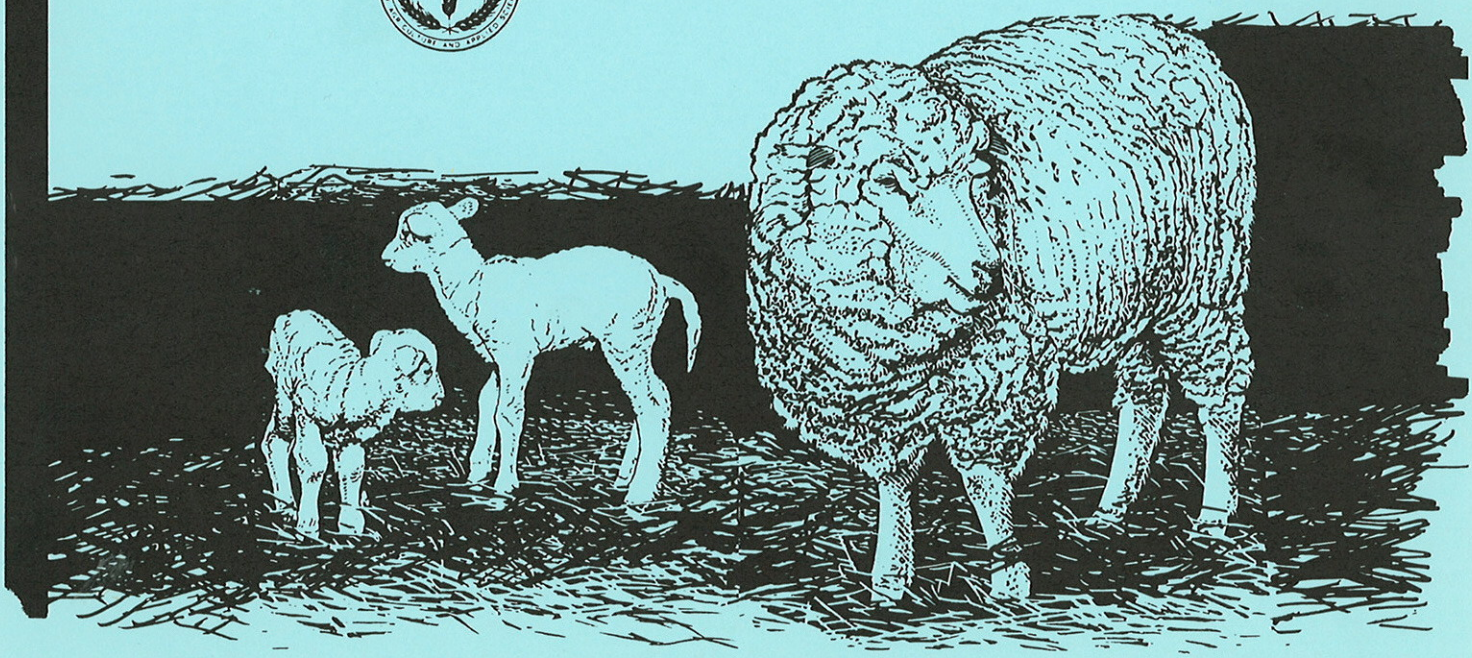
30th Annual Western Dakota

SHEEP DAY

Hettinger Armory
February 8, 1989

Timothy Faller, Superintendent
Hettinger Research & Extension Center
North Dakota State University



PROGRAM

9:00 AM (MST)	Tours at the Station
10:00 AM	Coffee
10:15 AM	Permanent Face Branding Demonstration Glenn Brown, Rancher, Buffalo, SD
10:30 AM	HETTINGER & FARGO STATION REPORTS Dr. Duane Erickson Dr. Kris Ringwall Mr. Roger Haugen Mr. Timothy Faller
12:00 NOON	LUNCH: ROAST AMERICAN LAMB
1:00 PM	WELCOME Dr. H.R. Lund, Director Agriculture Experiment Station North Dakota State University
1:15 PM	LIVESTOCK IMPROVEMENT AND MANAGEMENT RELATIVE TO IMPROVED WOOL PRODUCTION Sandy Joyce, Consultant Ranches of Taos, New Mexico
2:10 PM	WOOL TECHNOLOGY Angus McColl Yocum-McColl Testing Laboratory Denver, Colorado
3:05 PM	WHAT'S HAPPENING IN ANIMAL DAMAGE CONTROL Rick Severson USDA - Animal Damage Control Bismarck, North Dakota
3:25 PM	CLOSING REMARKS Dean Swenson, President ND Lamb & Wool Producers Assoc. Harwood, North Dakota

*There will be a program for the ladies in the afternoon beginning at 1:20 PM featuring "The McCalls Fashion Show". This fashion review will be conducted by local homemakers utilizing fashions provided by McCalls.

SHEEP DAY DIGEST

by
Timothy C. Faller, Superintendent
Hettinger Research and Extension Center
North Dakota State University

SECTION I

REPORTS OF RESEARCH IN PROGRESS

AT THE

HETTINGER RESEARCH & EXTENSION CENTER

AND MAIN STATION

PRESENTED BY

DR. DUANE ERICKSON
ANIMAL & RANGE SCIENCE DEPT.
NORTH DAKOTA STATE UNIVERSITY

DR. KRIS RINGWALL
NORTH DAKOTA STATE UNIVERSITY

TIMOTHY C. FALLER
SUPERINTENDENT

AT THE

30TH ANNUAL SHEEP DAY

HETTINGER RESEARCH & EXTENSION CENTER
HETTINGER, NORTH DAKOTA

FEBRUARY 8, 1989

BARLEY OR MILO FED IN WHOLE OR GROUND FORMS FOR FINISHING LAMBS

D.O. Erickson, T.C. Faller, K.A. Ringwall and P.T. Berg

NDSU Experiment Stations at Hettinger and Fargo, 1988

Summary

The feeding values of barley or milo fed in whole or ground diets based on feedlot performance of lambs and resulting selected carcass characteristics were determined. Two 70 d trials were conducted with four dietary treatments replicated twice in each trial utilizing a total of 800 early weaned lambs at the Hettinger Station. Diets were balanced to be iso-caloric 1380 D kcal/lb (69% TDN) and iso-nitrogenous (13.8% protein) and were self fed. Lambs on milo gained faster ($P<.06$) were 2.6 pounds heavier ($P<.02$) and ate more ($P<.0001$) feed compared to barley. Feed efficiency was similar ($P>.10$) between milo (7) compared to barley (6.6). All criterion in feedlot performance were similar ($P>.05$) between whole and ground form. There were no grain to form interactions ($P>.05$). Digestibilities of the diets were similar among diets. Carcass characteristics of leg score, USDA grade, loin area, back fat and % kidney were similar ($P>.05$) between milo and barley or between the physical forms. There were no grain to form interactions. The feed intake of lambs on barley is not as high or consistent especially during hot weather as the intake of milo or in other previous trials the intake of corn. It is of economic importance that feeding the grains in whole form does not affect performance or carcass characteristics and also that feed efficiencies are similar.

Introduction and Justification

Barley, as a major feedstuff in high energy diets for finishing lambs, has been compared with corn, oats, and wheat and with some combinations of these feedstuffs in several trials conducted at the Hettinger and Fargo Stations. Comparisons include; various quality grades of the grains, on a one to one replacement of the grains or on an equal energy and protein basis and with various protein supplements (soybean, linseed, sunflower oil meals, distillers dried grains and urea). The general conclusions can be made that the cereal grains fed in diets of equal energy and protein result in similar lamb gains, feed efficiency and carcass characteristics.

Feed intake is higher and more constant especially in hot weather with corn, but efficiency is similar. Wheat should not make up more than 30% of the grain in the diet. Grains (corn or barley) can be fed in whole form without a reduction in feedlot performance or digestible dry matter or protein. Carcass characteristics were similar with physical forms.

Milo (sorghum grain) is a popular feedstuff used in areas where it can be produced efficiently or is imported as the major grain in some countries (for example, Mexico). Information concerning the feeding value of milo compared to barley either in whole or ground form for finishing sheep is very limiting or nonexistent. These trials will provide information concerning the relative feeding value of barley to

milo for finishing lambs as measured by lamb performance (gain, efficiency, feed intake and digestibility) and various carcass criterion which will be useful to the sheep producer in making feed-management decisions. Relative pricing can be more accurate among grains as relative feeding values are established.

Objectives

To determine the comparable feeding values of barley and milo fed in complete mixed diets either in ground or whole form to finishing lambs. Lamb performance and carcass characteristics will be used as criterion as measures of dietary treatment.

