26th Annual Western Dakota SHEEP DAY

Hettinger Armory

Feb. 13, 1985

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

PROGRAM

9:45 A.M.	Coffee
10:10 A.M.	WHAT'S SCROTAL CIRCUMFERENCE WORTH? Kris Ringwall Livestock Specialist
10:45 A.M.	HETTINGER & FARGO STATION REPORT Dr. Duane Erickson Roger Haugen Timothy Faller, Superintendent
12:00 Noon	LUNCH: Roast American Lamb
1:10 P.M.	WELCOME Dr. H.R. Lund, Director Agriculture Experiment Station North Dakota State University
1:20 P.M.	A LAMB PACKER LOOKS AT MARKETING! Mr. Larry Wright John Morrell Inc. Sioux Falls, SD
1:50 P.M.	NATIONAL LAMB FEEDERS ASSOCIATION Mr. Jack Hardy Fairview, MT
2:20 P.M.	CONFINEMENT LAMB FEEDING Mr. Marlin Norby Fairview, MT
2:50 P.M.	BARN COUGH - WHAT IS IT? Dr. Kurt Wohlgemuth, DVM Extension Specialist

*There will be a program for the ladies in the afternoon featuring, "MAKING SAUSAGE" and "A LAMB CUTTING DEMONSTRATION."

SHEEP DAY DIGEST

by
Timothy C. Faller, Supt.
Hettinger Experiment Station

SECTION I

REPORTS OF RESEARCH IN PROGRESS

AT THE

HETTINGER EXPERIMENT STATION

PRESENTED BY

TIMOTHY C. FALLER
SUPERINTENDENT

DR. DUANE ERICKSON
ANIMAL SCIENCE DEPARTMENT
NORTH DAKOTA STATE UNIVERSITY

CLAYTON HAUGSE
ANIMAL SCIENCE DEPARTMENT
NORTH DAKOTA STATE UNIVERSITY

ROGER HAUGEN
ANIMAL SCIENCE DEPARTMENT
NORTH DAKOTA STATE UNIVERSITY

AT THE

26TH ANNUAL SHEEP DAY

HETTINGER EXPERIMENT STATION
HETTINGER, NORTH DAKOTA

FEBRUARY 13, 1985

WHEAT STRAW AS A FEED FOR CONFINED EWES
(PROJECT 3729)

T.C. Faller, C.N. Haugse and D.O. Erickson

Summary

Performance of ewes offered rations containing varying levels of straw continues to be variable with the group fed 60% straw/40% alfalfa having the better overall production. The percent ewes lambing and the percent lambing rate per ewe exposed has decreased each year. This may relate to some long term effect of this type of ration. Death loss in lambs is higher than desired.

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 the lactation period. Straw rations are fed from April 15 to July 25-30. Ewes are then fed a flushing ration for 2-3 weeks. Breeding takes place from August 10 to September 15. Ewes are returned to straw rations from September 15 to November 15-25. All ewes are then fed the same pre-lambing and lactation ration. The number of days on the straw ration has varied from year to year averaging from 160-180 days.

Results and Discussion

Weights of ewes were all very similar in July of 1984 (table 1). Ewes offered rations with 40 or 60% straw increased in weight approximately 10 pounds while other groups maintained their weight.

Ewes generally were in satisfactory condition throughout the year. There were more thin ewes in the 60% straw group in July 1984 than in the other 3 experimental groups (50%, 28%, 39%, 30%).

The group of ewes fed the 60% straw - 40% alfalfa ration had the best level of performance (table 1). A higher percentage of the ewes in this group lambed with ewes having a higher percentage of multiple births and raised more pounds of lamb per ewe. It is possible that flushing had a more desirable effect with this group of ewes.

TABLE 1. EWE WEIGHT AND PRODUCTION 1983-84

	100% Alfalfa	80% Alfalfa 20% Straw	60% Alfalfa 40% Straw	40% Alfalfa 60% Straw
Pre-breeding wt. (6-15-83)	162.1	162.6	148.2	144.8
Post breeding wt. (12-01-83)	160.6	164.3	155.5	157.6
Weaning wt. (4-5-84)	162.5	166.4	163.1	161.2
Mid-maintenance wt. (7-5-84)	160.2	165.0	160.4	157.4
Fleece wt.	13.8	13.1	12.8	12.7
Ewe Score				
Pre-breeding wt. (6-15-83)	3.49	3.27	3.18	3.00
Post breeding wt. (12-01-83)	3.81	3.84	3.49	3.37
Weaning wt. (4-5-84)	3.18	3.45	3.39	3.02
Mid-maintenance wt. (7-5-84)	3.00	3.22	3.07	2.73
Number of Ewes	43	44	50	44
% Ewes lambing	67	66	62	80
% Lambing rate	162	162	161	169
% Lambing rate/ewe exposed	109	107	100	134
% Single births	23	23	26	20
% Twins	77	77	68	75
% Triplets or more	0	0	6	5
% Death loss	19	26	20	17
Lbs. of lamb/ewe exposed	52	50	52	63
Ave. Lamb Index	69	73	75	66
Ave. Ewe Index	94	93	97	90

TABLE 2. THREE YEAR SUMMARY - EWE PRODUCTION

	Ration											
Production Item	100% Alfalfa 0% Straw			80% Alfalfa 20% Straw			60% Alfalfa 40% Straw			40% Alfalfa 60% Straw		
	82	83	84	82	83	84	82	83	84	82	83	84
% Ewes lambing	92	84 (81)	67	98	86 (83)	66	90	82 (78)	62	92	88 (87)	80
% Lambing rate	136	151 (150)	162	146	155 (154)	162	148	140 (150)	161	145	158 (157)	169
% Lambing rate per ewe exposed	125	127 (120)	109	143	133 (128)	107	133	116 (116)	100	129	139 (134)	134
% Death loss (lambs)	31	13 (21)	19	37	22 (28)	26	28	20 (23)	20	23	14 (18)	17
Lbs. lamb per ewe exposed	49	67 (56)	52	46	61 (52)	50	51	54 (52)	52	61	72 (65)	63
% Single births	48	34 (35)	23	37	29 (30)	23	35	46 (36)	26	46	32 (33)	20
% Twin births	47	66 (63)	77	63	71 (70)	77	65	54 (62)	68	45	59 (60)	75
% Triplet (+) births	5	0 (2)	0	0	0 (0)	0	0	0 (2)	6	9	8 (7)	5

TABLE 3. AVERAGE YEARLY EWE PERFORMANCE

	1982	1983	1984
% Ewes lambing	93	85	69
% Lambing rate	144	151	164
% Lambing rate per ewe exposed	132	129	112
% Death loss (lambs)	30	17	20
Lbs. of lamb per ewe exposed	52	63	54
% Single births	41	35	23
% Twins	55	62	74
% Triplets (+)	3	2	3

The lamb index does not follow a linear pattern. The index increases for lambs from ewes fed from 0 to 40% straw then decreases for the 60% straw group to its lowest value. This lamb index is a measure of 90 day adjusted weight which is increased for multiple births and ewe wool production.

A summary of three years performance is presented in table 2. Death loss is higher than desired. A summary indicating causes of death is not available at this time although it appears that a number of losses are due to pneumonia related conditions.

As ewes have increased in age there has been an increase in the number of multiple births and decrease in number of single lambs. Ewes fed the 60% straw/40% alfalfa ration have better performance than ewes fed other rations.

Performance of ewes on a yearly basis is presented in table 3. Percent ewes lambing has decreased in each of the last two years. Although the number of multiple births has increased the percent lambing rate per ewe exposed has also decreased. This decrease in performance may be related to some long term effect of this type of feeding regime.

THE EFFECT OF TWO MANAGEMENT SYSTEMS ON GROWTH AND EWE PRODUCTIVITY (PROJECT 3729)

T.C. Faller, D.O. Erickson and C.N. Haugse

Summary

Ewes raised under a confined management system have not performed as satisfactory as traditionally managed ewes. Outside ewes have had a higher percent of the ewes lambing, lambing rate per ewe exposed and have produced more pounds of lamb per ewe than ewes in confinement.

Experimental Procedure

One objective of this project is to determine the effect of confinement on ewe productivity and longevity. Three different cross-bred ewe groups are being compared under confinement and on a traditional (outside) system. Genetic groups being compared are (1) ½ Suffolk + ½ Rambouillet, (2) ¼ Finn + ¼ Border Leicester + ½ Rambouillet, and (3) ½ Finn + ½ Rambouillet ewes. Crosses to obtain these ewes were made in 1980 utilizing a group of Wyoming white face range ewes and Finn, Suffolk or ½ Finn + ½ Border Leicester rams. The inside (confined) sheep were placed on trial July 27, 1981. Confined ewes are fed a mixture of chopped alfalfa hay plus chopped straw 3 times each week in bunks. The daily ration for confined ewes contains 75% of recommended NRC level for energy.

Traditional or "outside" ewes are placed on native or tame pastures each spring. Ewes are brought into dry lot for breeding. Outside ewes are fed the same ration as confined groups during the breeding period and throughout the post-breeding, gestation, pre-partum and post-partum periods. All groups are allowed free access to a mineral mix (1/3 TM salt + 1/3 dicalcium phosphate + 1/3 iodized salt). Similar management procedures have been followed in each year. Ewes were mated to Suffolk rams.

Results and Discussion

Results of the third year of production (1983-84) are presented in Table 1. Ewes managed in the traditional (outside) manner continue to out perform the confinement ewes in percent ewes lambing, lambing rate and pounds of lamb (at weaning) per ewe exposed. Lamb death loss has been high for the outside ewe groups. One of the major differences in performance between the two groups is in the number of multiple births. Outside ewe groups had 94% multiple births compared to 83% for confined ewes. Triplets are most common with the ½ Finn + ½ Ramb ewe group.

A summary of three years data (combined for breeding groups) comparing confined and outside ewes is presented in table 2. The major difference between the groups is in lambing rate and pounds of lamb produced per ewe.

TABLE 1. EWE WEIGHT AND PRODUCTION - 1984

	Genetic Groups		
CONFINED	½ Suff ½ Ramb	¼ Finn ¼ B.L. ½ Ramb	½ Finn ½ Ramb
Pre-breeding wt. (8-01-83)	148.5	133.6	126.3
Post breeding wt. (10-01-83)	152.5	141.5	134.7
Weaning wt. (4-25-84)	152.2	128.4	124.2
Mid-maintenance wt. (6-02-84)	153.0	124.6	127.6
Wool wt. (12-01-83)	9.8	10.1	9.8
Ewe score (6-02-84)	2.65	2.39	2.38
Number of Ewes	32	34	36
% Ewes lambing	78	94	92
% Lambing rate	176	181	182
% Lambing rate/ewe exposed	138	171	167
% Single births	16	16	20
% Twins	77	69	53
% Triplets or more	7	16	27
% Death loss	11	10	13
Lbs. of lamb/ewe exposed	75	87	78
Ave. Lamb Index	70	66	62
Ave. Ewe Index	88	85	81
OUTSIDE			
Pre-breeding wt. (8-15-83)	149.0	135.8	133.1
Post breeding wt. (11-28-83)	151.7	141.8	136.7
Weaning wt. (7-01-84)	160.3	144.2	141.4
Mid-maintenance wt. (11-01-84)	151.2	137.9	138.8
Wool wt. (03-01-84)	8.6	8.6	8.5
Ewe score (9-02-84)	3.2	3.2	3.0
Number of ewes	33	36	36
% Ewes lambing	88	86	100
% Lambing rate	197	216	230
% Lambing rate/ewe exposed	173	186	230
% Single births	11	3	5
% Twins	67	66	48
% Triplets or more	23	31	47
% Death loss	12	15	34
Lbs. of lamb/ewe exposed	106	107	102
Ave. Lamb Index	80	78	77
Ave. Ewe Index	97	96	94

TABLE 2. THREE YEAR SUMMARY OF EWE WEIGHTS AND PRODUCTION

	Confined			Outside		
ITEM	1982	1983	1984	1982	1983	1984
Pre-breeding wt. (August)	111	138	136	113	143	139
Post-breeding wt. (October)	115	143	143	141	152	143
Mid-maintenance wt. (June)	138	134	135	143	141	143
% Ewes lambing	92	87 (89)	88	90	94 (92)	91
% Lambing rate	146	159 (162)	180	190	192 (199)	214
% Lambing rate/ewe exposed	134	138 (144)	159	172	180 (183)	196
Death loss (lambs) (%)	18	14 (14)	11	19	22 (20)	20
Lbs. lamb/ewe exposed	69	67 (72)	80	85	73 (88)	105

WARM BARN HOUSING
Project 3729

T.C. Faller and D.O. Erickson

Summary

Data for labor expenditures have been accumulated for 1984. These data are shown along with data that were collected in the previous 3 years.

