan Pole Frame Hay Shed	$2.50
MW 73111	36 Ft. Wide Glearspan Pole Frame Hay Shed	$2.50
MW 73112	48 Ft. Wide Clearspan Pole Frame Hay Shed	$2.50
MW 73113	32 Ft. and 48 Ft. Wide Pole Frame Hay Shed (Interior Poles)	$1.50
MW 73217	20, 45, 170, and 340 Bu Hoppered Grain Bins	$2.50
MW 73220	48 Ft. Wide Pole Frame Grain Storage	$1.50
MW 73250	Grain Storage Buidlings, 600, 1000, 1200, 1500, or 2000 Bu.	$1.50
MW 73293	Grain-Feed Handling Center, Work Tower Across Drive	$3.50
MW 73294	Grain-Feed Handling Center, Work Tower Beside Drive	$3.50
Amer. Plywood Assn.	10 Ton Hoppered Feed Bin	No Charge
Amer. Plywood Assn.	4 Compartment Bin for Feed Mill	No Charge
USDA 6090	5500 Bu. Wooden Grain Bin	2
MWPS-13	Planning Grain-Feed Handling Handbook	$4.00

STATIONARY ROUGHAGE SELF-FEEDER FOR 70 EWES OR 160 LAMBS (N.D. PLAN 872-1-1)

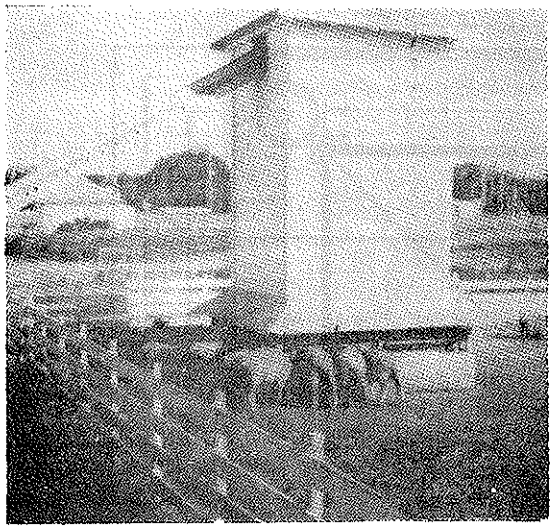
Timothy C. Faller and Dexter Johnson

Labor is one of the limiting factors of any sheep operation. Many attempts have been made to reduce labor requirements. Recognizing the need to reduce labor requirements of normal feeding chores, a large capacity roughage self-feeder was designed and constructed for use at the Hettinger Branch Station.

A 8' x 8' x 17' self-feeder was constructed with a 10' x 10' feed trough at the base. The 7-10 ton capacity depends on the consistency of the ration being fed, the 1,088 cubic foot capacity will hold enough feed for 70 ewes for 30-40 days feeding or when filled one-half full of more concentrated feed the feeder will hold enough feed for 160 fattening lambs for the same period.

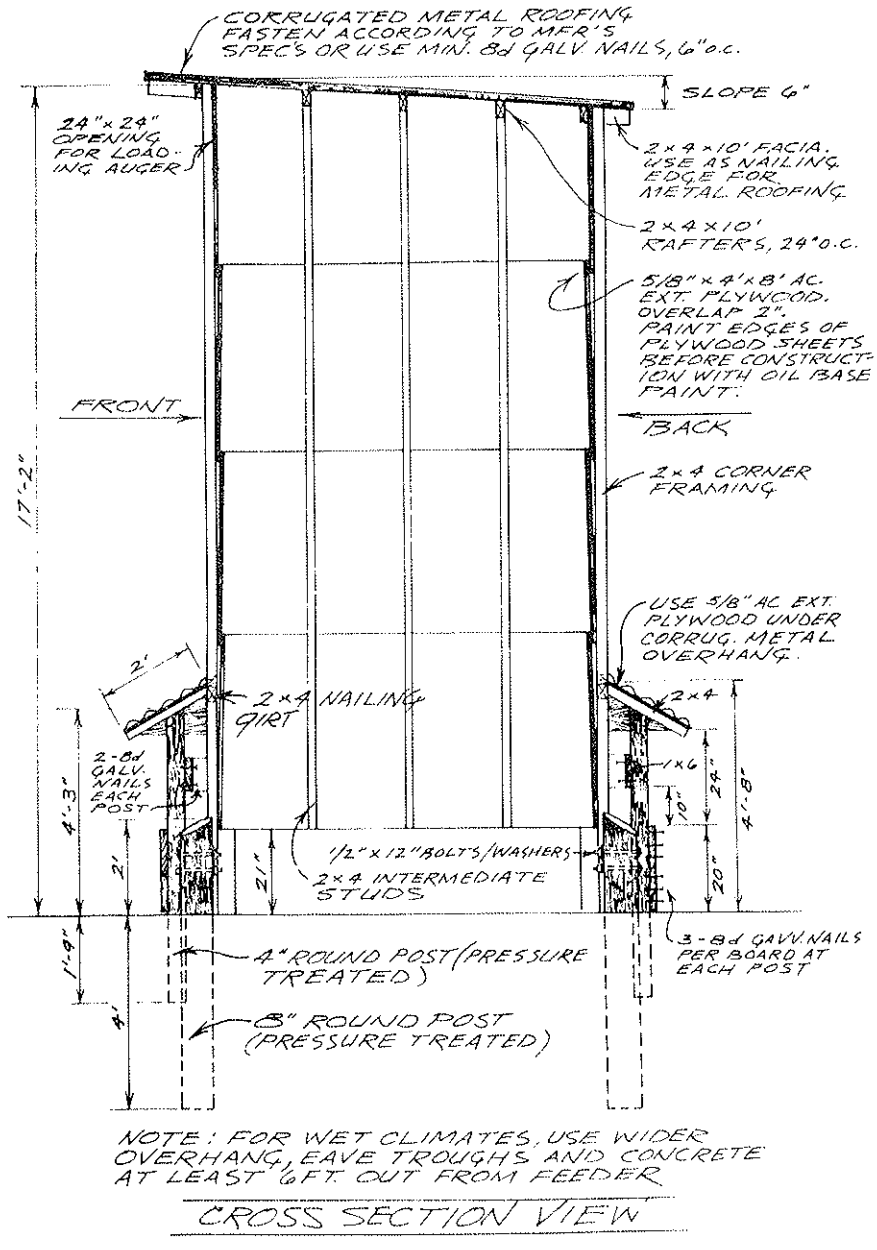
The covered feed holding area and, also over the trough area allow use in adverse climate conditions. A feeder of this height may be filled by a grinder mixer or an open-flite elevator as used at the Hettinger Station. At the Hettinger Station this feeder has been used for year-round feeding of a seventy head ewe flock with lambs, and also for growing 150 head replacement females. The feeder works exceptionally well for raising replacement stock.