Procedure

Feedstuffs were sampled and analyzed for selected nutritional components in order to balance the two (milo or barley) diets (table 2) on an equal protein level (table 2) and similar calcium and phosphorus levels (table 3). The nutritional analysis of diets sampled (20) throughout the two trials are shown in table 3. Acid detergent fiber (ADF) and digestibilities were similar among diets but NDF was higher in the barley diets. Early weaned (56 d) lambs were allotted based on weight (average 59 pounds) (table 4) sex and breed and dietary treatments (two diets in whole or ground form) were randomly assigned to 8 lots. Lamb weights and feed intake was recorded on a two week basis. Each trial lasted 70 days at which time the average weight was 97 pounds. Some of the lambs were sold for slaughter and the carcass criterion are shown in table 5.

Results and Discussion

The results from the two trials concerning lamb performance and carcass criterion are shown in tables 4 and 5 respectively. The analyzed nutrition composition of each dietary treatment is shown in table 3. Dry matter, ash, ADF, digestibility (IVDMD), phosphorus and calcium were similar among diets. The NDF and protein levels were higher in the barley diets. The similar ADF and IVDMD levels of the diets indicate a similar DE level of the diets. They were balanced to contain about 1375 D kcal/lb. Daily gains were similar ($P>.05$) among the 4 diets however comparing milo to barley gains were more rapid ($P<.06$) (table 4). Lambs ate more ($P<.05$) of both the whole and ground milo diets compared to both forms of the barley diets, however feed/gain was similar ($P>.05$) among diets. All carcass characteristics were similar ($P>.05$) among diets, between grains and between forms of diets (table 5). There were no interactions ($P>.05$) between grains and forms of diet for any of the feedlot performance criterion or carcass criterion. The information generated from these experiments is useful in making management decisions concerning feed processing of milo or barley diets and which grain would be most economical to use. The milo diet required 15% SBM whereas the barley diet only 9%. There were no differences in feed to gain ratios between barley and milo.

Acknowledgement

The grant provided by the North Dakota Barley Council was very instrumental in the accomplishment of this research and is very much appreciated.

TABLE 1. NUTRITIONAL COMPOSITION[a] OF FEEDSTUFF USED TO FORMULATE LAMB DIETS (HETTINGER 1988)

Feedstuff	Bushel wt.	Protein	TDN	DE/#	ADF	Ca	P
Alfalfa	---	16	52	1040	34	1.25	.17
Barley	47	12.0	77	1540	6.2	.05	.34
Milo	57	8.5	76	1520	6.0	.04	.34
SBM	---	44.0	78	1560	10.0	.25	.60
Limestone	---	---	---	---	---	36	---
Dicalcium phosphate	---	---	---	---	---	22	18

[a]90% dry

TABLE 2. DIETARY[a] TREATMENTS AND NUTRITIONAL COMPOSITION[b] FOR 1988 LAMB FEEDING TRIALS (HETTINGER 1988)

Feedstuff	% of Diet	% Protein	% TDN	DE/#	% ADF	% Ca	% P
Alfalfa	26	4.16	13.5	270	8.84	.325	.045
Milo	57	4.85	43.3	866	3.42	.023	.194
SBM	15	6.60	11.7	234	1.50	.038	.090
Diet 1 Totals	98	15.6	68.5	1370	13.8	.676	.419
Alfalfa	26	4.14	13.5	270	8.84	.325	.045
Barley	63	7.56	48.5	970	3.91	.031	.214
SBM	9	3.96	7.0	140	.97	.023	.054
Diet 2 Totals	98	15.7	69.0	1380	13.7	.669	.403

[a]Both diets will have .5% each of TM salt, limestone, dicalcium phosphate and ammonium chloride. 1.25% ionophore supplement, .05% Vit. A, D & E and 2.5 g Terramycin/100# mix.

[b]90% dry

TABLE 3. NUTRITIONAL COMPOSITION[a] OF DIETS BASED ON LABORATORY ANALYSIS (HETTINGER 1988)

	Milo Whole		Barley Whole		Milo Grd		Barley Grd	
	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Dry matter	90.5	.57	92.2	.88	90.5	.43	91.8	1.05
Ash	5.13	.84	5.39	1.23	5.55	.61	5.76	.83
NDF[b]	17.2	1.10	21.8	1.36	19.8	1.69	21.3	.72
ADF[c]	11.8	1.26	11.6	1.46	12.0	.92	11.8	1.53
Protein	15.4	1.25	17.2	1.61	15.8	.96	17.8	.91
IVDMD[d]	68.7	1.97	68.3	1.41	68.6	3.34	70.1	2.37
P	.424	.069	.421	.057	.427	.036	.440	.052
Ca	.672	.178	.666	.219	.730	.172	.686	.163

[a]As fed basis except Ca + P on dry basis.
[b]Neutral detergent fiber.
[c]Acid detergent fiber.
[d]In vitro dry matter digestibility.

TABLE 4. LAMB PERFORMANCE COMPARING BARLEY TO MILO FED IN WHOLE OR GROUND FORM (HETTINGER 1988)

	Milo-W	Barley-W	Milo-G	Barley-G	SE
Initial wt.	60.6	59.1	59.0	57.6	.82
Final wt.	99.5[a]	97.1[ab]	97.7[ab]	94.6[b]	.99
Daily gain	.567	.533	.552	.517	.017
Daily feed	3.79[a]	3.47[b]	3.96[a]	3.46[b]	.054
Feed/gain	6.68	6.61	7.32	6.61	.279

	Grain and Form Comparisons							
	Milo	Barley	SE	Prob.	Whole	Ground	SE	Prob.
Final wt.	98.6	96.0	.75	.02	98.3	96.3	.80	.06
Daily gain	.560	.525	.011	.06	.550	.535	.013	ns
Daily feed	3.87	3.47	.035	.0001	3.63	3.71	.085	ns
Feed/gain	7.00	6.61	.19	ns	6.64	6.97	.20	ns

[a,b]Different @ $P<.05$
ns = not sig. @ $P>.05$
ns = no sig. interactions @ $P>.05$

TABLE 5. CARCASS CHARACTERISTICS COMPARING BARLEY TO MILO FED IN WHOLE OR GROUND FORM (HETTINGER 1988)

	Milo-W	Barley-W	Milo-G	Barley-G	SE
Leg score	11.1	10.9	11.3	10.8	.27
USDA grd.	10.7	10.7	11.2	10.6	.23
Loin area	2.065	2.015	1.970	1.895	.074
Back fat	.177	.187	.201	.184	.011
Kidney %	2.51	2.39	2.59	2.22	.140

	Grain and Form Comparisons							
	Milo	Barley	SE	Prob.	Whole	Ground	SE	Prob.
Leg score	11.2	10.8	.18	ns	11.0	11.0	.19	ns
USDA grd.	11.0	10.6	.17	ns	10.7	10.9	.11	ns
Loin area	2.017	1.955	.055	ns	2.040	1.933	.045	ns
Back fat	.189	.186	.008	ns	.182	.192	.007	ns
Kidney %	2.55	1.96	.053	ns	2.45	2.41	.107	ns

ns = no sig. differences or interactions @ P>.05.

DISTILLERS DRIED GRAINS COMPARED TO SOYBEAN MEAL IN BARLEY OR MILO DIETS FOR FINISHING LAMBS

D.O. Erickson, B.L. Moore, P.T. Berg and M. Swantek

Animal and Range Sciences - Fargo Station 1988

Summary

Two trials utilizing 168 early weaned lambs were conducted to determine the performance and carcass characteristics of lambs fed barley or milo supplemented with soybean meal (SBM) or distillers dried grains (DDG). Dietary treatments were replicated six times. Diets were formulated based on nutritional composition of feedstuffs and "book values" for TDN to contain equal energy (72% TDN) and protein (14%) levels. Results of lamb performance are presented after 42 d and 56 d in the feedlot. Daily feed intake, gain and final weights were higher ($P<.01$) for milo compared to barley at either trial termination date. Feed to gain ratios were similar ($P>.05$) between grains. All feedlot performance criterion were similar ($P>.05$) between protein sources (SBM or DDG) at either of trial termination dates. All carcass characteristics (USDA grade, % kidney, conformation grade, leg score, backfat, loin area, dress % and yield grade) were similar ($P>.05$) between grains and protein sources. There were no ($P>.05$) interactions between grains and protein sources. The results indicated that the barley diets are more economical because feed efficiencies are similar and less protein supplement is needed in the diet. These results are similar to barley and corn comparisons and the same economic considerations are warranted.