Procedure

A log was kept of all work performed with sheep in the confinement barn. A comparison with data collected in 1981 - 1983 is shown in table 2. The following stocking rates were used.

Table 1 Stocking Rate

1983 - 84	406 ewes
1982 - 83	408 ewes
1981 - 82	432 ewes
1980 - 81	375 ewes

Table 2 Labor Expenditures

	Hours 1983-84	Hr/Ewe	3 Yr. Ave Hours 1980-83	3 Yr. Ave Hr/Ewe
Barning cleaning	63.0	.15	81.08	.20
Feeding	154.5	.38	150.22	.37
Bedding	101.0	.25	73.76	.18
Vaccination, Castration & Hoof Trimming	101.0	.25	35.2	.09
Lambing	220.0	.54	240.67	.59
Shearing (3 x 17 hr)	51.0	.13	64 47	.16
Total	690.5	1.70	645.40	1.59

Total labor costs for maintaining and caring for 406 ewes and their lambs until weaned amounted to 690.5 hours of 1.7 hours per ewe. Labor expenditures have very closely followed the districution patterns reported for the previous years.

The sheep unit utilized 17763 kilowatts of energy to provide lighting and heat for the office building. This amounted to 43.54 KWH per ewe which is greater than the previous years (33.7 KWH) in 1981, (36.2 KWH) in 1982, and (28.0 KWH) in 1983. This would refelct a longer winter season.

Water consumption was 1.17 gals per day per ewe and included water for the lambs until weaning and rams used during the breeding season.

Salt and mineral consumption was 12.0 lbs. per head or 174680 gals. = .53 ozs. per day. This amount compares to .8 oz. per day in 1981, .24 oz. per day in 1982, and .33 oz. per day in 1983.

Sheep bedding (straw) for 408 ewes and their lambs amounted to 2238 bales (5.51 bales per ewe). If straw is evaluated at .35 per bale the total cost for bedding was $783.30.

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 barn ventilates better with approximately 400 ewes in it.
- 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 to be equal or superior to traditional systems, however, extreme caution must be exercised at shearing time to issure 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 warning system is essential. High humidity appears to inhibit use of standard fire warning systems.

THE EFFECT OF SUPPLEMENTAL NIACIN IN A HIGH CONCENTRATE DIET FOR LAMBS CAPABLE OF GAINING IN EXCESS OF ONE POUND/DAY

T.J. Flakoll, M.R. Light, D.O. Erickson, V.K. Johnson,
C.N. Haugse, B.L. Moore and T.C. Faller

Summary

Two experiments were conducted, comprised of a feedlot trial and a digestibility trial to determine the effects of supplemental niacin additions to a high concentrate (77.5%) diet for lambs capable of gaining one pound/day.

Niacin additions of 0, 100, 200 and 300 ppm were incorporated into a diet calculated to contain 15.1% CP and 83.9% TDN (100% DM).

Feedlot lamb average daily gain (ADG) was greater ($P<.05$) for the 0 ppm niacin level compared to the 200 ppm treatment group. Lambs with 300 ppm niacin additions were more efficient than lambs with 100 ppm additional niacin ($P = .03$) or 0 ppm additional niacin ($P<.10$). Ram and wether lambs gained faster ($P<.01$) than ewe lambs (.84, .77 and .68 pounds/day). Lambs raised outdoors on range prior to the experiment exhibited higher ($P<.01$) ADG (.80 vs .74 pounds/day) than lambs raised indoors in a confinement barn. There was no diet/sex interaction ($P = .57$) for any treatment level.

A digestibility trial utilizing a 4 x 4 Latin design was used to determine digestibility and rumen VFA concentrations. Niacin additions did not affect ($P>.10$) the apparent digestibility of crude protein (CP), gross energy (GE), phosphorus (P), calcium (Ca), acid detergent fiber (ADF) and ash by acid insoluble ash indicator or total collection methods. There was a reduced rumen VFA ($P = .058$) concentration for 200 ppm when compared to the 0 ppm controls. Acetic acid was found to be reduced ($P = .078$) at niacin additions of 200 ppm compared to 100 ppm. There was no difference ($P>.10$) due to diet in rumen propionic, isobutyric, isovaleric and valeric acids.

Based on observations from these trials, there can be no recommendation concerning the addition of niacin to rations for feeder lambs.

Introduction

The gain and feed efficiency of feedlot lambs has steadily improved over the years due to breeding and nutrition. Optimum production per unit of feed used will be needed for profitable operations in the future. The whole system of livestock feeding, breeding and management has changed since the time of the early B-vitamin research. Productive capabilities using current technology far exceed management and production levels present in these earlier research efforts. As a result, recommended levels of many nutrients for ruminants are insufficient to meet most metabolic demands for the levels of production expected from livestock today and in the future. Nutrient requirements have to be continually assessed for their adequacy in meeting the genetic potentials of higher producing animals. There have been several instances of increased weight gains due to supplemental niacin, but often the results have been variable both in research trials and in the field.

Today's ruminant is a high producing factory; therefore, niacin requirements may be expected to follow the increase in growth and production as the demand for niacin is highest during these peak production periods.

Experimental Procedure

Niacin was added to a standard high energy diet (table 1) at one of four levels: 0, 100, 200 or 300 ppm of additional niacin. A premix of the supplements was blended and contained the entire amounts of niacin, vitamins A, D and E, terramycin, limestone, rumensin, ammonium chloride and soybean meal that were required for each treatment level. The supplemental premix made up 11% of the total diet and was mixed with ground corn and alfalfa to formulate a complete diet. The diet was fed ad libitum. All diets were calculated to contain 15.1% protein and 83.9% TDN on a 100% dry basis.

Lambs at the Hettinger Experiment Station were utilized in a feedlot growth trial under normal drylot conditions. Lambs (285) averaging 54 pounds were allotted by weight, sex and breeding in a 2 x 4 factorial design. The lambs were weighed and feed intake was recorded on a bi-weekly basis. The experiment was terminated after 70 days when the lambs averaged in excess of 105 pounds at a bi-weekly weigh period.

The digestibility trial was conducted at the NDSU Small Animal Research Center in Fargo, N.D. Four Columbia lambs were utilized in a 4 x 4 Latin square factorial design. The rams had an initial weight of 82 pounds and were divided into one of four levels of supplemental niacin (0, 100, 200 and 300 ppm). The diets were of similar composition and mixing procedures to the diet used in the feedlot trial.

Rumen samples were obtained by stomach tube and suction strainer at the end of each collection period during the digestibility trial to determine the effects of niacin supplementation on rumen volatile fatty acid concentration.

Results and Discussion

Feedlot lamb gain and feed efficiency are shown in tables 2 and 3. Supplementing niacin (0, 100, 300 and 300 ppm) resulted in no weight gain advantage ($P>.10$) for lambs whose daily gains (table 2) were .75, .71, .69 and .72 pounds/ day, respectively. Feed efficiencies (table 3) were .193, .184, .210 and .231 for additions of 0, 100, 200 and 300 ppm of niacin, respectively. There was an improvement in feed efficiency at the 300 ppm level as compared to 100 ppm additional niacin ($P = .03$) and 0 ppm ($P<.10$). This was due to a reduced feed intake to support maintenance of daily gain compared to other treatments. The lambs may have been eating for energy needs and may be exhibiting a chemostatic effect due to an increased energy utilization.

There was no apparent effect ($P = .57$) due to diet/sex interaction (table 5). Rams and wethers gained faster ($P<.01$) than ewe lambs regardless of treatment group (table 5). There was no difference

(P>.10) in weight by treatment at any of the weigh periods (table 6). There were differences in daily gain with different breed crosses (table 7).

There was no effect (P>.10) on apparent digestibilities due to niacin (tables 8 and 9). Rumen volatile fatty acid concentrations were not increased by niacin supplementation (table 10). Volatile fatty acids had a reduced molar percentage with supplementation at 200 ppm but was significant (P<.05) only for butyric acid when compared to 0 ppm. Total VFA concentrations were reduced (P = .058) at the 200 ppm when compared to 0 ppm. There was a decreased rumen acetic acid concentration at a less rigorous (P = .078) level for the 200 ppm level when compared to the 100 ppm treatment group.

Lambs raised indoors in a confinement barn prior to the feedlot trial had reduced (P<.01) gains during the experiment when compared to lambs raised outdoors on range (table 11). This may be due to a difference in age with the confinement lambs being younger than range raised lambs. The lambs had similar on test weight (53 vs. 54 pounds) but the confinement lambs appeared to by physiologically fatter. Since both groups were mixed together for the feedlot trial, it was not possible to determine differences in intake for the two groups.

With our limited number of trials with niacin, there can be no recommendation concerning the addition of niacin for lambs capable of gaining in excess of one pound per day. The role of niacin in ruminant nutrition will require further investigation.

TABLE 1. DIET COMPOSITION[a]

Ingredient	%
Corn (IFN 4-02-932)	69.00
Alfalfa (IFN 1-00-059)	20.00
44% Soybean meal (IFN 5-04-637)	8.50
Rumensin	1.25
TM Salt	0.5
Ammonium chloride (IFN 6-08-814)	0.5
Limestone (IFN 6-02-632)	0.3
Vitamins A, D & E[b]	0.05
Terramycin	2.5 g/100 pounds

[a]0, 100, 200 and 300 ppm niacin (IFN 7-26-003) were added for each of four treatment groups as required by design. All diets were calculated to contain 15.1% protein and 83.9% TDN on a 100% dry basis.

[b]Vitamin A, D, E premix (1,000,000 I.U. Vitamin A; 400,000 I.U. Vitamin D; 400 I.U. Vitamin E).

TABLE 2. AVERAGE DAILY GAINS (POUNDS) BY TREATMENT IN FEEDLOT TRIAL

Diet[a]	N	ADG	SE[d]
000	64	.753[b]	.0156
100	66	.709[b,c]	.0152
200	71	.692[c]	.0176
300	67	.720[b,c]	.0163

[a]Level of niacin supplementation in diet. For diet formulation see table 1.

[b,c]Columns with different superscript letters are different (P<.05) (MSE .012).

[d]Standard Error of Mean.

TABLE 3. FEED EFFICIENCY BY TREATMENT - FEEDLOT TRIAL

Diet[a]	N	Intake pounds/day	ADG	G/F
0	64	3.88	.755	.194[b,c]
100	66	3.86	.711	.184[b]
200	71	3.31	.693	.210[b,c]
300	67	3.11	.722	.232[c]
MSE[d]				.0001

[a]Level of niacin supplementation in diet. See table 1 for diet formulation.

[b,c]Columns with different superscript letters are different at $P<.05$. Diet 0 differs $P<.10$ from Diet 300.

[d]Mean Square of Error.

TABLE 4. ANALYZED NUTRIENT COMPOSITION (100% DRY BASIS) OF THE FEEDLOT DIETS

Treatment[a]	N	Total Ash	SE[b]	Acid Detergent Fiber	SE	Crude Protein	SE	Phosphorus	SE	Calcium	SE	Magnesium	SE	Niacin[c] (ppm)	SE	Ca:P Ratio
000	40	4.06	.074	11.76	.269	15.12	.168	.36	.018	.56	.018	.24	.006	12.11	.40	1.53:1
100	42	4.02	.067	11.49	.202	15.14	.163	.35	.006	.54	.020	.24	.003	43.50	2.42	1.55:1
200	46	4.43	.080	11.62	.175	14.90	.239	.34	.005	.54	.023	.24	.003	95.00	2.03	1.60:1
300	42	4.44	.110	11.19	.278	14.56	.197	.33	.003	.66	.038	.24	.004	14.00	3.47	2.03:1

[a] Level of niacin supplementation in diet (all listed as percentage). For diet formulation see table 1.
[b] Standard Error of Mean.
[c] From digestibility trial feed.