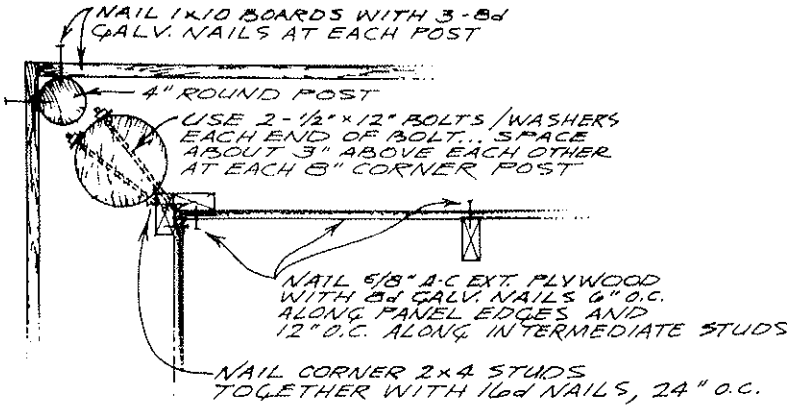
Important! Self-feeding sheep with this type feeder requires daily care as total roughage rations tend to pile in the center and it requires daily loosening with a fork.



Stationary roughage feeder in summer use for replacement ewes with screenings for feed.

(Faller is Superintendent, Hettinger Experiment Station and Dexter Johnson is Extension Agricultural Engineer)