Introduction and Justification

Distillers dried grains (DDG) (65% from barley and 35% from corn) which is produced as a by-product of the ethanol industry in North Dakota has been researched as an alternative protein supplement. The Animal and Range Sciences Department has recently conducted several experiments to determine the feeding characteristics of DDG by in vivo and in vitro methods. The DDG has been determined to have a relatively high escape protein which can be an advantage when fed along with feedstuffs that have high rumen degradable proteins or with urea. The product has 26% protein and 26% fiber. Therefore, more DDG and cereal grains are needed in diets compared with soybean meal (SBM) if diets are balanced on an equal protein and energy level. Suggested TDN level of the DDG product (65% barley and 35% corn) has 68% TDN however, work with dairy cattle at NDSU indicates a value of 78% TDN used. Distillers dried grains, primarily from barley, fed with high energy milo diets has not been studied. Research is needed concerning the feeding value of milo fed with either DDG or SBM compared to barley fed with the same protein sources. This information will be very useful in making feed-management decision for the livestock producer and for the pricing of these feedstuffs for market.

Objectives

To determine the relative feeding value of DDG (65% barley and 35% corn) compared to soybean meal fed with either milo or barley to finishing lambs.

Procedures

Diets (Table 2) were formulated utilizing the analysis (Table 1) of the feedstuffs to contain 14% protein and 72% TDN (1440 D kcal/lb) and similar calcium and phosphorus levels. Samples of diets were analyzed for selected nutritional fractions during the trials and the composition is shown in Table 3.

Diets containing SBM were lower in NDF, ADF and higher in digestibility (IVDMD) compared to the DDG diets with either barley or milo (Table 3). Lambs (168) were allotted by weight (61 lb average) breed and sex in both trials and randomly assigned to one of four dietary treatments (6 replicates). Lambs were self fed complete coarse ground mixed diets. Lamb performance criterion were recorded every two weeks with summaries shown in Table 4 for 42 days and 56 days. The intake of barley diets has been more inconsistent the latter part of the trial and especially in hot weather compared to other grains. That was the major reason for presenting data at two final weights or total experimental days. Sixteen (4/treatment) were slaughtered in order to obtain the carcass information (Table 5). Statistical methods were applied to the data to establish the effects of dietary treatments.

Results and Discussion

Diets were formulated to contain similar protein and energy levels (Table 2) based on the nutritional composition (Table 1) of the feedstuffs used in the diets. The analysis of the various dietary treatment indicate that the diets with SBM were lower in NDF and ADF and higher in digestibility (IVDMD) than the diets supplemented with DDG (Table 3). Protein levels (15%) were similar among diets as were calcium and phosphorus levels and ratios (Table 3). Differences in lamb performance criterion between grains or protein supplements were similar between terminating the experiment at 42 days or 56 days (Table 4). Final weights were higher ($P<.003$ and $P<.007$), daily gains were more rapid ($P<.002$ and $P<.005$) and daily feed intakes were greater ($P<.0004$ and $P<.002$) for the lambs on milo respectively for termination dates 1 and 2 compared to barley. Feed to gain ratios were not different ($P>.05$) between grains at either termination date. Similar results were obtained with corn to barley comparisons in previously reported trials. Lamb performance was similar ($P>.05$) between SBM and DDG as the protein supplement (Table 4) at either termination date. Considerably less protein supplement is required in the barley diets compared to the milo diets (Table 2) which should be an important economic consideration in feed management decisions. Less SBM is required compared to DDG because of protein levels of the protein sources (Table 1 and 2). There were no interactions ($P>.05$) between grains and protein sources for any of the lamb performance criterion. Dietary treatment grains or protein sources had no effect ($P>.05$) on the several carcass criterion measured (Table 5) and there were no interactions ($P<.05$) between grains and protein

sources. Barley compares favorably with milo as a feed grain alternative for feeder lambs as it does with corn, oats and wheat. Feed intake and gains were higher for milo (as it is with corn) but feed to gain ratios are the same for milo as barley (as it is with corn). Less protein supplement is required in barley based diets compared to milo or corn. Distillers dried grains is a satisfactory protein source for diets of either barley or milo for lambs.

Acknowledgement

The grant provided by the North Dakota Barley Council was very instrumental in the accomplishment of this research and is very much appreciated.

TABLE 1. COMPOSITION[a] OF FEEDSTUFFS USED IN DIETS FOR FINISHING LAMB TRIALS (FARGO 1988)

	%						
Feedstuff	Bu. wt.	Protein	TDN	DE/#	ADF	Ca	P
Barley	47	11.4	77	1540	6.2	.05	.34
Milo	57	8.5	76	1520	6.0	.04	.34
DDG[b]	--	26	78	1560	26.0	.08	.73
SBM	--	44	78	1560	10.0	.25	.60
Alfalfa	--	16	52	1040	34.0	1.25	.17
Limestone	--	--	--	--	--	36	--
Dicalcium	--	--	--	--	--	22	18

[a] 90% dry or as fed basis.
[b] 65% barley and 35% corn distillers grains plus solubles.

TABLE 2. DIETARY TREATMENTS AND CALCULATED NUTRITIONAL COMPOSITION FOR FINISHING LAMBS (FARGO 1988)

Diet	Barley DDG	Barley SBM	Milo DDG	Milo SBM
Alfalfa	12	12	12	12
Barley	70	79	--	--
Milo	--	--	58	72
DDG	16	--	28	--
SBM	--	7	--	14
	Nutritional Composition			
TDN %	72	72	72	72
Protein %	14	14	14	14
Ca	.668	.677	.665	.683
P	.467	.422	.514	.434

all diets will contain:

- .5% each of TM salt, ammonium chloride and dicalcium phosphate
- 1.25% vitamins-ADE, antibiotics and coccidiostat
- 1.00% limestone

TABLE 3. NUTRITIONAL COMPOSITION[a] OF DIETS BASED ON LABORATORY ANALYSIS WITH STANDARD DEVIATIONS (FARGO 1988)

	Barley DDG		Barley SBM		Milo DDG		Milo SBM	
Dry matter	90.3	.77	90.2	1.01	91.2	.69	89.5	.87
Ash	5.90	.46	5.69	.39	5.28	.39	5.11	.28
NDF[b]	25.8	1.83	21.6	1.86	23.4	2.18	14.3	1.78
ADF[c]	12.9	1.48	9.4	.75	12.8	1.37	7.5	.31
Protein	15.2	.66	15.1	.57	14.7	.91	15.0	.32
IVDMD[d]	75.7	3.04	79.6	1.54	76.3	1.05	83.4	1.18
P	.50	.039	.47	.050	.51	.043	.46	.027
Ca	.82	.182	.85	.191	.83	.145	.86	.057

[a]As is basis except Ca and P on dry basis.
[b]Neutral detergent fiber.
[c]Acid detergent fiber.
[d]In vitro dry matter digestibilities.

TABLE 4. LAMB PERFORMANCE COMPARING BARLEY TO MILO FED WITH DISTILLERS DRIED GRAINS OR SOYBEAN MEAL (FARGO 1988)

	Barley Dist.	Barley SBM	Milo Dist.	Milo SBM	SE
Initial wt.[1]	61.1	60.7	61.0	61.2	.31
Final wt.[1]	97.9	97.4	104.5	103.2	1.88
Daily gain[1]	.873$_{cb}$	.877$_{c}$	1.037$_{a}$	1.002$_{ab}$	.042
Daily feed[1]	3.46	3.30	4.03	3.85	.127
Feed/gain[1]	3.98	3.79	3.89	3.85	.079
Final wt.[2]	107.0	107.3	115.1	114.6	2.51
Daily gain[2]	.820$_{b}$	.833$_{b}$	.970$_{a}$	.957$_{ab}$	.043
Daily feed[2]	3.60	3.60	4.25	4.06	.154
Feed/gain[2]	4.39	4.33	4.40	4.27	.091

	Grain and Protein Source Comparisons							
	Barley	Milo	SE	Prob.	Dist. G.	SBM	SE	Prob.
Final wt.[1]	97.6	103.9	1.28	.003	101.2	100.3	1.59	ns
Daily gain[1]	.875	1.019	.028	.002	.955	.931	.036	ns
Daily feed[1]	3.38	3.94	.090	.0004	3.75	3.57	.121	ns
Feed/gain[1]	3.88	3.87	.057	ns	3.94	3.82	.057	ns
Final wt.[2]	107.2	114.8	1.71	.007	111.1	110.9	2.08	ns
Daily gain[2]	.827	.963	.029	.005	.895	.895	.036	ns
Daily feed[2]	3.60	4.16	.107	.002	3.93	3.83	.136	ns
Feed/gain[2]	4.36	4.33	.063	ns	4.40	4.30	.061	ns

[a,b,c]different @ P<0.5.
ns = no differences @ P>.05 no interactions @ P>.05.