TABLE 5. AVERAGE DAILY GAIN BY SEX (pounds/day) WITHIN TREATMENT[a]

Diet[b]	Female			Ram			Wether		
	N	pounds/day	SE[c]	N	pounds/day	SE	N	pounds/day	SE
000	37	.722	1.960	4	.905	6.13	23	.781	2.361
100	37	.677	1.611	4	.830	6.95	25	.739	2.780
200	39	.636	1.721	4	.781	5.737	25	.777	3.310
300	36	.675	2.273	4	.836	1.037	27	.766	2.185
Total	152	.675[d]	.971	16	.839[e]	2.714	100	.766[e]	1.32

[a]No diet x sex interaction was found ($P>.05$).
[b]Level of niacin supplementation in diet. See table 1 for diet formulation.
[c]Standard Error of Mean.
[d,e]Columns with different superscript letters are different ($P<.01$).

TABLE 6. AVERAGE 2-WEEK WEIGHT OF LAMBS (POUNDS) BY TREATMENT IN FEEDLOT TRIAL

	Day											
Diet[a]	0	SE[c]	14	SE	28	SE	42	SE	56	SE	70	SE
000	56.05	.295	68.19	.423	82.97	.532	92.46	.585	103.94	.611	111.44	.704
100	53.8	.146	65.98	.192	77.90	.263	87.16	.340	98.42	.373	105.92	.430
200	54.95	.145	67.52	.2	79.88	.282	86.94	.364	97.54	.444	107.25	.439
300	56.49	.271	69.73	.294	81.43	.366	90.47	.415	101.29	.468	110.11	.602

[a] Level of niacin supplementation in diet. See table 1 for diet formulation.
[b] No differences were found ($P>.05$).
[c] Standard Error of Mean.

TABLE 7. AVERAGE DAILY GAINS (POUNDS/DAY) BY BREED[a] WITHIN TREATMENT AND AS A BREED AVERAGE

Diet[b]	BR N	BR ADG	BR SE	BS N	BS ADG	BS SE	CC N	CC ADG	CC SE	OS N	OS ADG	OS SE	YS N	YS ADG	YS SE
000	21	.664	.023	15	.748	.025	7	.828	.052	10	.816	.037	11	.744	.043
100	22	.653	.026	13	.744	.034	8	.744	.042	8	.766	.029	15	.711	.030
200	23	.649	.034	15	.744	.038	8	.675	.054	10	.803	.039	12	.775	.003
300	21	.655	.034	17	.761	.026	8	.757	.037	9	.825	.047	12	.70	.031
Average by breed	87	.653[e,g]	.015	60	.750[h]	.015	31	.748[f]	.024	37	.801[c,h]	.019	50	.730[d,f]	.017

MSE = .0105
df = 12

[a]Breed Code: C = Columbia; S = Suffolk; R = Rambouillet; O = ½ Suffolk, ½ Rambouillet; Y = ½ Finnish, ½ Rambouillet; B = ¼ Finnish, ¼ Border Leicester, ½ Rambouillet

[b]Level of niacin supplementation in diet. For diet formulation see table 1.
[c,d]Rows with different superscript letters differ $P<.05$.
[e,f]Rows with different superscript letters differ $P<.01$.
[g,h]Rows with different superscript letters differ $P<.001$.
No breed x diet interaction was found $P>.10$.

TABLE 8. APPARENT NUTRIENT DIGESTIBILITIES (AS A PERCENTAGE) OF DIETS BASED ON ACID INSOLUABLE ASH DETERMINATIONS[a]

Diet[b]	N	Dry Matter	SE[c]	Crude Protein	SE	Acid Detergent Fiber	SE	Gross Energy	SE	Calcium	SE	Phosphorus	SE	Ash	SE
000	8	75.3	.95	69.67	2.05	23.91	2.33	74.10	1.02	19.08	5.77	29.36	5.19	49.27	3.81
100	8	70.97	2.65	64.98	3.46	10.10	9.41	67.95	3.40	12.99	10.72	25.39	8.08	46.37	3.55
200	8	75.53	.99	70.53	1.69	28.00	3.47	72.70	1.36	23.60	4.79	40.78	4.14	54.38	2.11
300	8	73.32	1.68	68.11	2.44	23.29	4.36	69.57	1.81	17.64	7.63	33.29	5.81	50.57	3.15
MSE df=3		23.56		50.04		250.08		35.36		458.80		286.18		83.10	
		P=.225		P=.427		P=.147		P=.172		P=.801		P=.326		P=.380	

[a]No significant differences were found P>.10.
[b]Level of niacin supplementation in diet. For diet formulation see table 1.
[c]Standard Error of Mean.

TABLE 9. TOTAL COLLECTION APPARENT DIGESTIBILITIES (AS A PERCENTAGE) BY DIET[a]

Diet	Dry Matter	SE[b]	Crude Protein	SE	Acid Detergent Fiber	SE	Gross Energy	SE	Calcium	SE	Phosphorus	SE	Ash	SE
000	71.31	.809	64.66	2.232	11.18	3.171	69.75	1.318	5.85	6.384	17.63	5.716	41.03	3.929
100	72.76	.484	67.26	.797	16.18	1.919	69.90	2.113	19.62	3.769	29.82	5.987	48.94	1.820
200	72.25	1.426	66.59	2.274	18.18	5.044	69.06	1.733	13.96	5.238	32.79	5.025	48.51	2.301
300	70.80	1.729	65.67	1.500	15.77	5.164	66.71	1.916	11.11	5.668	24.62	9.407	45.13	4.668
MSE = df=16	11.82		26.08		131.68		25.76		229.04		364.50		91.67	
	P=.186		P=.755		P=.665		P=.574		P=.346		P=.421		P=.337	

[a]Level of niacin supplementation in diet. For diet formulation see table 1.
[b]Standard Error of Mean.
[c]No significant differences were found at P>.10.

TABLE 10. MEAN RUMEN VOLATILE FATTY ACID MOLAR PERCENTAGE CONCENTRATIONS BY TREATMENT

Diet	N	Acetic Acid	SE[b]	Propionic acid	SE	Butyric acid	SE	Acetic/ propionic	Isobutyric acid	SE	Valeric acid	SE	Isovaleric acid	SE	Total VFA	SE
000	8	$2.82^{c,d}$	.32	2.62	.46	$.77^{e}$	.03	1.08/1	.0159	.0084	.1752	.1051	.0438	.0406	6.4928^{e}	.6421
100	8	3.02^{c}	.20	2.50	.34	$.55^{e,f}$	.06	1.21/1	.0062	.0046	.0628	.0100	.0889	.0300	$6.223^{e,f}$	.4948
200	8	1.97^{d}	.27	1.51	.10	$.43^{f}$	.08	1.30/1	.0053	.0035	.0711	.0084	.0703	.0148	4.120^{f}	.3367
300	8	$2.38^{c,d}$	.36	1.84	.44	$.66^{e,f}$	.09	1.29/1	.0205	.0124	.0685	.0147	.1515	.0456	$5.600^{e,f}$	.9113
MSE (df=3)		.69		1.07		.04			.0005		.0229		.0097		3.2020	

[a] Level of niacin supplementation in diet. See table 1 for diet formulation.
[b] Standard Error of Mean.
[c,d] Columns with different superscript letters differ at $P<.10$.
[e,f] Columns with different superscript letters differ at $P<.05$.

TABLE 11. LAMB GAINS (pounds/day) BY BREED WITHIN PRE-WEANING MANAGEMENT GROUPS[a]

Breed[b]	Confinement			Outdoor		
	N	ADG	SE[c]	N	ADG	SE
BS	42	.726[f]	.017	18	.805[g]	.029
OS	18	.770	.032	19	.836	.020
YS	39	.735	.010	11	.711	.034
Average		.737[d]			.797[e]	
df=17						

[a]Either housed indoors (confinement) or outdoors (outdoor) prior to feedlot trial. Initial weight: confinement - 52.96 lb (SE=.0096), outdoor - 54.45 lb (SE=.0013).
[b]Breed code: S = Suffolk
O = ½ Suffolk, ½ Rambouillet
Y = ½ Finnish, ½ Rambouillet
B = ¼ Finnish, ¼ Border Leicester, ½ Rambouillet
[c]Standard Error of Mean.
[d,e]Rows with different superscript letters are different P<.01.
[f,g]Rows with different superscript letters are different P<.10.

COMPARISON OF CEREAL GRAINS FOR FEEDLOT LAMBS

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Hettinger Research Station 1984

Summary

To determine the comparative feeding value of the common cereal grains (corn, barley and oats) for finishing lambs two experiments were conducted. All the diets in both experiments were balanced to contain 70% TDN and 15% protein. The dietary treatments were alfalfa fed with either corn, barley, oats or equal mix of the three grains. The first experiment utilized 90 lambs per treatment with an average initial weight of 54 pounds taken to an average weight of about 100 pounds. In experiment two 56 per treatment lambs weighing 72 pounds were utilized with the experiment terminating when the lambs averaged 109 pounds. The dietary treatments were replicated four times, when combining both experiments. The average daily gains of the lambs fed either corn, barley or a mixture were higher ($P<.002$, .005 and .004) respectively than the lambs fed oats in experiment one and higher ($P<.074$, .123 and .160) respectively over oats in experiment two. Feed efficiency was similar ($P>.05$) among treatments with barley yielding the lowest feed/gain in both experiments. The yield of carcass based on shrunk and cold weights was the lowest for the lambs fed oats in both experiments. These data indicate that corn, barley or a mixture of corn, barley and oats fed on an equal energy result in similar lamb performance and can be used interchangably according to supply and economics. The performance of lambs fed oats was lower in gains, feed efficiencies, dressing percentages and daily feed intakes. The digestible energy level of oats may not be as high as was used in the calculation of the diets.

Introduction

The three major alternative high energy sources (cereal grains) available to livestock producers in North Dakota are corn, barley and oats. It is of economic importance to establish the comparative feeding value of these fed alone or in combinations fed with low roughage diets to feeder lambs. Information comparing these cereals fed in diets of equal energy and protein to early weaned high producing lambs is limited. The major objective of these experiments was to compare corn, barley, oats and an equal mixture of the three fed in high and equal energy and protein (70% TDN and 15% protein) basis to feeder lambs with a genetic potential for rapid growth.

Experimental Procedure

In experiment one, 360 lambs with an average weight of 54 pounds were allotted to eight pens by weight breed and sex. The lambs were weighed and feed intake recorded on a bi-weekly basis for 66 days. Four diets (Table 2) were tested using 2 replicate lots per diet. The diets were self-fed ground complete mixed form. Feed samples were taken several times during the progress of the trial and the results of the nutritional analysis are shown in table 3. The cereal grains were of good quality weighing 51, 51 and 37 pounds (table 1) respectively for corn, barley and oats. Some of the lambs from each of the lots were randomly selected for carcass information. The same procedures and diets were used in experiment two. In experiment two 224 lambs with an average weight of 72 pounds (table 6) were used. The bushels weights were 52, 46 and 37 pounds respectively, for corn, barley and oats. The experiments were terminated when the average lamb weights were 100 and 109 pounds respectively for experiments one and two (tables 5 and 6).