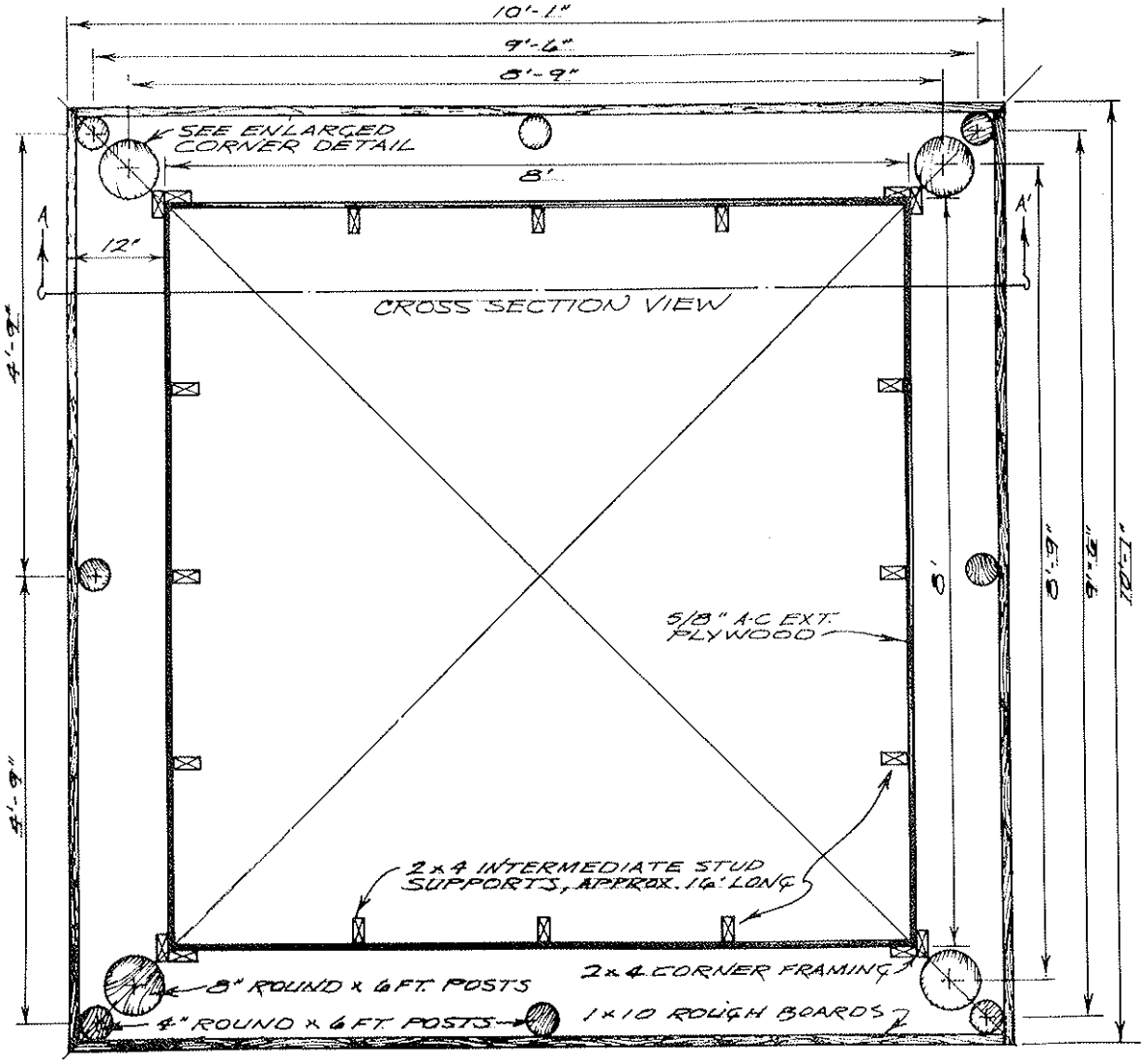


ENLARGED CORNER DETAIL

BILL OF MATERIALS

STATIONARY SHEEP FEEDER .. N.D. PLAN 872-1-1

4 - 8" x 6' - Pressure Treated Posts
8 - 4" x 6' - Pressure Treated Posts
8 - 1 x 10 - Rough Boards
4 - 1 x 6 - Rough Boards
19 - 5/8" x 4' x 8' - AC Ext. Plywood
8 - 2 x 4 x 18 - Corner Studs #2 or better
12 - 2 x 4 x 16 - Intermediate Studs
10 - 2 x 4 x 10 - Rafters, Facia and Nailing Girts
180 sq. ft. - 28 Guage - Corrugated Metal Roofing and Overhand
8 - 1/2" x 12" - Bolts, Washers and Nuts
7 lbs. - 8d - Galv. Nails for Plywood and Rough Boards
1 lb. - 16d - Nails for Corner Studs
1 gal. each of Oil Base Primer and Exterior Paint



TOP VIEW

PORTABLE ROUGHAGE SELF-FEEDER FOR 40 EWES OR 80 LAMBS (N.D. PLAN 872-1-2)

Timothy C. Faller and Dexter Johnson

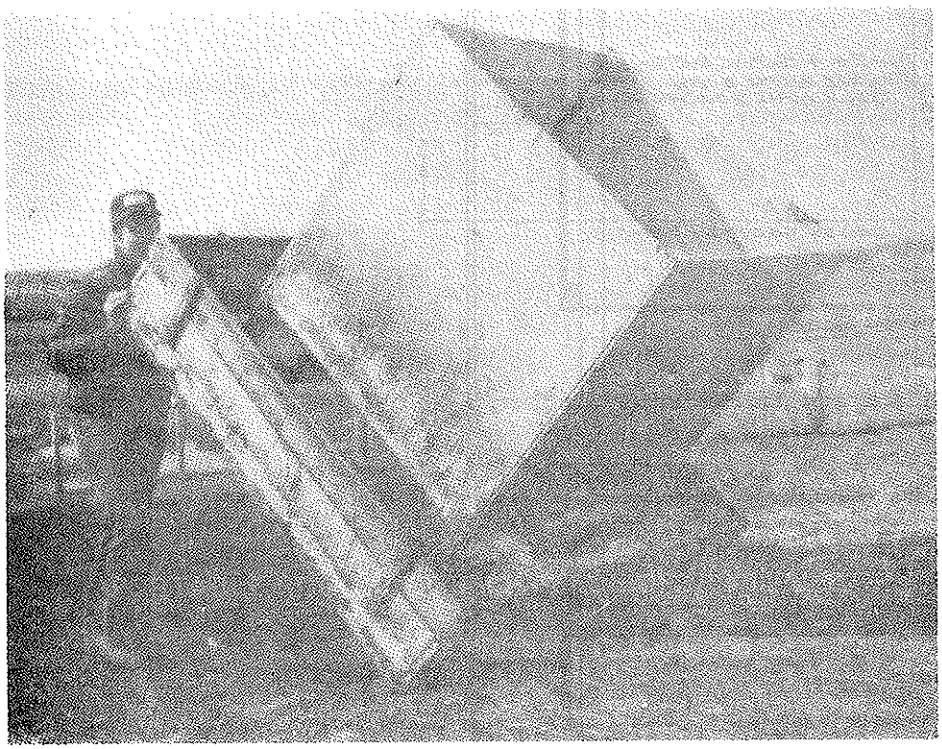
Ground roughage handling and feeding of sheep, pose many problems under North Dakota conditions. Cost, wool contamination, versatility are major considerations for use of various feeders. Recognizing the need for an economical type self-feeder of simple construction and suitable for many environmental conditions, this self-feeder was designed and put into use at the Hettinger Station.

A 4' x 4' feeder with a 6' x 6' trough will provide enough eating space for 40 ewes on a high roughage ration and the 80 cubic feet of storage will contain feed supply for 5-7 days for 40 ewes.

The feeder is used outdoors with no cover when feeding high roughage rations as normal precipitation (rain or snow) will be consumed by the sheep with no apparent spoilage if 40 ewes are provided per feeder. Higher quality and more concentrated feeds will require placing the feeders indoors and/or require constructing covers.

The 4' x 4' construction allows fitting with a grinder mixer. Possible modifications would include making the feeders taller for more storage capacity or longer for filling with a front end loader. (Example: 4' x 8' which would be sufficient feeder space for 60 ewes.)

Self feeding sheep with this type feeder will require daily care as high roughage rations will pile in the center.



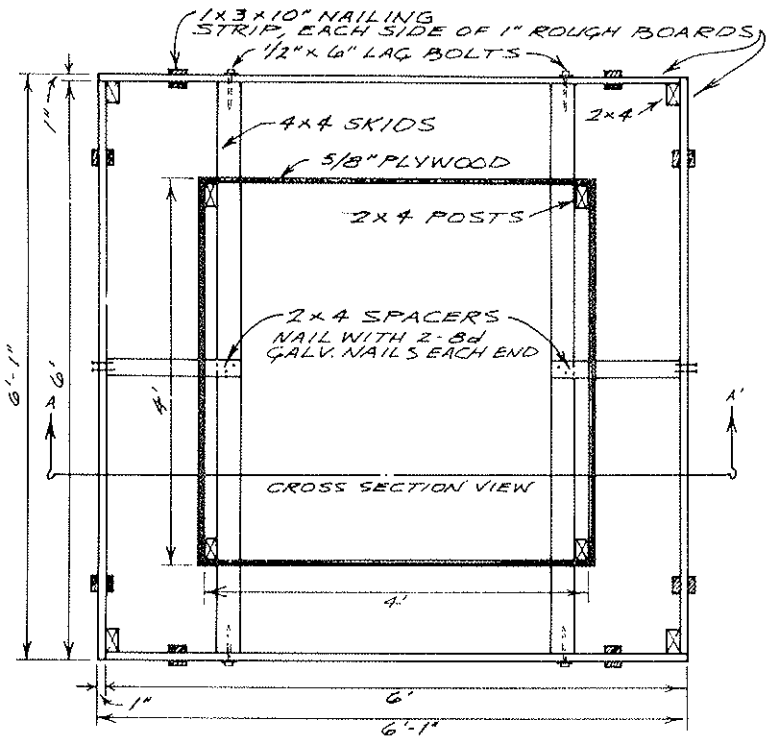
Superintendent Faller demonstrates the portability of the roughage feeder.