TABLE 5. CARCASS CHARACTERISTICS COMPARING BARLEY TO MILO FED WITH DISTILLERS DRIED GRAINS OR SOYBEAN MEAL (FARGO 1988)

	Barley Dist.	Barley SB	Milo Dist.	Milo SB	SE
USDA grd	10.5	10.7	10.5	11.2	.53
Kidney %	.93	1.10	1.17	1.57	.251
Conf. grd	11.5	12.2	11.0	11.5	.52
Leg score	12.0	13.0	11.3	12.2	.57
Back fat	.177	.153	.183	.175	.019
Loin area	2.663	2.625	2.675	2.675	.133
Dress. %	56.5	56.9	58.2	57.4	.72
Yield grd	2.47	2.30	2.61	2.61	.133

	Grain and Protein Source Comparisons							
	Barley	Milo	SE	Prob.	Dist. G	SBM	SE	Prob.
USDA grd	10.6	10.9	.38	ns	10.5	11.0	.38	ns
Kidney %	1.01	1.37	.18	ns	1.05	1.34	.177	ns
Conf. grd	11.9	11.3	.36	ns	11.3	11.9	.36	ns
Leg score	12.5	11.8	.40	ns	11.6	12.6	.40	ns
Back fat	.165	.179	.013	ns	.180	.164	.013	ns
Loin area	2.64	2.67	.094	ns	2.67	2.65	.094	ns
Dress. %	56.7	57.8	.51	ns	57.4	57.2	.51	ns
Yield grd	2.39	2.61	.093	ns	2.54	2.45	.094	ns

No differences among dietary treatments P>.05.
ns = no differences P>.05.

THE EFFECT OF SEASON ON SCROTAL CIRCUMFERENCE OF RAMBOUILLET RAMS AND REPRODUCTIVE CHARACTERISTICS OF FEMALE OFFSPRING FROM RAMS SELECTED FOR PREDICTABLE OR NO PREDICTABLE CHANGE IN SEASONAL SCROTAL CIRCUMFERENCE

K.A. Ringwall, T.C. Faller, J.E. Tilton, P.M. Berg and E. Minton

INTRODUCTION

The sheep industry has identified it's major problem as seasonal infertility. Not only is seasonal infertility a biological puzzle, but the effects of seasonal lambing limits managerial options and restricts a constant and dependable supply of lamb products to the consumer. In North Dakota, virtually all lambs are born from late January to early May. Producers have not been able to consistently produce a fall lamb crop for the purpose of grazing fall stubble and decreasing winter feed resources for the dry ewe. The purpose of this project is to provide additional information as to how the season of the year effects the ram and to explore the possibility of increasing the consistency of fall lambing for North Dakota producers by identifying potential sires that may produce daughters that will better fit a northern fall lambing program.

PROCEDURE

The influence of season on scrotal circumference of Rambouillet rams and reproductive characteristics of their offspring are being evaluated. Rambouillet rams are evaluated yearly and classified as seasonal or nonseasonal rams. Seasonal rams are defined as those rams whose scrotal circumferences increase predictably from the January, February and March average scrotal circumference to the August scrotal circumferences while non-seasonal rams show no seasonal trend to change in scrotal circumferences. Scrotal measurements are obtained in late February and late July from the Glenn Brown flock, Buffalo, SD and ram selection is based on these two measurements. Two rams with the greatest change and two rams with the least change are selected. Subsequent evaluation at the Research Extension Center will be utilized to confirm the right classification. If a ram fails to maintain a predictable seasonal pattern to annual change in scrotal circumference, the ram will be reclassified as a nonseasonal ram. Blood sampling for later analysis for luteinizing hormone (LH) was started in October 1987 and done monthly. The rams are bled at -30, 0, 15, 60 and 75 minute intervals with 1 Ug LH-FSH-RH administered at 1 and 61 minute time periods. The blood analysis for each ram will also help confirm that the ram is classified correctly. Nine seasonal rams and seven nonseasonal rams have been purchased to date and six seasonal and four nonseasonal rams are currently alive.

Initially, 25 to 30 purchased Rambouillet ewes per ram were mated yearly to four seasonal and four nonseasonal rams to produce progeny. Currently, seasonal and nonseasonal daughters are being compared at 10 months of age for ovulation rate and 14 to 18 months of age for the ability to conceive at the beginning or end of the breeding season. These ewes will be evaluated as dry ewes exposed to rams during August or April; followed by exposure to rams as wet ewes (recently weaned) during April or November. Once a ewe has had an

opportunity to conceive during April and August, the ewe will enter an upgrading breeding program were she will be mated to seasonal sires if she is a seasonal ewe or to nonseasonal rams if she is a nonseasonal ewe. This mating schedule will continue and each generation of progeny will be re-evaluated as described above. When possible, the ewes will be mated to individual sires, but if individual sire fertility is questionable, the ewes will be group mated by seasonal or nonseasonal rams. Both types of ewes will be exposed to teaser wethers and rams during the April breeding season to assure that both types of ewes have equal exposure to aggressive males.

RESULTS AND DISCUSSION

Four Rambouillet rams were purchased in August of 1985, 1986, 1987 and 1988 after initial evaluation of Brown's Rambouillet rams. In 1985 and 1988 two rams were selected each from two different age groups of rams, while in 1986 and 1987 all four rams were from the same age group. These rams have had scrotal circumference measurements taken on a monthly base since arriving at the station. Based on the January/March to August measurements (the scrotal circumferences used to select the rams), Table 1 gives the current status and classification of the purchased rams.

The accuracy of classification based on two measurements appears to be repeatable (Table 1). The first 12 rams that were purchased have had the January/March to August measurements retaken and the scrotal circumference changes the following year were similar with the exception of 5367. Ram 5367 was purchased as a seasonal ram, but was reclassified to nonseasonal after he failed to produce a predictable seasonal pattern of scrotal circumference change with follow up measurements. Those rams purchased in 1988 do not have one full years measurements available. Table 2 provides the mean secretory LH pattern for the two ram classes from October to September. The LH data further demonstrates that the two ram classes are different. With the exception of April, nonseasonal rams had elevated mean serum LH prior to the challenge, and also had greater mean serum LH post challenge during each month sampled. The sharp rise in seasonal ram serum LH during April is probably related to a seasonal change in the endocrine feedback mechanisms. The overall elevated status of serum LH in the nonseasonal ram may suggest a faulty regulatory mechanism which is subsequently demonstrated in inconsistent scrotal changes throughout the year.

The mating and lambing performance of ewes exposed to each ram is presented in Table 3. The ability of seasonal or nonseasonal rams to mate and conceive lambs during the fall appears to be different, as there is a slight advantage (7% more ewes lambing) for seasonal rams. Although, many variables can influence ram fertility, the majority of rams that have indicated fertility problems have been nonseasonal rams.

There does not appear to be any substantial differences in growth (Table 4) between seasonal or nonseasonal ewes. Early reproductive performance as ewe lambs sired by seasonal or nonseasonal rams is presented in Table 5. A similar number of each type are expressing estrus during November and December, however a greater number of seasonal ewes have expressed estrus during the first cycle of exposure to teaser wethers, while nonseasonal ewes tend to wait until the second cycle of exposure to teaser wethers (Table 5). The ovulation rate is similar between the two types of ewes (Table 5).

The reproductive prolificacy and prebreeding weights are given in Table 7 for mature seasonal and nonseasonal ewes. This table is very preliminary since ewes have not had an opportunity to lamb during all the different time periods or lactation types but does give some early indications of trends. Both ewe types are similar in body size prior to breeding, however the ewes vary in weight from one breeding season to the next. As with ovulation rate (Table 5), prolificacy seems to be slightly less for nonseasonal ewes (Table 7). In Table 3, nonseasonal rams tended to be less fertile, and that same trend can be noted in Table 8 for their daughters performance as mature ewes in April and August. Within each lambing period and ewe status, nonseasonal ewes have a lower conception percentage. Table 6 indicates those ewes that indicated 1 ng serum progesterone or greater following mating in April. The number of ewes with elevated serum progesterone corresponds to the number of ewes that lambed in October suggesting that fetal mortality was not a severe problem, if at all. The majority of ewes that failed to conceive, did not express estrus. During April, nonseasonal ewes may express first cycle estrus more readily than seasonal ewes, however this trend is not evident in August (Table 8).