Results and Discussion

The performance of the lambs and related information for experiment one is shown in table 5 comparing the 3 grains and an equal mixture of each. Lambs gained nearly .7 of a pound a day on either corn, barley or a mixture of the 3 grains compared to just under .5 of a pound for the lambs on oats. This difference may in part be explained on the IVDMD (digestibility) being only 68% of oats compared to 74, 75 and 77% for the mixed, barley and corn diets (table 3). The value of 72% TDN, used for oats may have been too high (table 1). The protein of the oats diet was only 14% compared to 16+% for the other diets (table 3). The feed per gain was similar for all diets of about 5 pounds of feed per pound of gain with barley resulting in 4.5 compared to 5+ for the other diets. The lambs on oats had the lowest dressing % based on shrunk cold carcass weights (table 5). Feed intake per day was also the lowest for oats which may also in part explain the reduced daily gain. The results of experiment two are shown in table 6. The general comparisons are similar to those in experiment one. Daily gains averaged .5$\pm$ pounds compared to about .7 pounds in experiment one. Initial lamb weights (heavier) and season of the year may effect gains and feed efficiencies. Again the lambs on oats gained slower compared to the lambs on any of the other 3 diets and required more feed per gain. The daily feed consumption was lower for the lambs on oats. Dressing % was the lowest on the lambs fed oats. The reduced gain, feed efficiency and dressing % may in part be due to lower diet digestibility (table 4) 67% compared to 73, 75 and 80% for mixed, barley and corn respectively, lower protein 14% compared to 15.5$\pm$% for the other three diets and to reduce feed intake for the lambs fed oats. The combined results of the two experiments are shown in table 7. The information generated from these experiments should be useful in making feed-management decisions concerning the feeding of the cereal grains to finishing lambs. Less roughage should be used when oats is the primary grain. It may be advisable to mix oats with corn or barley to derive optimum lamb performance. Lamb performance on corn or barley or a mixture of corn, barley and oats is similar if balanced on an equal energy and protein basis.

TABLE 1. NUTRITIONAL COMPOSITION OF FEEDSTUFFS FOR TRIALS ONE AND TWO HETTINGER - 1984

Feedstuff	90% dry				
	Protein[a]	TDN[T]	ADF[a]	Ca[a]	P[a]
			%		
Corn (51)[1](52)[2]	9.1	80	-	.006	.35
Barley (51)[1](46)[2]	11.0	77	5.6	.04	.38
Oats (37)[1](37)[2]	13.7	72	12.0	.08	.38
Alfalfa	15.5	52	32	1.31	.17
SFM	41.0	72	-	.28	.69
SBM	44.0	78	-	.25	.60

[a]Analyzed, [T]table values
[1 & 2]Bushel wt. for trials 1 and 2.

TABLE 2. EXPERIMENTAL DIETS FOR TRIALS ONE AND TWO HETTINGER - 1984

Feedstuff	Treatments			
	Corn	Barley	Oats	3 Grains
		%		
Grain	53	65	83	22, 22, & 22
Alfalfa	36	26	13	26
SBM	11	9	4	8
% TDN	70	70	70	70
% Protein	15	15	15	15

Common to all diets: .5% TM salt, 1% (treatments 1 & 2) .5% (treatments 3 & 4), .5% ammonium chloride, .05% ADE and 2.5 g Terramycin/100#.

TABLE 3. ANALYZED AVERAGE NUTRITIONAL COMPOSITION[a] OF DIETS TO COMPARE THE CEREAL GRAINS FOR FEEDER LAMBS (TRIAL 1 - HETTINGER 1984)

	Dietary Treatment			
Nutrient	Corn	Barley	Oats	3 Grains
	% and SD			
Protein	16.9 ± 1.07	16.0 ± 1.26	14.1 ± 1.86	16.1 ± 1.00
Fiber[b]	13.9 ± 1.46	13.4 ± 2.28	16.1 ± 1.64	14.8 ± 1.44
Ash	6.0 ± .61	5.6 ± 1.21	5.1 ± .56	5.8 ± .48
IVDMD[c]	77 ± 2.3	75 ± 3.1	68 ± 3.4	74 ± 3.0
Phosphorus	.358 ± .080	.366 ± .014	.358 ± .022	.356 ± .018
Calcium	.650 ± .157	.586 ± .243	.425 ± .154	.602 ± .152
Magnesium	.271 ± .055	.208 ± .045	.184 ± .026	.245 ± .053

[a]Expressed on "as is" (90% dry). Minerals dry.
[b]Acid detergent fiber.
[c]Invitro dry matter digestibility.
N = 40 observations per mean.

TABLE 4. ANALYZED AVERAGE NUTRITIONAL COMPOSITION[a] OF DIETS TO COMPARE THE CEREAL GRAINS FOR FEEDER LAMBS (TRIAL 2 - HETTINGER 1984)

Nutrient	Dietary Treatment			
	Corn	Barley	Oats	3 Grains
	% and SD			
Protein	15.7 ± .86	16.3 ± .82	14.3 ± .77	15.5 ± .82
Fiber[b]	13.5 ± 2.17	13.6 ± 1.25	17.3 ± 1.57	16.4 ± 1.34
Ash	5.9 ± .85	5.8 ± 1.07	5.4 ± .43	6.0 ± .54
IVDMD[c]	80 ± 2.0	75 ± 2.2	67 ± 2.4	73 ± 3.8
Phosphorus	.343 ± .017	.383 ± .011	.350 ± .009	.357 ± .009
Calcium	.919 ± .150	.841 ± .224	.844 ± .119	.925 ± .131
Magnesium	.224 ± .019	.203 ± .022	.182 ± .017	.201 ± .010

[a] Expressed on "as is" (90% dry). Minerals dry.
[b] Acid detergent fiber.
[c] Invitro dry matter digestibility.
N = 10 to 40 observations per mean.

TABLE 5. LAMB PERFORMANCE FROM TRIAL ONE COMPARING CORN OR BARLEY OR OATS OR COMBINATIONS OF THESE

	Dietary Treatment[1]				
	Corn	Barley	Oats	3 Grains	SEM
Initial wt. #	54	54	54	54	
Final wt. #	103	100	89	100	
Daily gain #	.723[a]	.660[a]	.489[b]	.677[a]	.0225
Feed/gain	5.013[a]	4.531[a]	5.302[a]	5.323[a]	.358
Feed/day #	3.736	2.933	2.798	3.665	
Dressing %[2]	49.0	52.0	45.6	49.5	

[1] Average of replicate lots.
[2] Shrunk cold carcass.
N = 90 lambs per treatment.
[a,b] $P<.002$, .005 and .004 respectively for corn, barley and mixed over oats.

TABLE 6. LAMB PERFORMANCE FROM TRIAL TWO COMPARING CORN OR BARLEY OR OATS OR COMBINATIONS OF THESE

	Dietary Treatment[1]				
	Corn	Barley	Oats	3 Grains	SEM
Initial wt. #	71	72	71	72	
Final wt. #	108	113	104	110	
Daily gain #	.565[a]	.543[a]	.447[b]	.531[a]	.0347
Feed/gain	8.202[a]	7.996[a]	8.904[a]	8.777[a]	.3581
Feed/day #	4.585	4.132	3.843	4.494	
Dressing %	54.3	53.2	49.1	52.7	

[1]Average of replicate lots.
[2]Shrunk cold carcass.
N = 56 lambs per treatment.
[a,b]P<.074, .123 and .160 respectively for corn, barley and mixed over oats.

TABLE 7. COMBINED RESULTS FROM TRIALS ONE AND TWO COMPARING THE CEREAL GRAINS

	Dietary Treatment[1]				
	Corn	Barley	Oats	3 Grains	SEM
Daily gain #	.644[a]	.602[a]	.468[b]	.604[a]	.0261
Feed/gain	6.608[a]	6.263[a]	7.103[a]	7.050[a]	.221
Dressing %[2]	51.7	52.6	47.4	51.1	

[1] Average of two experiments 4 replicate lots per treatment.
[2] Shrunk cold carcass.
[a,b] P<.002 for corn, barley and mixed over oats.

LINSEED MEAL COMPARED TO EITHER SUNFLOWER OR SOYBEAN MEALS FOR EARLY WEANED LAMBS

D.O. Erickson, W. Limesand, W.D. Slanger and B. Moore

NDSU Sheep Barn 1984

Summary

Two experiments were conducted to compare linseed (LSM), sunflower (SFM) and soybean meals (SBM) as supplemental protein sources for early weaned lambs fed corn/alfalfa pelleted diets containing 72% TDN and 14.2% protein. Seventy-two lambs with an average weight of 74 pounds were allotted into 6 pens (2 pens per diet) in the first experiment and 48 lambs with an average weight of 53 pounds were allotted into 6 pens (2 pens per diet) in the second experiment. The lambs in experiment one gained 1.00. 1.06 and 1.05 pounds a day on LSM, SFM and SBM respectively. The feed required per gain was 4.23, 4.04 and 4.13 respectively for the above protein supplement treatment. Feed intake per day averaged 4.1 pounds across the 3 treatments. The combined weighted (adjusted for sheep numbers) data for both trials indicate daily gains of .96, 1.01 and 1.00 pounds and feed/gain of 4.20, 4.03 and 4.21 respectively for LSM, SFM and SBM. All of these protein sources supported excellent lamb performance. Recommendations resulting from previous research conducted at the Fargo and Hettinger Stations has been that SFM supports lamb performance equal to that of SBM when fed on an equal energy and protein basis. The results from this past years trials again support that recommendation. These results also suggest that LSM meal as well as SFM meal can be used as alternative protein sources for finishing lambs.

Introduction

The availability and the prices of protein supplements is variable. Soybean has been the standard protein supplement used for lamb feeding. Lamb performance is continuously improving due to breeding and feeding management. Along with continued improved performance there is a need to increase protein levels and other nutrients in the diets. The economics of protein supplementation becomes more important. Sunflower and linseed meals are produced in this area. There is a need to establish the feeding value of these protein sources in comparison to SBM. Several experiments over the past 5 years have compared the SFMs available (28, 34 and 40+%). Most of the results indicate that SFM or combinations of SFM and SBM supports similar lamb performance when diets are balanced on an equal energy and protein basis. It was of interest and economic importance to establish the feeding value of LSM compared with SFM and SBM for rapid gaining early weaned feeder lambs.

Experimental Procedure

Two experiments were conducted at the NDSU Sheep Barn to compare the performance of lambs fed corn/alfalfa diets containing 72% TDN and

14.2% protein supplemented with either LSM, SFM or SBM as single protein supplements. The diets contained above the National Research Council (NRC) recommendations of vitamins A, D and E and calcium and phosphorus. Antibiotics and ammonium chloride were added to the diets. The feedstuffs were analyzed (table 1) prior to balancing the diets. The diets used in both experiments are shown in table 2. The diets were sampled several times during the experiments and these results are shown in table 3. Seventy-two purebred Columbia, Hampshire and Suffolk lambs were allotted by weight (average 74 pounds), breed (4 from each) and sex into six lots (duplicate lots/diet) in experiment one. Experiment two utilized 48 crossbred lambs averaging 53 pounds. These lambs were allotted by weight, breed and sex into 6 lots utilizing the same design and dietary treatments as in experiment one. Lambs were taken off experiment at an average weight of 103 and 104 pounds respectively for the two experiments. The lambs in the first experiment were shorn and weight gain was corrected for wool weight.

Results and Discussion

The major results of experiment one are shown in table 4. Lambs gained about one pound a day and were very similar for each of the protein sources and similar between replicates within treatments. The lambs consumed about the same amount of feed (4.3 pounds) a day among the 3 protein sources resulting in similar amount of feed needed per gain (4.1). The second experiment was conducted with lighter lambs, 53 pounds compared to 74 pounds in experiment one. This should allow for a more critical test of diet differences. The results for experiment two are shown in table 5. The lambs gained about .9 pounds a day which was .1% of a pound less than in experiment. The lighter initial weight, the breeding and the season of the year may all have contributed to the difference between the experiments. Feed efficiencies and feed intakes were similar among the protein sources and between replicates within a protein source. The combined daily gains, feed/day and the feed/gain from the 2 experiments involving 40 lambs per each protein source comparison are shown in table 6. There were no real differences in lamb performance among the three protein sources. This information will be useful to producers in making feeding management decisions for finishing lambs.