(Faller is Superintendent, Hettinger Experiment Station and Dexter Johnson is Extension Agricultural Engineer)

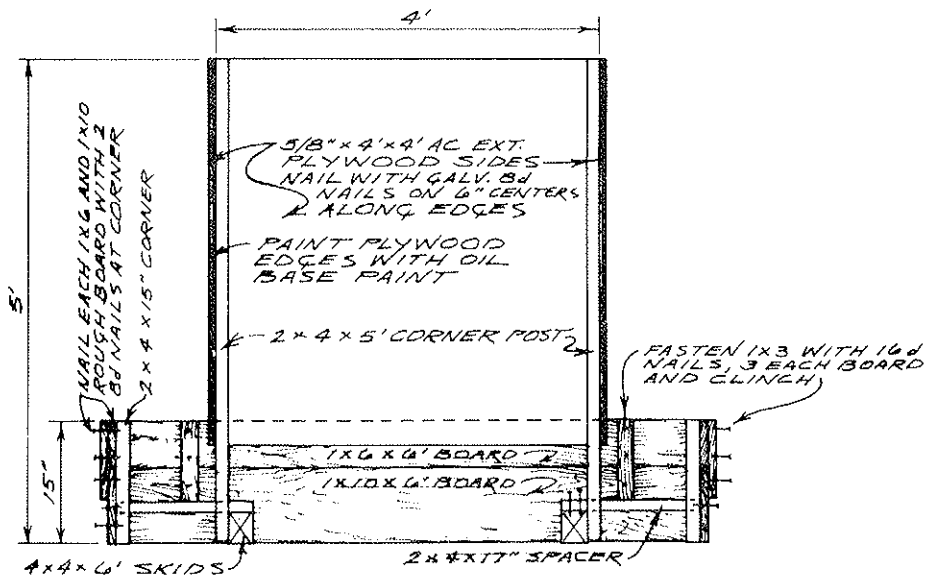
BILL OF MATERIALS

PORTABLE SHEEP FEEDER ... N.D. PLAN 872-1-2

2 - 5/8" x 4' x 8' - AC Ext. Plywood
3 - 2 x 4 x 10' - #2 or Const. Grade
2 - 1 x 3 x 8' - Boards
4 - 1 x 6 x 6' - Boards
4 - 1 x 10 x 6' - Boards
2 - 4 x 4 x 6 - Skids
4 - 1/2" x 6" - Lag Bolts and Washers
1 lb. - 8d - Nails for Plywood and Side Boards
24 - 16d - Nails for Clinching Nailing Strips
1 gal. each of Oil Base Primer and Exterior Paint



TOP VIEW



CROSS SECTION VIEW

16' COLLAPSIBLE FENCELINE FEED BUNKS (FOR SHEEP)

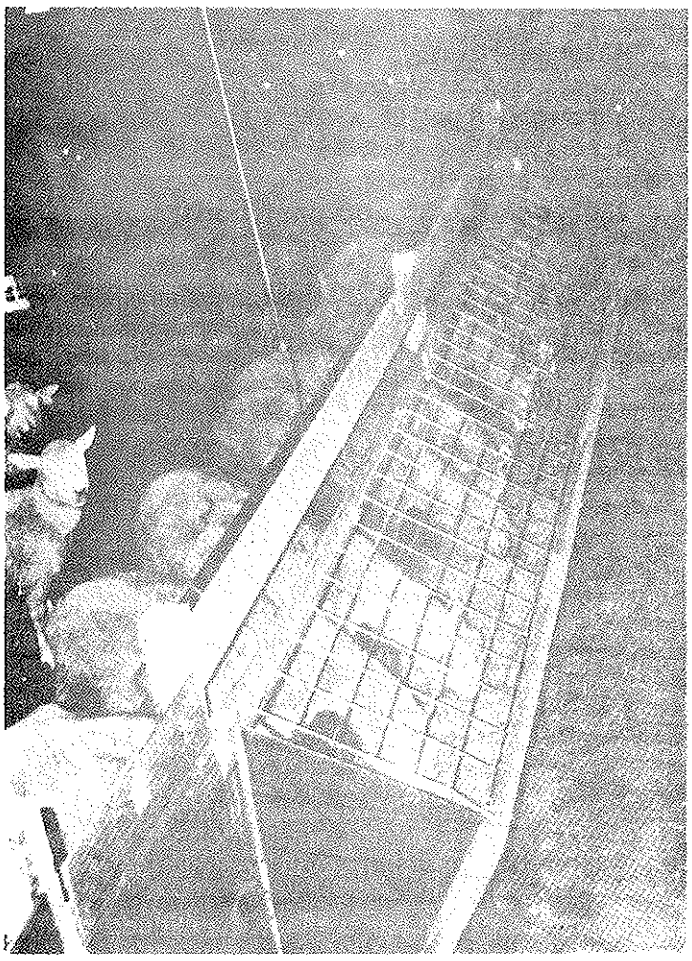
Timothy C. Faller and Dexter Johnson

Inexpensive, versatile, fenceline feedbunks are usable in many present day sheep operations. Many ranchers are utilizing finely ground roughage rations to mechanically handle feed to the eweflock. Realizing the need for a new, low-cost type of feedbunk construction for sheep producers the Hettinger Experiment Station produced the collapsible feeder for use in many operations.