TABLE 1

SCROTAL CIRCUMFERENCE CHANGE FROM THE AVERAGE JANUARY, FEBUARY AND MARCH SCROTAL CIRCUMFERENCE TO THE AUGUST (PRE-BREEDING) SCROTAL CIRCUMFERENCE FOR SEASONAL AND NONSEASONAL RAMS FROM 1985 TO 1988

RAM NUMBER	CLASSIFICATION	AVERAGE CHANGE (CM) 1985	1986	1987	1988
2532	nonseasonal	2.3	.1	dead	dead
4066	nonseasonal	1.0	.3	2.1	2.1
5367	nonseasonal		8.2	3.1	-3.0
6014	nonseasonal		1.3	dead	dead
6135	nonseasonal		.6	4.9	- .2
6559	nonseasonal			2.4	dead
7479	nonseasonal				-2.4
7680	nonseasonal				- .7
3289	seasonal	11.9	3.8	dead	dead
4162	seasonal	9.4	2.9	4.2	5.5
5303	seasonal		8.4	8.0	7.2
T311	seasonal			6.3	5.2
6579	seasonal			8.0	4.7
7242	seasonal			9.0	7.0
7495	seasonal				2.2
8360	seasonal				4.7

TABLE 2

MEAN SECRETORY PATTERNS OF LH IN SERUM FROM OCTOBER TO SEPTEMBER PRIOR TO INFUSION OF 1 MICRO GRAM LH-FSH-RH AND SIXTY MINUTES POST INFUSION FOR SEASONAL AND NONSEASONAL RAMS

RAM CLASS	INFUSION STATUS	TIME OF YEAR									
		OCT	NOV	DEC	FEB	MAR	APR	MAY	JUN	AUG	SEP
seasonal	pre	0.25	0.27	0.24	0.43	0.31	1.40	0.35	0.36	0.40	0.28
nonseasonal	pre	0.69	0.52	0.26	0.74	0.65	0.95	1.39	0.82	0.84	0.36
seasonal	post	1.30	1.60	0.90	2.00	1.90	2.40	2.30	1.80	1.90	1.00
nonseasonal	post	1.90	2.00	1.30	2.30	3.20	3.30	3.50	2.60	3.60	1.20

TABLE 3

NUMBER OF EWES MATED, EWES LAMBING AND SUBSEQUENT CONCEPTION RATE OF EWES EXPOSED TO SEASONAL AND NONSEASONAL RAMBOUILLET RAMS DURING FALL BREEDING WHEN EXPOSED FOR TWO ESTROUS CYCLES.

RAM NUMBER	CLASS	TOTAL EWES	NUMBER MATED	PERCENTAGE MATED	NUMBER LAMBING	PERCENTAGE LAMBING	CONCEPTION PERCENTAGE
3289	s	38	38	100.0	32	84.2	84.2
4162	s	39	39	100.0	33	84.6	84.6
5303	s	40	38	95.0	21	52.5	55.3
6579	s	25	23	92.0	20	80.0	87.0
7242	s	25	23	92.0	19	76.0	82.6
T311	s	24	24	100.0	15	62.5	62.5
Seasonal averages				96.9		73.4	75.7
2532	n	39	38	97.4	24	61.5	63.2
4066	n	67	63	94.0	50	74.6	79.4
5367	n	40	40	100.0	31	77.5	77.5
6014	n	12	12	100.0	11	91.7	91.7
6135	n	40	39	97.5	15	37.5	38.5
6559	n	25	22	88.0	17	68.0	77.3
Nonseasonal averages				96.0		66.4	69.2

TABLE 4

ACTUAL BIRTH, WEANING, EARLY FALL, LATE FALL AND LONG YEARLING WEIGHT FOR EWE LAMBS SIRED BY SEASONAL AND NONSEASONAL RAMS

SIRE TYPE	TOTAL EWES	BIRTH WEIGHT	WEANING WEIGHT	FALL WEIGHT EARLY	FALL WEIGHT LATE	LONG YEARLING WEIGHT
seasonal	88	11.4	36	114	122	140
nonseasonal	113	11.2	37	119	121	136

TABLE 5

REPRODUCTIVE PERFORMANCE OF EWE LAMBS SIRED BY SEASONAL AND NONSEASONAL RAMS DURING TWO 17 DAY CYCLES OF EXPOSURE TO TEASER RAMS PRIOR TO LABAROSCOPIC SURGERY FOR THE DETERMINATION OF OVUALTION RATE

	ESTRUS EXPRESSION				LAPAROSCOPIC OBSERVATIONS				
SIRE TYPE	NEVER	1ST CYCLE	2ND CYCLE	BOTH CYCLES	NUMBER OF CORPORA LUTEA 0	1	2	3+	AVERAGE CORPORA LUTEA/OVULATION
seasonal	5	1	43	36	18	74	18	0	1.20
nonseasonal	7	1	42	15	21	46	16	0	1.26

TABLE 6

NUMBERS OF SEASONAL OR NONSEASONAL EWES WITH LESS THAN ONE NG SERUM PROGESTERONE OR ONE NG OR GREATER SERUM PROGESTERONE FOLLOWING APRIL EXPOSURE FOR TWO 17 DAY ESTROUS CYCLES

SIRE TYPE	NUMBER OF EWES LESS THAN 1 NG	NUMBER OF EWES 1 NG OR MORE
seasonal	10	41
nonseasonal	14	38

TABLE 7

REPRODUCTIVE PROLIFICACY AND PRE-BREEDING WEIGHTS FOR FEMALE OFFSPRING OF NONSEASONAL AND SEASONAL RAMBOUILLET RAMS DURING APRIL, AUGUST AND NOVEMBER WHEN EXPOSED FOR TWO ESTROUS CYCLES AS LACTATING OR NON-LACTATING EWES

LAMBING PERIOD	EWE STATUS	SIRE TYPE	PREBREEDING WEIGHT	LAMBS BORN/ EWE LAMBING	LAMBS WEANED/ EWE LAMBING
April	Dry	N	154 (49)	1.39 (23)	1.09 (23)
April	Dry	S	144 (28)	1.32 (19)	1.21 (19)
April	Wet	N	146 (4)	1.33 (3)	1.33 (3)
April	Wet	S	148 (22)	1.67 (18)	1.50 (18)
August	Dry	N	157 (46)	1.57 (7)	1.33 (3)
August	Dry	S	150 (41)	1.60 (23)	1.39 (23)
August	Wet	N	--- (0)	---- (0)	---- (0)
August	Wet	S	--- (0)	---- (0)	---- (0)
November	Dry	N	--- (0)	---- (0)	---- (0)
November	Dry	S	--- (0)	---- (0)	---- (0)
November	Wet	N	176 (24)	---- (0)	---- (0)
November	Wet	S	177 (35)	---- (0)	---- (0)

TABLE 8

ESTRUS EXPRESSION, CONCEPTION CYCLE AND CONCEPTION RATE FOR FEMALE OFFSPRING OF NONSEASONAL AND SEASONAL RAMBOUILLET RAMS DURING APRIL, AUGUST AND NOVEMBER WHEN EXPOSED FOR TWO ESTROUS CYCLES AS LACTATING OR NON-LACTATING EWES

			ESTRUS EXPRESSION				CONCEPTION CYCLE			
LAMBING PERIOD	EWE STATUS	SIRE TYPE	NONE	1ST CYCLE	2ND CYCLE	BOTH CYCLES	FAILED	1ST CYCLE	2ND CYCLE	CONCEPTION PERCENTAGE
April	Dry	N	20	21	3	4	26	8	15	46.9
April	Dry	S	6	7	12	3	9	2	17	67.9
April	Wet	N	1	1	0	2	1	0	2	67.7
April	Wet	S	0	9	0	13	4	6	12	81.8
August	Dry	N	11	3	25	6	14	3	22	64.1
August	Dry	S	3	10	17	11	8	9	26	81.4
August	Wet	N	--	--	--	--	--	--	--	----
August	Wet	S	--	--	--	--	--	--	--	----
November	Dry	N	3	3	0	1	--	--	--	----
November	Dry	S	1	2	0	0	--	--	--	----
November	Wet	N	0	12	10	2	--	--	--	----
November	Wet	S	2	22	9	2	--	--	--	----

EWE REPRODUCTION AND OFFSPRING PERFORMANCE OF F1 BOOROOLA MERINO X RAMBOUILLET, F1 FINNISH LANDRACE X RAMBOUILLET AND RAMBOUILLET UNDER SEMI-RANGE AND SEMI-CONFINEMENT MANAGEMENT SYSTEMS

K.A. Ringwall, T.C. Faller, P.M. Berg and L.D. Young

INTRODUCTION

Both research findings and applied practices support the concept that maximizing cash inflow into a ewe flock is primarily achieved by producing as many lambs with acceptable growth rate as possible per ewe. The Finnish Landrace sheep has demonstrated the potential to increase ewe fertility and prolificacy. As the Finnish Landrace became more accepted, selection has been achieved to improve the growth rate of the current Finnish Landrace population and many sheep producers utilize the breed in their operations with good success. However, those sheep producers that wish to provide a fine wool product have not been able to utilize the Finnish Landrace because of the decreased wool quality. These producers utilize Rambouillet or Rambouillet type sheep and have had to rely on selection to increase the reproductive capacity of their flocks. Selection for increased reproduction has been a very slow process, and since the Rambouillet sheep does not provide much variation in reproductive capacity, improvement has been little to none over the years. A new development within the Amercian sheep industry has been the importation of the Booroola Merino. The Booroola Merino is a sheep that would not decrease wool quality and offers increased reproductive capacity. By incorporating the Booroola Merino into a fine wool producer's operation, the fine wool producer may have the same opportunity that has been available to the non fine wool producer for several years, that is the ability to increase lamb production without hindering wool income. The objective of this trial is to evaluate ewe production and offspring performance of specific crosses of Booroola Merino, Finnish Landrace, and Rambouillet breeds of sheep under different management systems so that a better understanding of the Booroola Merino sheep can be achieved and properly evaluated for use in North Dakota sheep flocks.