TABLE 1. NUTRITIONAL COMPOSITION OF FEEDSTUFFS (SHEEP BARN 1984)

	90% dry			
Feedstuff	Protein[a]	TDN[t]	Ca[a]	P[a]
		%		
Corn (54#/bu.)	9.1	80	.006	.35
Alfalfa	16.0	52	1.25	.25
SBM	44	78	.25	.60
SFM	41	72	.28	.69
LSM	34	69	.40	.82

[a]analyzed, [t]table values.

TABLE 2. EXPERIMENTAL DIETS (SHEEP BARN 1984)

	Treatments		
Feedstuff	SBM	SFM	LSM
		%	
Corn	63	65	62
Alfalfa	28	24	24
SBM	9	-	-
SFM	-	11	-
LSM	-	-	14
TDN	72	72	72
Protein	14.2	14.2	14.2

Common to all diets: .5% TM salt, .5% limestone, .5% ammonium chloride, 1.25% super pellets (Rumensin), .05% ADE and 2.5 g Terramycin/100#.

TABLE 3. ANALYZED AVERAGE NUTRITIONAL COMPOSITION[a] OF DIETS TO COMPARE SBM, SFM AND LSM (SHEEP BARN 1984)

	Dietary Treatment		
Nutrient	SBM	SFM	LSM
		% and SD	
Protein	14.0 ± .74	14.0 ± .73	13.7 ± 1.20
Fiber[b]	16.1 ± .92	16.0 ± 1.15	16.9 ± 1.04
Ash	7.3 ± .76	7.2 ± .67	7.4 ± .53
IVDMD[c]	69 ± 5.2	66 ± 5.0	68 ± 5.2
Phosphorus	.285 ± .013	.371 ± .012	.339 ± .027
Calcium	.852 ± .154	.808 ± .118	.853 ± .140
Magnesium	.327 ± .166	.334 ± .083	.310 ± .029

[a]Expressed on the "as is" (90%) dry. Minerals dry.
[b]Acid detergent fiber.
[c]Invitro dry matter digestibility.
N = 12 observations per mean.

TABLE 4. LINSEED, SUNFLOWER AND SOYBEAN MEALS FOR LAMBS.
EXPERIMENT ONE (SHEEP BARN 1984)

	Supplemental Protein Source								
	SBM			SFM			LSM		
	rep 1		rep 2	rep 1		rep 2	rep 1		rep 2
Initial wt.#	74.5		74.3	74.8		73.7	74.5		74.0
Final wt.#	105		103	105		103	104		101
Daily gain #	1.080		1.018	1.071		1.057	1.017		.970
Mean		1.049			1.064			.994	
Feed/day	4.405		4.256	4.375		4.214	4.342		4.066
Mean		4.331			4.294			4.204	
Feed/gain	4.077		4.181	4.083		3.989	4.275		4.193
Mean		4.129			4.036			4.234	

24 Sheep per treatment mean.

TABLE 5. LINSEED, SUNFLOWER AND SOYBEAN MEALS FOR LAMBS.
EXPERIMENT TWO (SHEEP BARN 1984)

	Supplemental Protein Source								
	SBM			SFM			LSM		
	rep 1		rep 2	rep 1		rep 2	rep 1		rep 2
Initial wt.#	52.5		54.8	51.9		51.8	51.5		53.5
Final wt.#	110		102	103		102	103		104
Daily gain #	.990		.835	.975		.895	.911		.904
Mean		.913			.935			.908	
Feed/day	4.120		3.754	3.737		3.781	3.775		3.748
Mean		3.937			3.759			3.762	
Feed/gain	4.162		4.497	3.835		4.224	4.145		4.146
Mean		4.330			4.030			4.146	

16 Sheep per treatment mean.

TABLE 6. LAMB[a] PERFORMANCE BASED ON WEIGHTED AVERAGE FROM THE TWO EXPERIMENTS (SHEEP BARN 1984)

	Supplemental Protein Source		
	SBM	SFM	LSM
Daily gain #	.995	1.012	.960
Feed/day #	4.173	4.080	4.0272
Feed/gain	4.209	4.034	4.199

[a]40 sheep treatment.

LINSEED MEAL COMPARED TO LINSEED MEAL COMBINATIONS WITH SOYBEAN OR SUNFLOWER MEALS FOR FINISHING LAMBS

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NDSU Animal Research Center 1984

Summary

Two experiments were conducted to determine the feeding value of linseed meal (LSM) fed as the only supplemental protein source as compared to LSM in equal combinations with either soybean (SBM) or sunflower (SFM) meals to early weaned feeder lambs. In both experiments the corn/alfalfa pelleted diets were balanced to contain 73% TDN and 14.3 protein. The first experiment was conducted with 60 purebred Columbia or Suffolk lambs with an average initial weight of 56 pounds. The lambs were allotted by weight, breed and sex in six lots with one of the 3 dietary treatments randomly assigned to replicate lots. Lamb daily gains averaged (replicate lots) were 1.01, .97 and .99 pounds respectively for the LSM, LSM/SBM and the LSM/SFM. Feed intakes per day were also similar among treatments being 4.40, 4.21 and 4.29 pounds respectively for the above protein treatments. Feed per unit of gain averaged 4.3 for all 3 protein treatments. There were no statistical differences by any of the measures among the protein treatments. Linseed meal is a very satisfactory protein supplement fed alone or in combination with SBM or LSM in a corn/alfalfa diet for finishing lambs.

Introduction

Extensive research has been conducted concerning the feeding value and protein quality of SFM fed alone or in combinations with SBM to finishing lambs. It has been established that SFM can be a satisfactory protein source in high energy finishing lamb diets as a single protein source and in various combinations with SBM. Linseed meal is another alternative protein source produced in this area. Information regarding the feeding value of LSM fed alone or in combinations with SBM or SFM to finishing lambs is limiting.

Experimental Procedure

Two experiments were conducted utilizing 99 purebred Columbia and Suffolk early weaned lambs to determine the feeding value of LSM fed alone or in combination (50/50) with either SBM or SFM in corn/alfalfa pelleted diets of equal energy (73% TDN) and protein (14.3%). Lambs weighed an average of 56 and 62 pounds for experiment one and two respectively and in both experiments taken to an average of 111 pounds. Lamb weights and feed consumption was taken on a bi-weekly basis. The lambs were shorn during experiment one and corrections were made for fleece weights. The diets were based primarily on analyzed nutritional components of the feed-stuffs as shown in table 1. The nutritional composition of the diets are based on values in table 1 and are shown in table 2. The composition of the diets based on the samples collected during the experiments are shown in table 3.

Results and Discussion

Lamb gains were similar among the dietary treatments and between experiments averaging nearly 1 pound a day (table 4 and 5). The feed needed per unit of gain was about 4 pounds (table 4) for all three diets in experiment one, which is very efficient. The feed per gain averaged about 4.6 pounds (table 5) for all three diets in experiment two. The combined results from the two experiments are shown in table 6. The lamb gains were 1.01, .97 and .99 for LSM, LSM/SBM and LSM/SFM respectively. The feed/gains respectively for the same diets were 4.3, 4.4 and 4.3. None of the parameters were different due to protein sources as measured statistically. These results indicate that LSM fed alone or in combinations with SBM or SFM in corn/alfalfa diets to finishing lambs is a viable alternative protein source. These results again support SFM as an alternative protein source as has been shown in research work previously reported by NDSU. These comparisons are made on an equal energy and protein basis.

TABLE 1. NUTRITIONAL COMPOSITION OF FEEDSTUFFS
(RESEARCH CENTER 1984)

	90% dry			
Feedstuff	Protein[a]	TDN[t]	Ca[a]	P[a]
	%			
Corn (54#/bu.)	9.1	80	.006	.35
Alfalfa	16.0	52	1.25	.25
SBM	44	78	.25	.60
SFM	41	72	.28	.69
LSM	34	69	.40	.82

[a]analyzed, [t]table values.

TABLE 2. DIETS FOR RESEARCH CENTER LAMB TRIALS 1 AND 2 1984

Feedstuff	LSM	LSM/SBM	LSM/SFM
		%	
Corn	62.0	62.5	63.5
Alfalfa	24.0	26.0	24.0
LSM	14.0	-	-
SBM	-	5.75/5.75	-
SFM			6.25/6.25

Common to all diets: .5% TM salt, .5% ammonium chloride, 1.25 super pellets, .05% ADE, 2.5 g terramycin/100#. Sodium bentonite 2%, TDN = 73% and Protein 14.3% for each diet.

TABLE 3. ANALYZED AVERAGE NUTRITIONAL COMPOSITION[a] OF DIETS TO COMPARE LSM and LSM/SBM AND LSM/SFM COMBINATIONS (RESEARCH CENTER 1984)

Nutrient	Dietary Treatment		
	LSM	LSM/SBM	LSM/SFM
	% and SD		
Protein	12.8 ± .68	13.5 ± .31	13.3 ± .41
Fiber[b]	16.0 ± 1.06	16.7 ± 1.06	16.4 ± .64
Ash	6.9 ± .92	7.4 ± .56	7.3 ± .50
IVDMD[c]	68 ± 3.5	67 ± 7.3	69 ± 4.9
Phosphorus	.335 ± .033	.316 ± .038	.364 ± .034
Calcium	.687 ± .105	.796 ± .059	.708 ± .060
Magnesium	.410 ± .201	.403 ± .223	.430 ± .244

[a] Expressed on the "as is" (90%) dry. Minerals dry.
[b] Acid detergent fiber.
[c] Invitro dry matter digestibility.
N = 12 observations per mean.

TABLE 4. RESULTS FROM EXPERIMENT ONE COMPARING LINSEED AND COMBINATIONS OF LINSEED WITH EITHER SOYBEAN OR SUNFLOWER MEALS

	LSM			LSM/SBM			LSM/SFM		
	rep 1		rep 2	rep 1		rep 2	rep 1		rep 2
Initial wt.#	55.0		56.6	57.3		56.6	56.3		57.2
Mean		55.8			57.0			56.8	
Final wt.#	110.8		109.8	112.7		109.9	109.1		112.1
Mean		110.3			111.3			110.6	
Daily gain #	.996		.950	.989		.952	.943		.980
Mean		.973			.971			.962	
Feed/gain	3.979		3.977	4.072		4.086	3.983		4.073
Mean		3.978			4.079			4.028	
Feed/day #	3.964		4.029	3.755		3.779	3.889		3.993
Mean		3.997			3.797			3.941	

TABLE 5. RESULTS FROM EXPERIMENT TWO COMPARING LINSEED AND COMBINATIONS OF LINSEED WITH EITHER SOYBEAN OR SUNFLOWER MEALS

	LSM	LSM/SBM	LSM/SFM
Initial wt. #	62.2	60.6	62.3
Final wt. #	113.0	108.3	110.5
Daily gain #	1.037	.973	1.008
Feed/gain	4.539	4.633	4.526
Feed/day #	4.706	4.525	4.562

TABLE 6. COMBINED RESULTS FROM THE TWO EXPERIMENTS[a] TESTING LINSEED MEAL ALONE OR IN COMBINATIONS WITH SOYBEAN OR SUNFLOWER MEALS (RESEARCH CENTER 1984)

	Diet		
	LSM	LSM/SBM	LSM/SFM
Daily gain #	1.009	.972	.988
Feed/day #	4.398	4.209	4.290
Feed/gain	4.294	4.392	4.309

[a]The averages are weighted based on animal numbers in each experiment.

SECTION II

REPORT ON

VALUE OF MEASURING SCROTAL CIRCUMFERENCE

PRESENTED BY

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TIMOTHY C. FALLER
SUPERINTENDENT

LAMB MARKETING

PRESENTED BY

LARRY WRIGHT
JOHN MORRELL & CO.
SIOUX FALLS, S.D.

"BARN COUGH - WHAT IS IT?