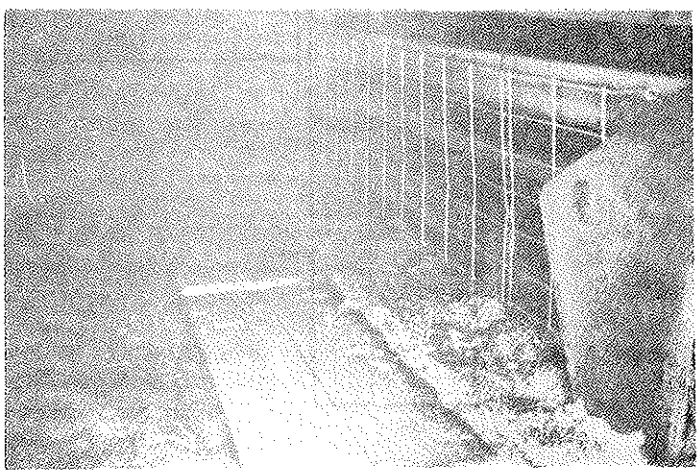
A 16' long feeder section was developed that uses the ground for a base and boards for sides. A wider top than bottom forms an angle which aids feed to slide to the bottom of the bunk. To keep lambs from crawling through, a grated cover was made by cutting a 52" x 16' "Stock Panel" in half (lengthwise forming 32' linear bunk cover). This grated cover attaches to a back fence section with a 9" wide neckspace opening and a 18" high front section to give the bunk shape. The back fence side is attached to wooden posts spaced 8' apart. There is no plywood floor in the bunks used at the Hettinger Station.

These bunks are easily collapsed to aid cleaning. This can be for cleaning snow out of the bunk when used outside in the winter or for pen access when used indoors. The grated cover serves as a constraint keeping baby lambs from escaping the pen via the feedbunk. The roughage should be cut no longer than 1½" to easily fall through the grated cover. When feeding only mature sheep an inexpensive option would be to use chains to give the bunk form. Another option would be the addition of a closure board to keep sheep out of the bunk and prevent wool contamination when unloading feed into the bunk from a wagon. The closure board would fit into the open neckspace and could be raised up after the feed is delivered into the bunk.

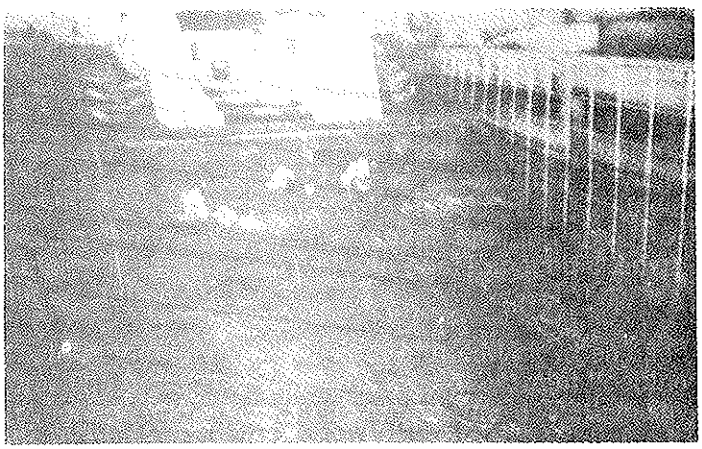
(Faller is Superintendent, Hettinger Experiment Station and Dexter Johnson is Extension Agricultural Engineer)



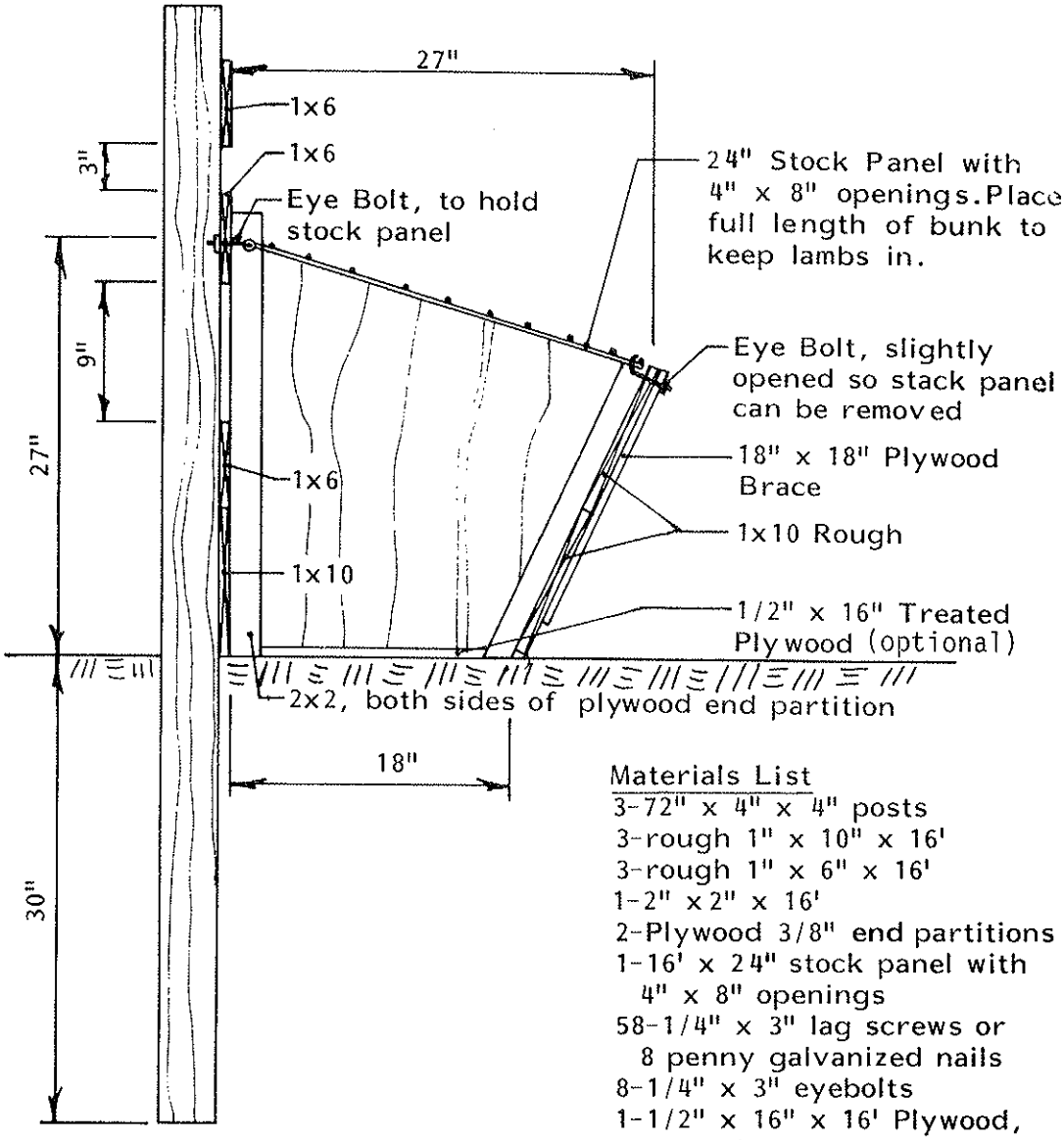
1. The "Stock Panel" grate in place holds the fenceline bunk together, keeps lambs from crawling out of pen and permits unloading feed directly into bunk.