PROCEDURE

Reproductive performance, wool production, and longevity are being evaluated for F1 Booroola Merino x Rambouillet (BxR), F1 Finnish Landrace x Rambouillet (FxR) and Rambouillet (Rambouillet) ewes under confinement versus semi-range management. Crosses to obtain these ewes were made in 1984 and 1985 utilizing a group of Wyoming Rambouillet range ewes and Finnish Landrace or Booroola Merino rams leased from USDA-Roman L. Hruska U.S. Meat Animal Research Center, Clay Center, Nebraska. The Rambouillet control ewes were purchased from the same source as the ewes utilized in making the F1 crosses. In the falls of 1986 and 1987, a minimum of 36 BxR ewes, 36 FxR ewes, and 36 Rambouillet ewes were randomly selected from those lambs born during 1985 and 1986. These ewes were managed similarly until the fall of 1987 when the surviving ewes were assigned to confinement or semi-range management groups. The ewe were either 1 1/2 or 2 1/2 years of age at the start of the trial. Ewes and lambs are fed by current NRC requirements for sheep with the exception that no increase in nutrition is given at breeding.

Confinement lambs are raised under total confinement and go to the feedlot following weaning. Under the semi-range system, lambs are weighed the same time as the confinement group for weaning, but are returned to range for the rest of the summer with their dams. Both groups of ewes are combined from breeding to just prior to lambing and allowed to stubble graze until winter and then fed in confinement. Rambouillet rams have been used during the first 17 days of the breeding seasons starting in early November, Suffolk and Columbia rams are used the last 17 days of the breeding season.

RESULTS AND DISCUSSION

April reproductive performance and subsequent lamb growth is presented in Table 1. These data only include 1987's performance and are preliminary. Management system does not have any obvious effects on ewe size at the start of the trial, but confined ewes fed a maintenance ration with no flush lost weight prior to the 1988 breeding, while ewes that had access to fall grazing gained weight. Currently, FxR are the heaviest ewes and BxR are the lightest ewes within each system. FxR ewes are also the most fertile in both systems during November breeding, however, BxR ewes are the most prolific. Prolificacy is considerably greater for BxR ewes in both systems.

All breed types can not raise the lambs produced on an equal bases. The greatest losses are occurring within BxR ewes under semi-range conditions, however even under confinement, BxR ewes are experiencing lamb losses in excess of other breed combinations or types. Weaning weights are similar between breeds within the confinement system, but more differences seem to be developing between breeds under semi-range. As lambs approach 5 months of age, lambs from BxR ewes appear to be expressing an early maturing growth pattern.

Although conclusions cannot be made this early in the trial, speculation would indicate that BxR ewes have difficulty competing with larger framed FxR and Rambouillet ewes. Excessive prolificacy of BxR ewes increase the stress these ewes are under and the BxR ewes may require additional inputs and a non competitive environment to express there full potential. Currently, FxR ewes are producing more lambs that grow similar to Rambouillet lambs, therefore, suggesting increase lamb marketings. Rambouillet ewes indicate the least fertility and prolificacy, so even with similar lamb growth rate of FxR ewes, total lamb marketings are limited.

TABLE 1

APRIL REPRODUCTIVE PERFORMANCE AND SUBSEQUENT LAMB GROWTH OF BOOROOLA MERINO X RAMBOUILLET, FINNISH LANDRACE X RAMBOUILLET AND RAMBOUILLET X RAMBOUILLET EWES BORN DURING 1985 AND 1986 AND MAINTAINED UNDER SEMI-CONFINMENT OR SEMI-RANGE MANAGEMENT

	BOOROOLA MERINO		FINNISH LANDRACE		RAMBOUILLET	
	CONF.	RANGE	CONF.	RANGE	CONF.	RANGE
1987 PRE-BREEDING						
WEIGHT (LBS)	129	126	154	149	140	139
(EWE #)	(31)	(32)	(33)	(33)	(31)	(33)
NUMBER OF EWES EXPOSED	31	33	33	33	31	33
NUMBER OF EWES LAMBING	27	33	29	33	31	27
NUMBER OF LAMBS BORN PER EWE EXPOSED	2.29	2.76	2.00	2.36	1.58	1.27
NUMBER OF LAMBS BORN PER EWE LAMBED	2.63	2.76	2.27	2.36	1.58	1.56
AVERAGE LAMBING DATE	APR 13	APR 15	APR 14	APR 11	APR 17	APR 12
NUMBER OF LAMBS WEANED PER EWE LAMBED	1.36	1.20	1.68	1.67	1.15	1.28
AVERAGE 56 DAY WEIGHT (LBS)	41.3	35.4	39.1	42.0	42.2	39.7
(LAMB #)	(38)	(30)	(52)	(50)	(31)	(32)
NUMBER OF LAMBS FIVE MONTHS POST LAMBING PER EWE LAMBED	1.08	1.26	1.61	1.68	1.19	1.29
AVERAGE FIVE MONTH WEIGHT (LBS)	69.0	57.0	73.4	65.3	73.5	64.4
(LAMB #)	(23)	(29)	(39)	(43)	(22)	(31)
1988 PRE-FLUSHING WEIGHT (LBS)	135	133	164	157	158	157
(EWE #)	(28)	(28)	(31)	(31)	(31)	(28)
1988 PRE-BREEDING WEIGHT (LBS)	128	138	157	161	152	160
(EWE #)	(28)	(28)	(31)	(31)	(31)	(27)

EWE REPRODUCTION AND OFFSPRING PERFORMANCE OF 3/4 BOOROOLA MERINO X 1/4 RAMBOUILLET, 1/2 BOOROOLA MERINO X 1/2 RAMBOUILLET, 1/4 BOOROOLA MERINO X 3/4 RAMBOUILLET AND RAMBOUILLET EWES

K.A. Ringwall, T.C. Faller, P.M. Berg and L.D. Young

INTRODUCTION

Several questions have been raised in regards to the recent importation of the Booroola Merino. Booroola Merino sheep are noted for exceptional prolificacy and appear to produce a 60's to 62's fleece. However, Booroola sheep are small by american standards and ewes that weigh less than 100 pounds would not be uncommon. Because of the severe restrictions on size, the initial cross between Booroola Merino rams and another ewe breed may not overcome the size restriction. Fortunately, prolificacy of the Booroola Merino is thought to be transmitted through classical mendelian inheritance as a single gene. This is in contrast to Finnish Landrace sheep which transmit their prolificacy through additive gene action which results in dilution of the genes with each successive outcross. In the case of Booroola Merino sheep, if ewes or rams that carry the gene can be easily identified early in life, then producers can select for prolificacy independent of body size. Eventually an exceptable ewe should be achieved that carries the Booroola prolificacy gene. The purpose of this study is to evaluate the genetic mechanism which determines increased prolificacy of Booroola Merino ewes and develop breeding schemes to introduce Booroola fertility into North Dakota flocks.

PROCEDURE

A flock of F1 Booroola Merino X Rambouillet ewes were produced at the NDSU Research Extension Center - Hettinger during 1984 and 1985 utilizing a group of Wyoming Rambouillet range ewes and Booroola Merino rams leased from USDA-Roman L. Hruska U.S. Meat Animal Research Center, Clay Center, Nebraska. In 1986, F1 Booroola Merino X Rambouillet rams were mated to the same group of Wyoming ewes to produce the first set of 1/4 Booroola Merino X 3/4 Rambouillet ewes and the F1 Booroola Merino X Rambouillet ewes were mated to Rambouillet rams in 1988 to produce the second set of 1/4 Booroola Merino X 3/4 Rambouillet ewes. The 3/4 Booroola Merino X 1/4 Rambouillet ewes were produced by mating the F1 Booroola Merino X Rambouillet ewes to Booroola Merino rams leased from USDA-Roman L. Hruska U.S. Meat Animal Research Center, Clay Center, Nebraska. The Rambouillet ewes were produced from the Wyoming ewes bred to Rambouillet rams and are maintained as a line of straight bred Rambouillets.

Estrus is monitored as ewe lambs for two estrous cycles prior to December laparoscopic procedures when ovualtion rate is determined. Wethers which have been implanted with testosterone are equipped with Sire-Sine marking harnesses and mating activity is recorded at 17 day intervals. The implants were ten cm long and made from silicone tubing (6.4 mm internal diameter, 9.5 mm outside diameter) by sealing one end with silicone rubber adhesive, filling the tube with testosterone propionate and sealing the open end with adhesive. Four wethers are used and implanted at different times to assure continued coverage of estrus ewes. In an effort to monitor estrus activity, mating marks are

recorded as light if no more than 2 marks were evident on the ewes rump, medium if three or more marks were evident and heavy if individual marks could not be counted because of excessive mounting by the teaser wether.