PRESENTED BY

DR. KURT WOHLGEMUTH, DVM
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AT THE

26TH ANNUAL SHEEP DAY

HETTINGER EXPERIMENT STATION
HETTINGER, NORTH DAKOTA

FEBRUARY 13, 1985

SEASONAL CHANGES IN SCROTAL CIRCUMFERENCE AND SEXUAL FLUSH IN MATURE F_2 FINNISH LANDRACE X DORSET RAMS

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Summary

Scrotal circumference, sexual flush, body weight and body condition score were recorded monthly on 31 mature Finn x Dorset F_2 rams. All rams were classified as seasonal or nonseasonal based on the decrease in scrotal circumference from October to April. Rams with the greatest decreases in scrotal circumference were classified as seasonal. The objective was to determine if these rams maintain the same scrotal circumference profile from year to year. During the first year, seasonal rams attained maximal fall scrotal circumference of 34.18 cm followed by minimal scrotal circumference of 29.07 cm. Maximal fall scrotal circumference of nonseasonal rams was 30.74 cm and decreased to 29.83 cm in the spring. Change in scrotal circumference of individual rams was consistent from the first year to the second. Both ram classes had seasonal changes in sexual flush, but nonseasonal rams had greater intensity and quantity of flush throughout the year. Overall conclusions: Seasonal rams had a consistent annual cycle in scrotal circumference. The majority of nonseasonal rams followed the same 12 month pattern of scrotal circumference change as seasonal rams, but the magnitude of the changes were greatly reduced. Four rams had no seasonal profile of monthly change in scrotal circumference.

Introduction

The most limiting factor to increased efficiency of sheep production is seasonal infertility. I use the term seasonal to mean the lack of a constant level of fertility during the year. Seasonal reproduction is partially dependent on the duration of light in a day and both ewes and rams under go physiological changes throughout the year.

The mature ram is well suited for studying methods to improve fertility because the primary reproduction organ, the testis, can be readily observed and measured. Plus, the ram has distinct color changes of the skin (sexual flush) which occur with changing reproductive stages.

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Several breeds have been evaluated for changes in scrotal circumference throughout the year. In England, Islam and Land (1977) evaluated Finnish Landrace, Tasmanian Merino, Finn-Merino, and Finn-Dorset rams. These breeds differed in the onset of scrotal change: however, October and November were the months when rams exhibited the largest scrotal circumference. The rams in the various breeds had gradual declines in scrotal circumference through June, then scrotal circumference started to increase, with the exception of Merino rams. The scrotal circumference of Merino rams started to increase during April.

The period of rapid decrease in scrotal circumference is not constant for breeds or locations. The smallest scrotal circumference of native Icelandic rams occurrred during March and April and the decrease was 15% of the scrotal circumference in the fall (Dyrmundsson et al., 1981). Suffolk, Lincoln, Columbia, and Polypay rams obtained a minimal scrotal circumference in January and February in North America (Mickelsen et al., 1982). These rams had an average scrotal circumference of 37.8 cm in October and 32.6 cm in February.

Suffolk and Managra breeds in Manitoba achieved maximal scrotal circumferences in September through November and minimal circumferences during March to April (Sanford and Yarney, 1983). Rambouillet rams in November had a maximal scrotal circumference in October to November, with the smallest circumference in February to March (Tulley and Burfering, 1983). Even in Merino rams, in which the ewe is noted for having an extended lambing season, maximal scrotal circumference is greater in the fall than in the spring (Skinner and van Heerden, 1971).

If rams with constant scrotal circumference are more independent of changes in daylength, these rams may sire daughters that are less seasonal in their reproductive cycles. The ability to indentify rams and verify that they are less responsive to light cues has not been reported for the previously mentioned breeds. The purpose of the following study was to identify rams which have the least and greatest change in scrotal circumference from fall through spring and determine if these rams repeat the same scrotal circumference profile from year to year.

Materials and Methods

Thirty-one F_2 Finn x Dorset rams, born during the springs of 1980 and 1981, were maintained under Oklahoma pasture conditions until spring of 1984. Rams were managed in a single group throughout the study, with the exception of the May and June breeding period. Rams were weighed each month and supplemented with alfalfa and grain when forage was limited during dry and (or) winter periods. Condition scores (on a scale of 1 = extremely emacinated to 9= fat deposits over the lumbar vertebrae and ribs) were assigned each month.

Starting in May, 1982, two independent scrotal circumference measurements were made on each ram while the ram was resting on his rump. The testes were held firmly in the lower portion of the scrotum and measured with a fiberglass tape measure. The testes were palpated between scrotal circumference measurements for testicular or epididymidal abnormalities.

Sexual flush was also monitored throughout the study. Flush was scored for quantity and intensity. The intensity of flush was scored: 0 = no color, 1 to 3 = shades of pink, 4 to 5 = light reds, 6 to 7 = reds, 8 = dark red, and 9 = purple. The quantity of flush was scored: 0 = none, 1 = a band of color no wider than 1 cm within each inguinal region, 2 = a band of color no wider than 3 cm within each inguinal region, 3 = a band of color wider than 3 cm but still within each inguinal region and not including the teat, 4 = a band of color which includes the inguinal area, the teat and spotting of color between the two teats, and 5 = a solid band of color across the two teats and including both inguinal regions.

For the purpose of evaluating the consistency of changes in scrotal circumference, rams with the greatest (n=8) and least (n=7) change in scrotal circumference between October and April were selected from the original 31 rams. The degree of change was calculated by subtracting the mean March and April scrotal circumference from the mean October to November scrotal circumference. Rams that had the greatest decrease in scrotal circumference from fall to spring were classified as seasonal and rams with the least change were classified as nonseasonal. The classification of rams was based on measurements from October, 1982 to April, 1983.

Data were analyzed by multivariate analysis of variance (MANOVA) performed on the regression coefficients. A full sinusoidual regression model with 12 months per period was fit to each ram for the variables scrotal circumference, sexual flush, body weight and condition score. The independent variables for the model were month, sine of month, cosine of month, month * cosine of month.

Results and Discussion

Scrotal circumference for seasonal rams changed at a greater rate each month during two complete circannual photoperiods (P .01, figure 1). Seasonal rams had maximal scrotal circumferences during September of each year (34.18 and 34.39 cm). In contrast, nonseasonal rams had maximal scrotal circumferences of 30.74 cm in November of the first year and 31.59 cm in October of the second year. Seasonal rams had minimal scrotal circumferences during March of both years (29.07 and 28.58 cm) and the minimal scrotal circumferences for nonseasonal rams were 29.83 cm during April of the first year and 30.28 cm during March of the second. However, there was an interaction for scrotal circumference between ram classification and month. Seasonal rams had the largest scrotal circumference during the fall months, but the smallest during the early winter months. The only time of year that nonseasonal rams had larger scrotal circumference than seasonal rams was from February through April (figure 1). During the normal fall breeding season, rams less responsive to season had smaller scrotal circumferences.

The classification of the rams based on the degree of scrotal circumference change from fall to spring was essentially the same for both years. The Spearman correlation coefficient for ram ranks between years was .82 ($P<.001$). Initially, when ranked from the least scrotal circumference change to the greatest, nonseasonal rams ranked 1st to 7th, while seasonal rams were 8th to 15th. Except for two rams, all seasonal rams remained in the upper half, and nonseasonal rams remained in the lower half when ranked on scrotal change the second year. The rams were not reclassified based on scrotal change during the second year, but maintained their seasonal and nonseasonal designation from the first year. The overall scrotal circumference changes were similar to previous breed comparisons (Skinner and van Heerden, 1971; Islam and Land, 1977; Dyrmundsson et al., 1981; Mickelsen et al., 1982; Sanford and Yarney, 1983; Tulley and Burfering, 1983;).

The influence of season on intensity of sexual flush is summarized in figure 2. Maximal flush intensity preceeded maximal scrotal circumference by one month for both ram classes. The flush intensity profiles were different for the two ram classes ($P<.05$). Seasonal rams had maximal flush intensity prior to nonseasonal rams the first year but both groups were similar the second year. The quantity of flush was also affected by ram class ($P<.05$, figure 3). Nonseasonal rams had a larger area of flush during the fall which was also the time of maximal flush intensity (figure 3).

Nonseasonal rams had heavier body weights throughout the study (figure 4, $P<.05$). However, there were no significant differences in seasonal weight changes between the two ram classes. Body condition also tended to be greater ($P<.10$) for nonseasonal rams during the two year study (figure 5). The seasonal change in body weight and condition score were expected since the rams were maintained under pasture conditions and subjected to seasonal changes in pasture forage. However, two sources of evidence indicate that change in scrotal circumference was not strongly influenced by change in body weight. Nonseasonal and seasonal rams were similar in body weight change, but the scrotal circumference profiles were distinctly different between the two rams types. In addition, change in scrotal circumference for individual rams was consistent from the first year to the second (Spearman rank correlation = .82, $P<.001$) but individual change in body weight was not consistent (Spearman rank correlation = -.39, $P>.5$).

In conclusion, although this classification system clearly produced two distinct ram classes, a note of caution must be expressed. I only evaluated the extremes of the rams in our herd. The one type of ram that could be classified incorrectly with this system is the ram that has an extreme decline in scrotal circumference in December and January, but than regains scrotal circumference so the March value is similar to the October and November average circumference. A February and March average may be an alternative measurement to classify rams.

Seasonal rams had a consistent annual cycle in scrotal circumference. The majority of nonseasonal rams followed the same 12 month pattern of scrotal change as seasonal rams, but the magnitudes of the change were greatly reduced. Additional selection could have been made within nonseasonal rams since some rams had cycles that approximated six months, while 4 rams had no seasonal pattern of monthly change in scrotal circumference.

Literature Cited

Dyrmundsson, O.R., P. Sigtyrggsson and S.S. Torteinsson. 1981. Seasonal variation in testis size of Icelandic rams. J. Agri. Res. Icel. 13:55.

Islam, A.B.M.M. and R.B. Land. 1977. Seasonal variation in testis diameter and sperm output of rams of breeds of different prolificacy. Anim. Prod. 25:311.

Mickelsen, W.D., L.G. Paisley and J.J. Dahmen. 1982. Seasonal variations in scrotal circumference, sperm quality, and sexual ability in rams. J. Amer. Vet. Med. Assoc. 181:376.

Sanford, L.M. and T.A. Yarney. 1983. Circannual changes in serum levels of pituitary hormones and testosterone and in testis size of sexually active and inactive adult rams. Can. J. Anim. Sci. 63:811.

Skinner, J.D. and J.A.H. van Heerden. 1971. The effect of daylength on the reproductive tract of the Merino ram. S. Afr. J. Anim. Sci. 1:77.

Tulley, D. and P.J. Burfering. 1983. Libido and scrotal circumference of rams as affected by season of the year and altered photoperiod. Theriogenology 20:435.