2. The front of the feedbunk drops down when the grate is lifted up. Note the grate lays against the back of the bunk.

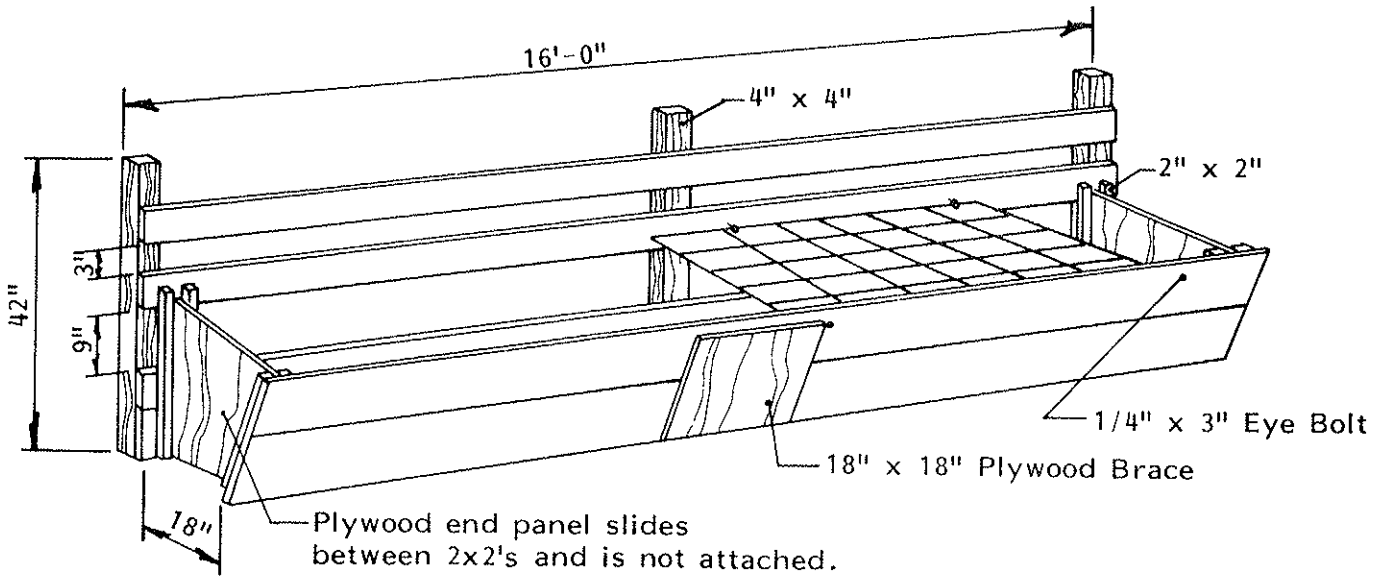


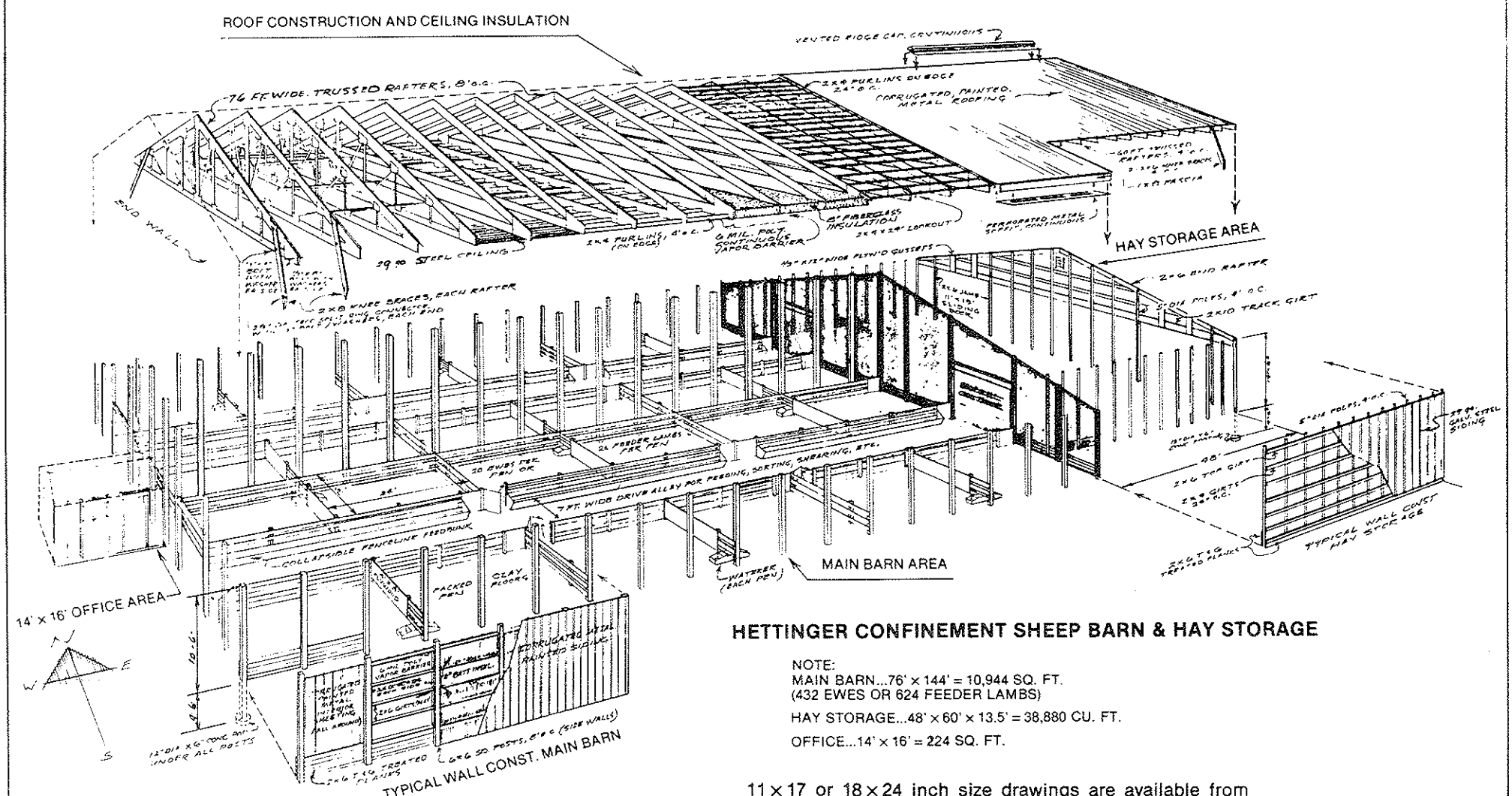
3. Bunk cleaning is simple and fast when the front of the bunk is moved out of the way.



Materials List

3-72" x 4" x 4" posts
3-rough 1" x 10" x 16'
3-rough 1" x 6" x 16'
1-2" x 2" x 16'
2-Plywood 3/8" end partitions