The ewes are classified according to ovulation rate. Any Booroola type ewe that have ovulation rates of one or less at 10 months of age are culled from the flock. Starting in august of 1988, the 1/4 Booroola Merino X 3/4 Rambouillet ewes will be mated to Rambouillet or F1 Booroola Merino X Rambouillet rams and the 3/4 Booroola Merino X 1/4 Rambouillet ewes will be mated to F1 Booroola Merino X Rambouillet rams. Those daughters (7/8 Rambouillet, 5/8 Rambouillet or 3/8 Rambouillet) that have multiple ovulations at 10 months of age will be selected to remain in the flock. The Rambouillet flock will not be culled on ovulation rate. All ewes will be fed by current NRC requirements.

RESULTS AND DISCUSSION

Growth data is presented in Table 1 for Rambouillet, 1/4 Booroola, 1/2 Booroola and 3/4 Booroola ewes. All the growth traits are influenced to some extend by the percentage of Booroola Merino present within the ewe type. Birth weight, weaning weight, early and late fall weight and long yearling weight all tend to increase as the Rambouillet percentage increases. The opposite is true for ovulation rate at 10 months of age (Table 2). As the percentage of Rambouillet increases, ovulation rate decreases.

As mature ewes the growth differences observed as ewe lambs are still evident (Table 3). As the percentage of Rambouillet increases, the prebreeding weight of the ewe increases but the lambs born per ewe lambing and lambs weaned per ewe decrease. Table 4 presents the estrus and conception data. An interesting difference can be observed between the Booroola crossbred ewes and Rambouillet ewes. A greater percentage of Booroola crossbred ewes conceive to the first 17 days of ram exposure than do Rambouillet ewes and Booroola crossbred ewes have greater conception rates during august.

TABLE 1

ACTUAL BIRTH, WEANING, EARLY FALL, LATE FALL AND LONG YEARLING WEIGHT FOR RAMBOUILLET, 1/4 BOOROOLA MERINO X 3/4 RAMBOUILLET, 1/2 BOOROOLA MERINO X 1/2 RAMBOUILLET AND 3/4 BOOROOLA MERINO X 1/4 RAMBOUILLET EWE LAMBS

EWE TYPE	TOTAL EWES	BIRTH WEIGHT	WEANING WEIGHT	FALL WEIGHT EARLY	FALL WEIGHT LATE	LONG YEARLING WEIGHT
RAMBOUILLET	201	11.3	37	117	121	138
1/4 BOOROOLA	115	10.5	34	84	102	124
1/2 BOOROOLA	139	9.9	34	86	85	108
3/4 BOOROOLA	107	7.8	29	89	88	104

TABLE 2

REPRODUCTIVE PERFORMANCE FOR RAMBOUILLET, 1/4 BOOROOLA MERINO X 3/4 RAMBOUILLET, 1/2 BOOROOLA MERINO X 1/2 RAMBOUILLET AND 3/4 BOOROOLA MERINO X 1/4 RAMBOUILLET DURING AUGUST WHEN EXPOSED FOR TWO ESTROUS CYCLES

EWE TYPE	ESTRUS EXPRESSION				LAPAROSCOPIC OBSERVATIONS				
					NUMBER OF CORPORA LUTEA				
	NEVER	1ST CYCLE	2ND CYCLE	BOTH CYCLES	0	1	2	3+	AVERAGE CORPORA LUTEA/OVULATION
Rambouillet	12	2	85	51	39	120	34	0	1.23
1/4 Booroola	32	1	60	22	35	39	28	10	1.64
1/2 Booroola	--	--	--	--	28	34	50	12	1.80
3/4 Booroola	7	0	52	35	19	12	36	38	2.57

TABLE 3

REPRODUCTIVE PROLIFICACY AND PRE-BREEDING WEIGHTS FOR RAMBOUILLET, 1/4 BOOROOLA MERINO X 3/4 RAMBOUILLET, 1/2 BOOROOLA MERINO X 1/2 RAMBOUILLET AND 3/4 BOOROOLA MERINO X 1/4 RAMBOUILLET DURING AUGUST WHEN EXPOSED FOR TWO ESTROUS CYCLES

LAMBING PERIOD	EWE TYPE	PREBREEDING WEIGHT	LAMBS BORN/ EWE LAMBING	LAMBS WEANED/ EWE LAMBING
August	Rambouillet	154 (87)	1.59 (32)	1.38 (26)
August	1/4 Booroola	143 (35)	2.70 (20)	---- (0)
August	1/2 Booroola	132 (114)	2.62 (82)	1.68 (66)
August	3/4 Booroola	122 (24)	2.28 (18)	---- (0)

TABLE 4

ESTRUS EXPRESSION, CONCEPTION CYCLE AND CONCEPTION RATE FOR RAMBOUILLET, 1/4 BOOROOLA MERINO X 3/4 RAMBOUILLET, 1/2 BOOROOLA MERINO X 1/2 RAMBOUILLET AND 3/4 BOOROOLA MERINO X 1/4 RAMBOUILLET DURING AUGUST WHEN EXPOSED FOR TWO ESTROUS CYCLES

		ESTRUS EXPRESSION				CONCEPTION CYCLE			
LAMBING PERIOD	EWE TYPE	NONE	1ST CYCLE	2ND CYCLE	BOTH CYCLES	FAILED	1ST CYCLE	2ND CYCLE	CONCEPTION PERCENTAGE
August	Rambouillet	14	13	42	17	22	12	48	73.2
August	1/4 Booroola	1	20	9	6	0	21	14	100.0
August	1/2 Booroola	5	41	29	10	8	65	40	92.9
August	3/4 Booroola	1	13	6	5	2	16	7	92.0

PURCHASING AND BREEDING EWE LAMBS
PROJECT ND6261
(1989 PROGRESS REPORT)
T.C. FALLER, K.A. RINGWALL

The most important factor to a profitable sheep enterprise is more income than expense. Many factors influence the long term profit potential for a sheep enterprise. Of these, percent lamb crop marketed on an annual basis is of primary importance. Other factors that have great importance are: market values, management expertise, initial purchase price, interest rates. In view of the high prices of older breeding ewes many producers have considered quality ewe lambs for replacement stock or as a base flock for establishing a new enterprise. The most predominant ewe lamb available is the western white face with a high level of Rambouillet ancestry.

PROCEDURE

The Hettinger Research Extension Center initiated a three year project to study the value of ewe lambs purchased as breeding stock. Two hundred ewe lambs of predominant Rambouillet ancestry will be purchased in the fall of years 1987-1989. Each year the ewe lambs will be subjected to either of two nutritional regimes. The (high level HL) ration will be based on 60% grain and 40% alfalfa. The (low level LL) ration will be grazing crop aftermath with 1# grain as a supplement daily. When grazing is not available 4# of alfalfa will be added to the grain supplement. Lambs were weighed initially and allotted randomly to (HL) or (LL) rations based on a 10# weight break. The (HL) and (LL) rations will be fed from purchase through the end of breeding. After completion of breeding the ewe lambs will be submitted to similar diets for the duration of the trial. The ewe lambs will be exposed to fertile Columbia ram lambs for a 30 day period, December 15 through January 15 each year. Data will be collected on livability, weight gain, breeding performance, market value of wool and lamb produced and subsequent year's performance of the 600 ewe lambs involved. Due to drought conditions in 1988, no lambs were purchased for 1988 breeding delaying termination of this project until 1991.

RESULTS

The major objective of this investigation was to evaluate performance of western ewe lambs as breeding stock and to assist producers in establishing a reasonable value for purchase of breeding ewe lambs. A second objective was to evaluate the effect of the (HL) and (LL) nutritional regimes on ewe lamb performance and ewe performance in subsequent years. Two hundred ewe lambs were purchased October 12, 1987 at an average weight of 85#. They were weighed, tagged (initial weight) and allotted October 26, 1987. A breeding weight was taken December 2, 1987 and a post breeding weight was taken January 15, 1988. Table 1 represents weights of the ewe lambs at various weigh periods. Four lambs were removed from the data for various reasons: one died, two lost their identification and one was a castrated male instead of a female.