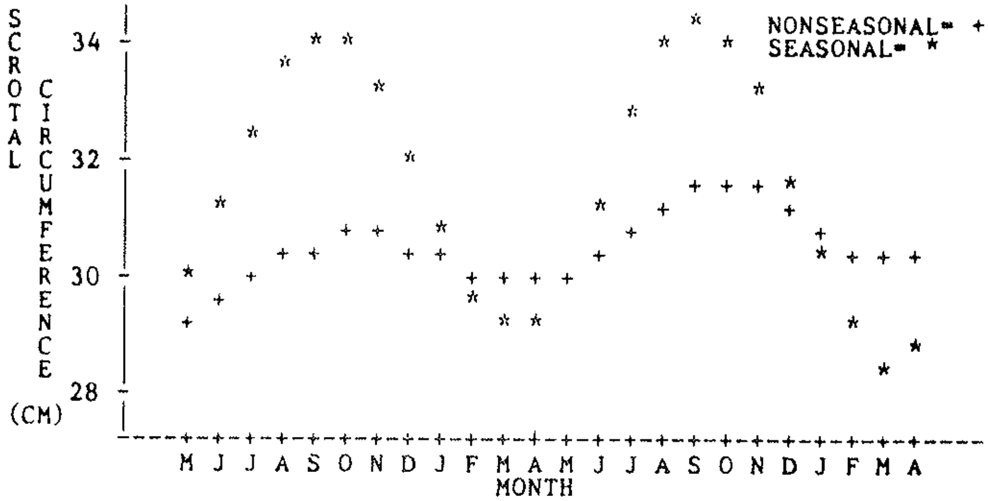

FIGURE 1. SCROTAL CIRCUMFERENCE OF SEASONAL AND NONSEASONAL RAMS OVER A TWO YEAR PERIOD

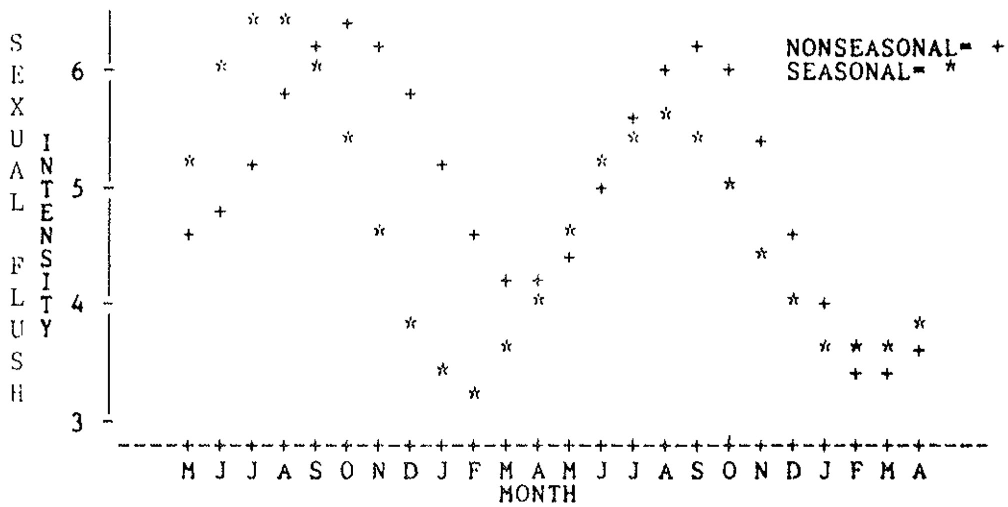

FIGURE 2. SEXUAL FLUSH (INTENSITY) OF SEASONAL AND NON-SEASONAL RAMS OVER A TWO YEAR PERIOD

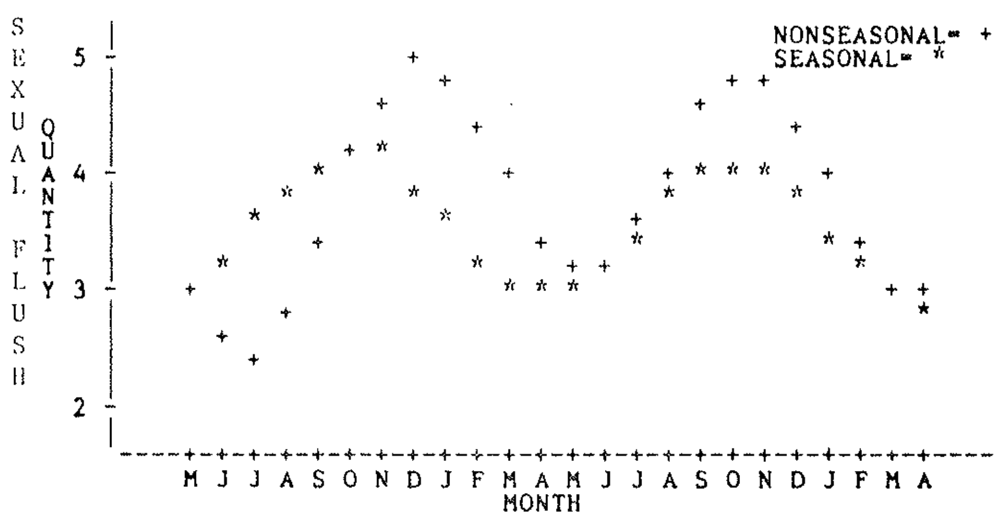

FIGURE 3. SEXUAL FLUSH (QUANTITY) OF SEASONAL AND NONSEASONAL RAMS OVER A TWO YEAR PERIOD

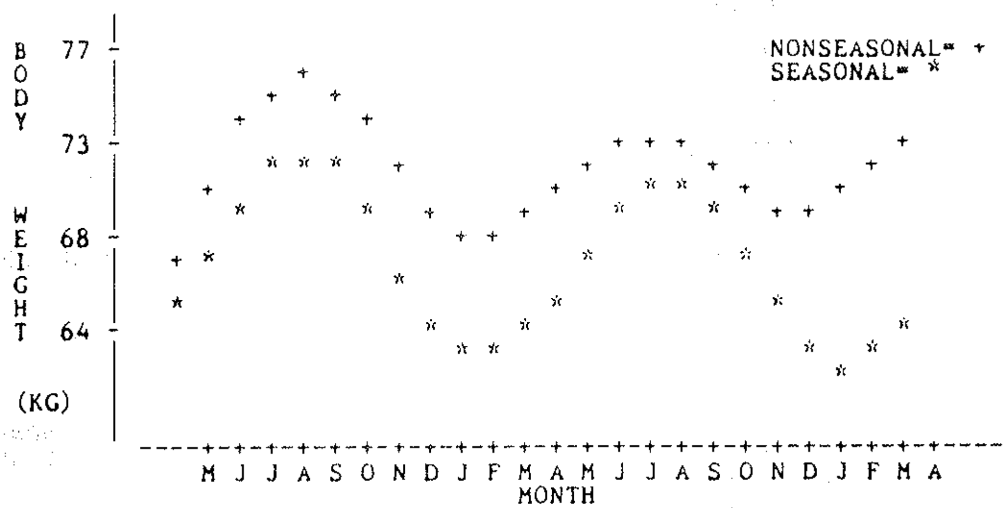

FIGURE 4. BODY WEIGHT OF SEASONAL AND NONSEASONAL RAMS OVER A TWO YEAR PERIOD

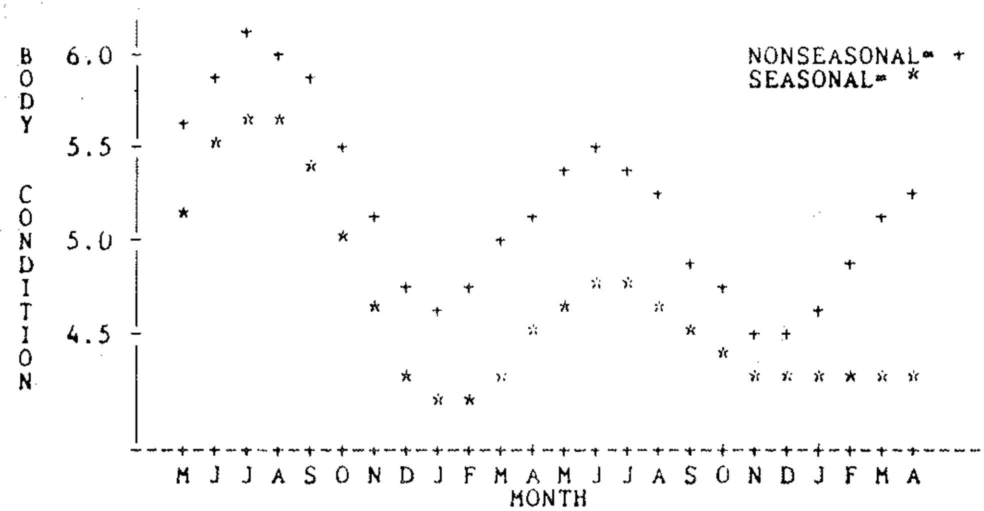

FIGURE 5. BODY CONDITIONS OF SEASONAL AND NONSEASAONAL RAMS OVER A TWO YEAR PERIOD

EFFECTIVE LAMB MARKETING

Larry Wright
John Morrell & Co.
Lamb Buying

Good marketing, to be effective, must start at the beginning of a project. A producer's first priority should be to have a market outlet for his product.

I. General Considerations
   A. Facilities and labor requirements
      1. Building and lots
      2. Feeding equipment
      3. One person or family-hired personnel
      4. Good temperament-disciplined
   B. Utilize cost effective feeds
      1. Grains-faster and shorter feeding periods
         a. area grown-evluate freight cost
      2. Pasture, roughages and waste land-longer feeding periods
         a. utilize ewe/lamb operation for feeder production
      3. High priced land-more adapt to fat lamb operation
   C. What type operation-diversify yearly income
      1. Ewe flock and lambs
         a. late winter to early spring-better facilities
         b. late spring to early summer-poor facilities
      2. Availability of load lot feeders
         a. purchase from September to January
         b. selling from November to April
      3. Have a plan for feeders-try to have your product ready when supplies of your kind of product are low.

Ex.	Buy	Sell	
	60#	110#	Lights in demand
	90#	125#	Heavies in demand

      4. Cannot over-emphasize the ability of the producer to have a <u>plan</u> for the venture when he starts.

II. Understand market outlets-how they work.
   A. Types of market
      1. Direct-John Morrell & Co.
      2. Terminal or stockyards
         a. Sioux Falls-auction
         b. St. Paul-private treaty
      3. Sale barn-Huron-Faith-Belle Fouche

4. Tele-auction-Wisconsin
5. Group selling-Tyler area

B. Advantages and Disadvantages
1. Commission-yardage and feed
2. Competitors (how many are active)
3. Mileage and freight cost
4. Closer to home is generally more profitable

C. Selling options
1. Yards, sale barns and tele-auctions
   a. competitive bidding on know/unknow weights
   b. does your buyer have the opportunity to see your product
2. Direct marketing
   a. off truck weighing and pricing
   b. shrinking weights on local area scale-packer pays freight
   c. grade and yield offers payment on quality product and weighing conditions
   d. contract-locked in profit margins
3. Be aware when selling by phone that you must be able to represent your product accurately. Every business needs a high quality product that us delivered on time.
4. Remember -- a buyer is looking at dead costs
5. Ask questions - do not be naive

III. Be a knowledgeable and skillful salesman

A. Factors affecting pricing
1. Demand for product
   a. regular sales
   b. anticipate sales-ethnic & special holidays (Easter)
2. Supply
   a. regular sources-regional and seasonal
   b. terminal and tele-auctions
   c. weather and roads

B. Values directly related to price
1. Yield-net #/Gross # (carcass versus live)
   a. hard fed
   b. fill of water and feed
   c. wet, dirty, manuary pelts
   d. trim on carcass from bruises, injury and needles
   e. animals inherent ability to have more of its total weight in carcass lean fat and bone rater than evisera
   f. pelt length
2. Pelt credits
   a. spring pelts
   b. full wool
   c. fall clip - 1"
   d. no. 1 clip - 3/4"
   e. no. 2 clip - 1/2"

f. no. 3 clip - 1/4"
g. no. 4 clip - fresh shorn
h. be aware of discounts on manury & burry pelts and of no values placed on black pelts

3. Price spread on carcass weights-weight range discount.
   35#-45#
   45#-55#
   55#-65#
   65#-up
4. Quality carcass grade
   a. choice and prime
   b. good (discount)
   c. mutton (severe discount if in a lamb lot)
   d. break joint-bucky carcass discount
5. Offal credits
   40#, 50#, and 60#

C. Remember-you have a perishable product-move it punctually with discretion.
   1. Know your competitive markets.
   2. Know the meat trade.
   3. Know trends and supplies.
   4. Know your closes outlet for subject lambs (sick, injured and prolapsed).

IV. Good businessmen with a good image bring repeat business.
   A. Try to creative and competitive with being dishonest.
   B. Build credibility and integrity.
   C. Complaints should be given the utmost attention, a good business person should admit to mistakes, apologize, and correct them.
   D. Unsolved disagreements will cause your image to tarnish.
   E. One business associate that is abused sometimes by misrepresentation is your buyer. Remember, you want him on your side. When supplies are abundant, he will be the one to help you.