1-16' x 24" stock panel with 4" x 8" openings
58-1/4" x 3" lag screws or 8 penny galvanized nails
8-1/4" x 3" eyebolts
1-1/2" x 16" x 16' Plywood, treated





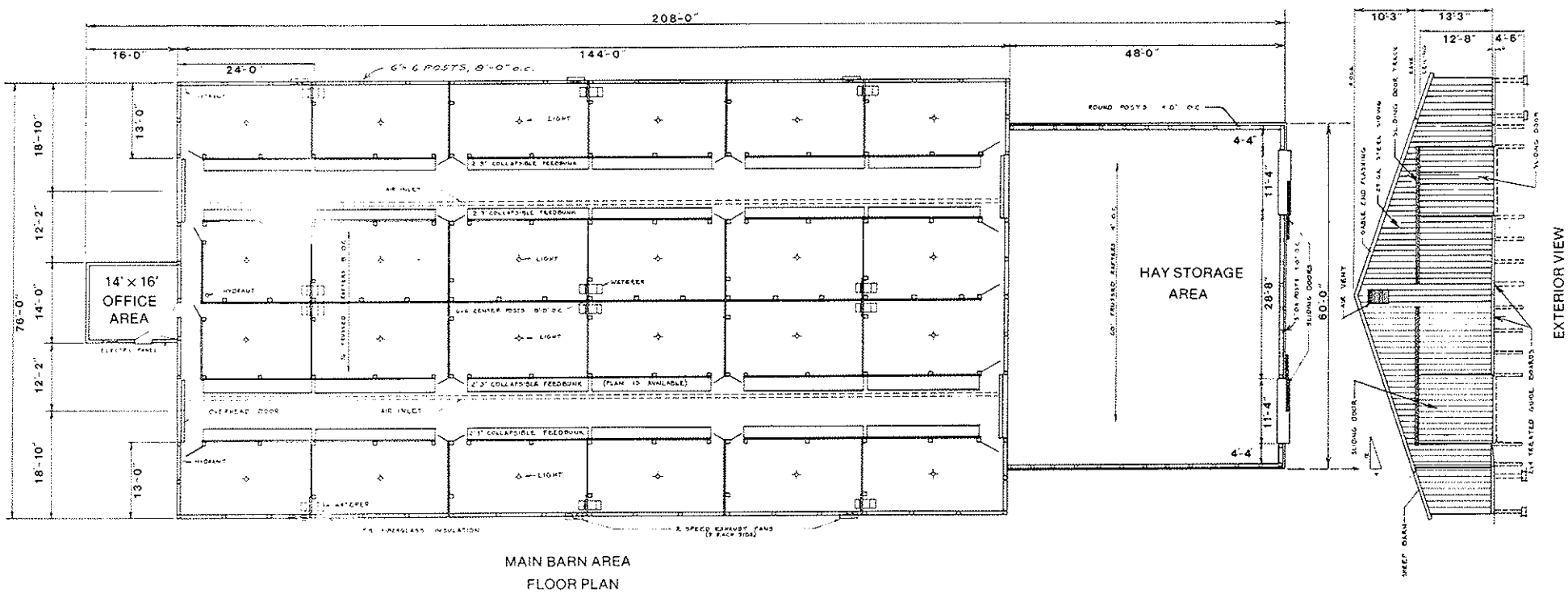
HETTINGER CONFINEMENT SHEEP BARN & HAY STORAGE

NOTE:
MAIN BARN...76' x 144' = 10,944 SQ. FT.
(432 EWES OR 624 FEEDER LAMBS)

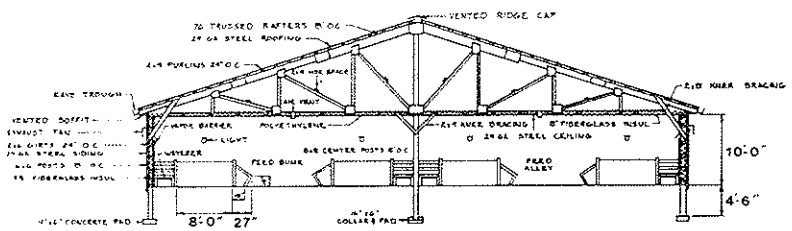
HAY STORAGE...48' x 60' x 13.5' = 38,880 CU. FT.