TABLE 1

GROWTH PERFORMANCE OF FALL-BRED RAMBOUILLET EWE LAMBS

WEIGHT RANGE	INITIAL NO. (LL)	INITIAL NO. (HL)	INITIAL WT. 10-26-87 (LL)	INITIAL WT. 10-26-87 (HL)	BREEDING WT. 12-2-87 (LL)	BREEDING WT. 12-2-87 (HL)	POST BREEDING WT. 1-15-87 (LL)	POST BREEDING WT. 1-15-87 (HL)
60-70#	3	2	65.0	68.0	76.0	80.0	84.3	83.0
70-80#	18	17	75.8	75.8	95.3	90.1	95.7	103.9
80-90#	28	27	83.7	84.5	100.0	100.3	102.4	117.48
90-100#	28	27	94.4	94.0	111.6	109.0	112.5	127.2
100-110#	15	16	103.3	103.9	121.3	118.1	120.6	139.31
110-120#	5	5	113.0	111.4	127.0	123.0	126.8	144.6
120-130#	2	3	122.0	123.0	140.0	140.0	139.5	155.7
TOTAL	99	97	-	-	-	-	-	-
AVERAGE	-	-	90.9	91.1	108.2	105.8	109.3	123.3

Lambs grew at similar rates in the (LL) group while an abundance of crop aftermath was available as compared to the confined (HL) group. When the (LL) group was subjected to a limited diet the (HL) group excelled as would be expected. Total feed costs for the (LL) group were $7.70 for the 82 day feeding period involved, for the (HL) group feed costs were $17.14. Data collected in 1988 relative to reproductive performance of the two groups will indicate if the additional feed investment will be repaid. After breeding both groups will be grown on a similar diet based on 20% grain and 80% roughage fed at 5# per head daily.

TABLE 2

LAMBING PERFORMANCE OF RAMBOUILLET EWE LAMBS FED ON HIGH LEVEL (HL) AND LOW LEVEL (LL) FEEDING REGIMES PRIOR TO BREEDING

WEIGHT @ PURCHASE	(LL) NO. EXPOSED	(LL) NO. BRED	(HL) NO. EXPOSED	(HL) NO. BRED	TOTAL BRED
60-70	3	1	3	0	1/6
70-80	18	5	18	6	11/36
80-90	28	4	27	13	17/55
90-100	28	15	28	15	30/56
100-110	15	5	16	8	13/31
110-120	5	3	5	2	5/10
120-130	2	2	3	3	5/5
TOTALS	99	35	99	47	82/198

TABLE 3

PERCENT BRED OF RAMBOUILLET EWE LAMBS MATED ON (HL) AND (LL) FEEDING REGIMES

WEIGHT RANGE	FEEDING REGIME (LL)	(HL)	AVERAGE OF WEIGHT
60-70	33	0	17
70-80	28	33	31
80-90	14	48	31
90-100	54	54	54
100-110	33	50	42
110-120	60	40	50
120-130	100	100	100
MEAN PERFORMANCE	35	47	42

Tables 2 and 3 indicate that as lambs became heavier at purchase time breeding performance improved. Lambs bred in the feedlot (HL) performed at a higher level than those mated under a (LL) pasture feeding regime. A 90-100 pound weight minimum at purchase would appear to be critical for Rambouillet type ewe lambs purchased at an average 225 days of age with the intent of being bred at 265 days of age and subsequently lambed at 425 days of age.

TABLE 4

COMPARATIVE ANNUAL PRODUCTION OF RAMBOUILLET TYPE EWE LAMBS FED (HL) AND (LL) FEEDING REGIMES PRIOR TO MATING

	FEEDING REGIME (LL)	(HL)
Percent Conceiving	35.4	47.4
Percent Born Per Ewe Lambing	103.0	109.0
Percent Weaned Per Ewe Lambing	81.1	93.9
Average Birth Weight (Lbs.)	12.6	12.1
Wool Production (Lbs.)	8.24	8.92
Weaning Weight (Lbs.)	51.8	52.4

SUMMARY

Early indications would point favorably to exposing Rambouillet type ewe lambs under feedlot conditions (HL) as opposed to mating on fall grazing with a grain supplement (LL). This project is not complete and it is intended to accumulate three years data prior to complete statistical analysis, hence it is offered as a progress report only. The next intended repetition of this project will be the fall of 1989 if climatic conditions return to normal.

SECTION II

MANAGEMENT SECTION

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SUPERINTENDENT
HETTINGER RESEARCH & EXTENSION CENTER

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HETTINGER RESEARCH & EXTENSION CENTER

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NORTH DAKOTA STATE UNIVERSITY

30TH ANNUAL SHEEP DAY

HETTINGER RESEARCH & EXTENSION CENTER
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STATUS OF THE NORTH DAKOTA SHEEP DEVELOPMENT PROJECT

We are off to a good start in 1988. As of December 31, 1988 there are 40 people participating in the three groups that are located in Belfield, Bowman, and Mott. The groups include a wide diversity of sheep operations ranging from total drylot confinement to traditional range operations. Flock size varies from 20 to 850 head, with 113 the average. More than 1500 ewes have been purchased this fall and in January and February several hundred more will be added to new and existing flocks.

The program is presently covering an area from south of Marmarth to north of Beach then east to Killdeer and south to the South Dakota border.

Participants include both new producers and existing producers who wish to expand. Many participants are father-son or husband-wife teams.

There are several interesting programs lined up for the first half of 1989. In January we will see a demonstration on shearing and wool quality. February is the annual Sheep Day. In March we will discuss health care for baby lambs. Paul Bultsma will speak on forages for sheep in April and in May, Roger Haugen will present a program on production records.

If you would like more information about this program please contact Dan Nudell at the Hettinger Research and Extension Center at 701-567-4323.

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.

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.

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.

ORPHAN LAMBS - MANAGEMENT IDEAS

1. To buy a good milk replacer it should be 30% fat and at least 24% protein. Good replacers are available from:
   a. Land O'Lakes
   b. G T A

   It will cost approximately $1.00 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. They sell a self priming nipple and tube assembly that we have found to be excellent for starting orphans. Many types of feeding systems can be home made.

3. Start on nurser quickly. Young lambs start easier. Check ewes udder right after she lambs and make the 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 cc of 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 antibody globulins to protect against disease organisms. Cow colostrum milk can be substituted for ewe colostrum milk. It can be kept frozen in 1-4 oz. containers, 2 ounces are ideal.

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

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.

SHEEP BARNS AND EQUIPMENT 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.)

CORRALS AND BARNS

Plan No.	Plan Title	Sheets
MW 72050	Pole Utility Buildings	$ 2.00
MW 72505	Slatted Floor, 40'x 72', Feeder Lamb Barn	3.00
MW 72506	240 Ewe and Lambing Barn, 40' x 104'	3.00
MW 72507	500 Ewe and Lamb Feeding Barn, 74' x 256'	3.00
MW 72508	12' x 16' Portable Lamb Feeding Shed	2.00
MW 72509	40 Ewe and Lambing Barn, 24' x 32'	2.00
ND Plan	Confinement Sheep Barn & Hay Storage (at Hettinger)	1.00
Reprint #759	Practical Sheep Housing for North Dakota	No Charge
USDA 6096	Shearing Shed & Corral Arrangement	1
USDA 6236	Portable Handling Corral for Sheep (Metal Wood)	1
AE-683	Sheep Barn Layout	No Charge
AED-13	Insulation and Heat Loss	No Charge
AED-19	Slip Resistant Concrete Floors	No Charge
AED-25	Earth Tube Heat Exchange System Planning	No Charge
MWPS-3	Sheep Housing and Equipment Handbook (This 116 page booklet was revised in 1982. It includes barn and layout planning plus plans for fences and sheep equipment.)	$ 6.00
MWPS-9	Designs for Glued Trusses	$ 5.00

FEED HANDLING & FEEDERS

USDA 5917	Fencing, Feeding, and Creep Panels	1
Reprint #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	$ 3.00
MW 73111	36 ft. Wide Clearspan Pole Frame Hay Shed	3.00
MW 73112	48 ft. Wide Clearspan Pole Frame Hay Shed	3.00
MW 73113	32 ft. & 48 ft. Wide Pole Frame Hay Shed (Interior Poles)	3.00
MW 73210	Moveable Grain Storage Walls, 6' to 12' High	2.00
MW 73217	20, 45, 170, and 340 Bu. Hoppered Grain Bins	3.00
MW 73220	48 ft. Wide Pole Frame Grain Storage	2.00
MW 73250	Grain Storage Buildings, 600, 1000, 1200, 1500, or 2000 Bu.	3.00
MW 73293	Grain-Feed Handling Center, Work Tower Across Drive	4.00
MW 73294	Grain-Feed Handling Center, Work Tower Beside Drive	4.00
APA	10 Ton Hoppered Feed Bin	No Charge
APA	4 Compartment Bin for Feed Mill	No Charge
AED-15	Horizontal Bunker Silos, Concrete Tilt-up	No Charge
USDA 6090	5500 Bushel Wooden Grain Bin	2
MWPS-13	Planning Grain-Feed Handling Handbook	$ 5.00