SECTION III

MANAGEMENT SECTION

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26TH ANNUAL SHEEP DAY

HETTINGER EXPERIMENT STATION
HETTINGER, NORTH DAKOTA

FEBRUARY 13, 1985

RESPIRATORY DISEASES OF SHEEP: An Overview

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The respiratory tract is one of the body's system most vulnerable to infection. Sheep are no exception; respiratory diseases rank high in statistical analysis of sheep mortality. This overview summarizes present information on causes and types of respiratory diseases of sheep. Some suggestions for prevention and treatment are offered.

• CAUSES OF RESPIRATORY DISEASES

Known causes of respiratory diseases of sheep are grouped into two broad categories; (1) infectious causes and (2) noninfectious causes. The non-infectious causes are often referred to as "predisposing" or "contributing" factors. Whatever they are called, there is a dramatic interaction between noninfectious causes and infection. Any effort to prevent infectious causes is usually fruitless unless a serious control of contributing ("noninfectious") factors is undertaken.

• NONINFECTIOUS CAUSES OF RESPIRATORY DISEASES

Noninfectious causes are best defined as flaws in management which appear as inadequate environment, stressful mishandling, insufficient attention, or a combination of these.

a. Inadequate environment

Sheep are adaptable to a broad range of environments but they cannot cope all the time with environmental abuses. Cold stress, recent shearing, crowding, poor ventilation, high humidity, noxious gases, DUST, rigorous weather, mud, slush, wind, etc... are all singly or in combination part of environmental inadequacies.

With the advent of confinement - total or partial - the risk of respiratory disease in sheep has increased. Larger number of sheep could be victims of stress at the same time. The population at risk may be greater than under pasture conditions.

b. Stressful mishandling, insufficient attention

One may call them "neglect and abuse". This type of noninfectious causes include:
- Dehydration
- Hunger
- Crowding, beating
- Chasing, dogs, people
- Sorting, shipping, fumes

Furthermore, negligence in early detection and treatment of infections often results in avoidable losses of pounds and/or lives.

- INFECTIOUS CAUSES OF RESPIRATORY DISEASES

Numerous infectious agents are associated with respiratory diseases of sheep. The following table lists some of the most common.

See Table 1. on following page.

- PREDOMINANT TYPES OF RESPIRATORY DISEASES IN SHEEP

1. Rhinitis/sinusitis

These are conditions of the upper respiratory tract. They are characterized mainly by sneezing, runny nose, head shaking, wheezing. Pneumonia may be the end result.

Some factors associated with these clinical signs include:
- Nose bots
- Viruses: PI_3, RSV, BT
- Tumors: polyps, adenocarcinomas

2. Verminous (parasitic) pneumonia

Lungworms are more common in animal that are grazed, especially at high concentration during moist/warm weather. Coughing is the main sign. It is due to irritation of air ways. Large numbers of lungworm may even block airpassages and cause breathing impairment. Secondary pneumonia may occur.

Verminous pneumonia may be caused by the common lungworm (Dictyocaulus), the hair lungworm (Muellerius) and the small red lungworm (Protostrongilus). The first two species have been detected in North Dakota. The small red lungworm is common in Wyoming.

Table 1.

INFECTIOUS AGENTS ASSOCIATED WITH RESPIRATORY DISEASES OF SHEEP

Type of Microorganism	Name	Type of disease Caused
PARASITES	Nose bots (*Oestrus ovis*)	Rhinitis, sinusitis
	Lung worms (*Dictyocaulus filaria*)	Verminous pneumonia
	Flukes (*Fasciola and Fascioloides m.*)	Hemorrhage, sudden death
	Hydatid cysts (*Echinococcus granulosus*)	Slight breathing difficulty
FUNGI	Mold dusts (*Aspergillus fumigatus*)	Pneumonia
MYCOPLASMAS	*Mycoplasma ovipneumoniae*	Pneumonia
CHLAMYDIA	*Chlamydia psittaci*	Pneumonia, aborton (EAE), pink eye, arthritis
VIRUSES	OPP virus	Progressive pneumonia
	Parainfluenza type 3 (PI_3)	Rhinitis, tracheitis, pneumonia
	Adenovirus (Several strains)	Pneumonia, pleuritis
	Respiratory Syncytial Virus (RSV)	Rhinitis, pneumonia
	Blue tongue virus	Difficult breathing
	Sore mouth (contagious ecthyma)	Difficult breathing
BACTERIA	*Pasteurella hemolytica*	Bronchompneumonia, pleuritis, pericarditis, septicemia
	Salmonella sp.	Occasional pneumonia, scours
	Pasteurella multocida	Secondary pneumonia
	Staphylococcus sp.	Secondary pneumonia
	Streptococcus sp.	Secondary pneumonia
	Hemophilus sp.	Secondary pneumonia
	Corynebacterium pseudotuberculosis	Caseous lymphadenitis
	Mycobacterium bovis	Tuberculosis

3. Acute pneumonia

Acute pneumonia is also known as enzootic pneumonia, pasteurellosis, shipping fever, lamb pneumonia, bacterial pneumonia, etc. It is usually an acute, infectious disease characterized clinically by fever, depression, lack of appetite, cough, labored/painful breathing and nasal discharge. Affected animals suffer from inflammation of lungs; pleuritis, pericarditis and septicemia may be also part of the problem.

Pasteurella hemolytica is the bacterium responsible for most infections. There are two major types: biotype "A" causes primarily pneumonia and biotype "T" causes mainly septicemia in older animals. *Pasteurella hemolytica* (PH) is commonly found in nostrils and tonsils of healthy sheep. PH causes pneumonia once it reaches the lungs, colonizes them and releases toxins. Factors which assist this process include:

- Mycoplasmas, chlamydia and viruses
- Non-infectious factors previously mentioned
- Stress!

Acute bacterial pneumonia is predominant among young lamb and feeder lambs.

4. Chronic/progressive pneumonia

a. Ovine progressive pneumonia (OPP): A chronic, fatal disease of mature sheep caused by a retrovirus in the Lentivirus subfamily. First described by H. Marsh in 1923 in Montana.

Animals clinically affected by OPP are usually 2 yr. and older. They fail to keep up with the rest of the flock, develop rapid breathing during exertion and lose weight. Symptoms gradually worsen until death 3-12 months after initial onset of signs. Precise mechanism of transmission is not fully understood. Horizontal transmission may be the most probable mode of natural infection. Vertical transmission (dam to progeny, *in utero*) has been demonstrated experimentally, but is not common under natural conditions. The contamination of colostrum with OPP virus has been demonstrated also.

Diagnosis of OPP is based on clinical signs, post mortem lesions and isolation of the virus. Testing blood serum or colostrum whey with the AGID test is commonly done. The AGID test does two things: (1) it detects OPP virus antibodies and (2) it identifies sheep infected with the OPP virus. However, a positive AGID test is not conclusive evidence that a sheep has clinical OPP, or that matter will ever develop clinic signs of the disease or lung lesions.

b. Caseous lymphadenitis is caused by *Corynebacterium pseudotuberculosis*. It is primarily characterized by abscessation of lymph nodes. Signs of respiratory disease occur when abscesses develop in lungs or associated lymph nodes. Lung abscesses may be discrete but often extensive bronchopneumonia develops.

c. Tuberculosis can occur in sheep but is rare.

d. Pulmonary adenomatosis ("Jaagsiekte") is another chronic virus disease of sheep; eight cases have been reported recently (1982) in USA.

5. Miscellaneous conditions

a. Aspiration pneumonia: Young lambs artificially fed or tubed carelessly or those with impaired swallowing may aspirate milk into lungs. Older animals drenched when recumbent may also aspirate fluids.

b. White muscle disease should always be considered in the differential diagnosis of pneumonia. Rapid breathing, abdominal respiration, coughing and respiratory sounds are often noticed in animals with heart damage, as in WMD.

• TREATMENT OF BACTERIAL PNEUMONIA

1. Consult your veterinarian, use your past experience for treatment which has proven effective in your area.

2. No. 1 rule: "Treat early, with sufficient drug and repeat treatment".

3. Some treatments used:

a. Tetracyclines

- LA-200: 1 cc/20 lb, deep i.m. repeat at 24 hr.
- Injectable terramycin (100 mg/cc)
  1 cc/10 lb, under skin, for at least 3 days
- Oral tetracyclines have proven effective. Give 2-3 mg/lb, twice daily, for at least 2 to 3 days. In addition they seem to control Mycoplasma and Chlamydia

b. Penicillin (Procaine, G): 12,000-15,000 IU/per lb/under skin/for at least 3 days

c. Sulfa drenching (sulfamethazine or sulfachloropyridazine)
1½ gr/lb on day one
½ gr/lb days 2 and 3
Change treatment if no improvement noticed by day 2.

d. S.E.Z. (Sulfaethopyridazine)
6.5% drinking water solution
Use 1 oz/gal for up to 4 days

e. Other drugs which may be effective include: ampicillin, trimethoprim, tylosin, triple sulfas and erythromycin.

4. Regardless of drug used, do not forget No. 1 Rule:
"Treat early,
Give enough drug,
Repeat treatment."

• PREVENTION OF BACTERIAL PNEUMONIA

1. It involves primarily MANAGEMENT

2. Avoid, or dramatically reduce stress

3. Work on environment, handling, nutrition, shelter

4. Importance of colostrum intake by newborn

5. Water medication of brood ewes

   - use S.E.Z. or sulfamethazine
   - for 4 days prior to lambing

6. Recent research indicates possible degree of control by using Nasalgen - IP, a cattle vaccine

   - is given intranasally (squirted inside a nostril)
   - 1 cc to ewes, before lambing
   - ½ cc to lambs at birth, repeated before weaning

7. Pasteurella bacterins presently available have not proven effective in controlling bacterial pneumonia of sheep.

2-13-85

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, William Slanger, Robert Harrold,
Tim Faller, Wes Limesand, 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 studies and quality measures on the effects of protein protection have been investigated. Numberous experiments both in the feed lot and in the metobolism 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 experiment involved the use of soybean meal as a comparative or control protein supplement.

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

- Sunflower meals support satisfactory gains and feed efficiencies in high energy finishing diets.
- Sunflwer meals (40^+) support gains and feed efficiencies equal to that of soybean meal or with various conbinations of sunflower and soybean meals when fed in diets of equal protein and TDN. When sunflwer 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, digestibliities 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 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.), and Tim Flakott (MS)

Ovine Footrot

Footrot in sheep is the result of synergistic reaction between two organisms one which is nearly always present in the livestock environment (Fuso-bacterium 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 environmnet 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 most 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 particular 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 do 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 hoofs 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 Hoof, 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 organism.

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 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 on to 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 organism. 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 irritation 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. Formaldahyde is irritating 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 chemichal. 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 pounds 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 exhibit 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 on to 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 foot-rot has been eliminated.

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 felf 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 bacterial (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 ox. containers.

11. Provide supplemented feed immediately. Use high energy, highly palatable feed. Where few lambs are bing fed it may be advisable to purchase a good commerical 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. Do not worry - lambs will make compensating gains later on.

HETTINGER BRANCH EXPERIMENT STATION

FLOCK CALENDAR - OUTLINE

PRIOR TO BREEDING

1. Bag and mouth ewes and cull those that do not 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 weeds 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 (do not sinter 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 lb. oats per ewe per day.
3. Shear ewes, trim hoofs, and vaccinate ewes for example: Enterotoxemia, Vibriosis, and Soremouth.
4. Four weeks before lambing increase grain by 1/2 - 3/4 lb 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 lb 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 hours - 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, (do not wait until signs of wormines 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.

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
NW 72506	240 - Ewe and Lambing Barn, 40'x104'	2.50
NW 72507	500 - Ewe and Lamb Feeding Barn, 74'x256'	2.50
NW 72508	12'x16' Portable Lamb Feeding Shed	1.50
NW 72509	40 - Ewe and Lambing Barn, 24'x32'	1.50
Reprint no. 759	Practical Sheep Housing for North Dakota	No Charge
USDA 6096	Shearing Shed & Corral Arangement	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 Clearspan 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 Buildings - 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