OFFICE...14' x 16' = 224 SQ. FT.

11 x 17 or 18 x 24 inch size drawings are available from NDSU, Extension Agricultural Engineering, Fargo, N.D. 58105. $1.00 per set.



MAIN BARN AREA
FLOOR PLAN



CROSS-SECTION VIEW

HETTINGER CONFINEMENT SHEEP BARN & HAY STORAGE

Ram Fertility and Management

Wallace D. Eide
Extension Livestock Specialist

Roger G. Haugen
Extension Livestock Specialist

James Tilton
Professor of Animal Science

The level of fertility in a ram is becoming increasingly important in the overall sheep management program. A highly fertile ram will not only settle a greater number of ewes earlier in the breeding season but will also fertilize a higher proportion of twin eggs than rams with poor fertility. In addition, recent data suggests that highly fertile rams tend to sire daughters that reach sexual maturity at an earlier age and ovulate more ova during each heat (estrous) period.

Sexual Maturity

Sexual maturity of ram lambs is related to both age and weight. These factors are influenced by heredity and environmental factors such as climate and nutrition. Sexual maturity of the ram lamb appears to be more closely related to body weight than age. Studies indicate sexual maturity in rams occurs at a body weight nearing 40 to 60 percent of the mature weight for that breed. Sexual maturity may be delayed beyond one year of age if the ram lamb is subjected to inadequate nutrition and/or unfavorable environmental conditions.

Investigations indicate that full development of a ram's reproductive organs occur somewhere between 100 to 150 days of age. Suffolk and Hampshire males will mature earlier than the fine wool breeds. Also, crossbred lambs tend to mature earlier than straightbred lambs. Most lambs are first ready to reproduce by 150 days.

Sheep producers agree that healthy, active, well-grown ram lambs may be used with good success on a limited number of ewes. Breeding apparently has no adverse effect on the growing ram lamb as long as adequate nutrition is supplied. These statements should not be misinterpreted to suggest that all ram lambs will satisfactorily breed ewes.

The ram lambs may be ready, willing and even capable to reproduce by five months of age or earlier, but their ability to settle a large number of ewes still needs time to develop. Researchers studying semen production in ram lambs have noted that sperm motility scores dramatically improve from six to nine months of age, with a corresponding decrease in the percent abnormal and percent dead sperm. Studies have indicated that as testicular size increases there is also an increase in sperm numbers, improving overall semen quality. Recent evidence indicates that rams with larger testicles are capable of superior reproductive performance and will produce offspring with greater reproductive capacity.

Some recommendations on using ram lambs are:

1. Age — minimum of 6.5 months of age and preferably older.
2. Weight — dependent on breed — approximately 150 pounds.
3. Separate ram lambs from yearling and mature rams. **They can't compete!**
4. Check for testicle development, disease or malformation. Watch for epididymitis!
5. Have a semen evaluation test.
6. Sex education — put ram lambs with some cull ewes before the breeding season. Observe for differences in libido.
7. Double the ram to ewe ratio. If presently using two mature rams per 100 ewes, use four ram lambs per 100 ewes.
8. If ram lambs are active, they may need supplemental feed.
9. Use a marking harness or paint on the brisket and check mating performance daily.
10. Consider using ram lambs on ewe lambs. Stress is reduced for the ewe lambs.

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North Dakota State University Fargo, North Dakota 58105

can also involve hemacytometric counts for sperm concentration, checking pH, and examining sperm morphology. While all of these tests are beneficial in identifying the ram which has inferior semen quality, it cannot identify those rams which are of marginal breeding value. A semen test does not provide information about the libido or serving capacity of a particular ram.

Temperature

High temperatures may have adverse affects on ram breeding performance. The ram's scrotal and testicular temperature is normally a few degrees below that of actual body temperature. The scrotum not only houses and protects the testes but also regulates the temperature of the testes. When the weather is hot the muscles in the scrotum relax and the testicles are suspended well below the body cavity. Conversely, when the weather is cold the muscles in the scrotum will draw the testes up near the body. Research indicates that if the testes are placed in the body cavity by surgical procedures, the body heat will soon sterilize the ram. Even placing an insulated bag around the scrotum has been known to cause sterility.

When atmospheric temperature exceeds 90°F for a period of time and humidity is high, fertility will be reduced in most rams. Also, anything which causes elevated body temperature such as fever and increased exercise during warm weather can seriously affect ram fertility. When the body or scrotal temperture returns to normal, fertility will usually return in about six weeks.

There are several different management practices which can be used to alleviate the effects of high temperatures. Shearing rams before placing in the breeding pasture has been reported to increase fertility during the late summer and early fall. It would also be advisable not to allow rams to become too fat. Consideration should also be given to providing rams with some shade or keeping them in the coolest available place during the day and allowing them with the ewe flock only at night.

Physical Factors

Any physical condition which will prevent or reduce a ram's ability to mate with a ewe will reduce the number of lambs he will sire. These physical conditions might include crippling or lameness due to disease or mechanical injury. Careful attention should be paid to the hoofs of the ram throughout the year. A ram with poor feet and legs is not going to seek out and breed many ewes. If rams develop a respiratory condition which cannot be corrected by antibiotic therapy, they should be culled.

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