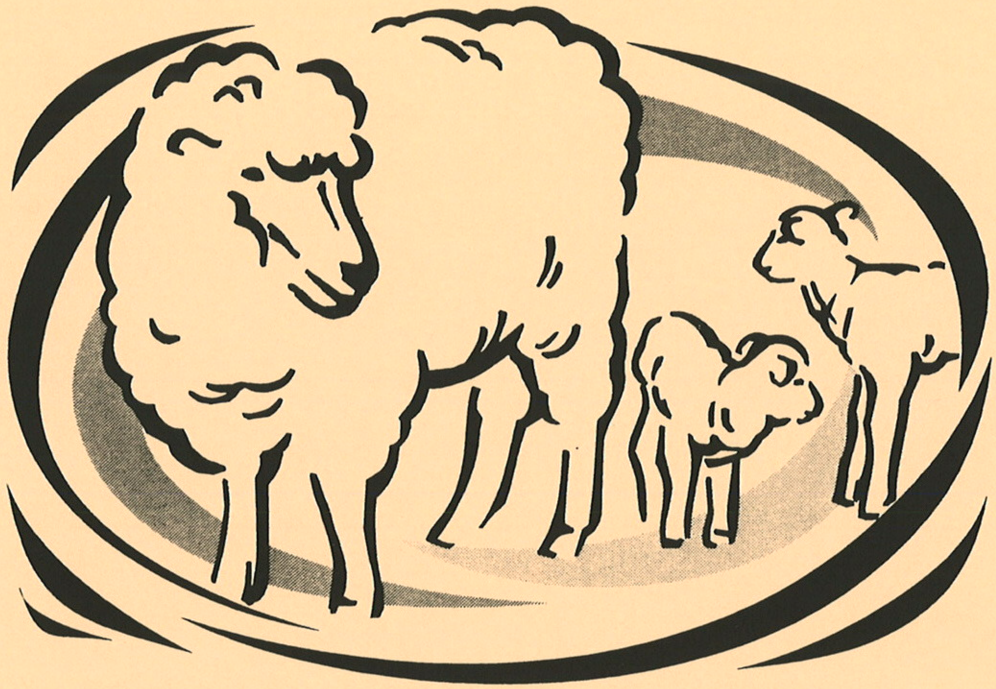
REPORT NO. 37



WESTERN DAKOTA SHEEP DAY

February 14, 1996

HETTINGER ARMORY

Hettinger Research Extension Center
and
Department of Animal and Range Sciences
North Dakota State University

February 14, 1996

Dear Sheep Producer:

On behalf of the Hettinger Research Extension Center and the Department of Animal and Range Sciences, let us welcome you to "Sheep Day". This report collectively represents North Dakota State University's efforts at both locations to provide information for the support of the sheep industry. We welcome your comments as grassroots users of the efforts of both Extension and Experiment Station resources. Your constructive comments assist us to participate meaningfully in the future of your industry.

A collective, positive and participatory attitude by producers and caretakers of their land grant resources will go far to solve problems confronting the sheep industry.

Best wishes for a day of sharing and learning.

Timothy C. Faller
Director
Hettinger Res. Ext. Ctr.
NDSU, Hettinger, ND
(701) 567-4323

Jerrold Dodd
Chair
Dept. of Animal & Range Sci.
NDSU, Fargo, ND
(701) 231-7641

PROGRAM

9:45 AM (MST)	Sheep Equipment Display and Coffee at the Hettinger Armory
10:10 AM	Early Bird Door Prize Drawing
10:15 AM	HETTINGER & FARGO STATION REPORTS Dr. Kris Ringwall Dr. Paul Berg Mr. Roger Haugen Dr. Woodrow Poland Mr. Timothy Faller
12:00 NOON	LUNCH: AMERICAN LAMB DINNER
1:00 PM	WELCOME Dr. Robert Todd Director, North Dakota Ag. Experiment Station North Dakota State University
1:15 PM	"Q-FEVER - THE HUMAN IMPLICATIONS" Ramona Eisenbarth, RN, Ag. Health Nurse Custer District Health Unit New Leipzig, North Dakota
1:45 PM	"A NEW PACKING PLANT FOR THE SHEEP INDUSTRY" Phil Huber, President Timberline Feedlot and Timberline Meats Worland, Wyoming
2:30 PM	"SHEEP PRODUCTION IN KAZAKHSTAN" Tim Faller, Director Hettinger Research Extension Center Hettinger, North Dakota
3:15 PM	"CLOSING REMARKS" Wyman Sheetz, Vice President North Dakota Lamb & Wool Producers Assoc. Hensler, North Dakota

*There will be a spouse program in the afternoon beginning at 1:15 PM. Presentations at this program will focus on "COOKING WITH LAMB" and "TAKING WOOL FROM SHEEP TO SHAWL".

SHEEP DAY DIGEST

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

SECTION I
REPORTS OF RESEARCH IN PROGRESS AT THE HETTINGER RESEARCH AND EXTENSION CENTER AND MAIN STATION

MR. ROGER HAUGEN
EXTENSION LIVESTOCK SPECIALIST
NORTH DAKOTA STATE UNIVERSITY

DR. PAUL BERG
DEPT. OF ANIMAL & RANGE SCIENCES
NORTH DAKOTA STATE UNIVERSITY

TIMOTHY C. FALLER
DIRECTOR
HETTINGER RESEARCH EXTENSION CENTER

DR. KRIS RINGWALL
EXTENSION LIVESTOCK SPECIALIST
NORTH DAKOTA STATE UNIVERSITY

DR. WOODROW POLAND
LIVESTOCK SPECIALIST
DICKINSON RESEARCH EXTENSION CENTER

AT THE
37TH ANNUAL SHEEP DAY

HETTINGER RESEARCH EXTENSION CENTER
HETTINGER, NORTH DAKOTA

FEBRUARY 14, 1996

REPRODUCTIVE CHARACTERISTICS OF MATURE AND YEARLING RAMBOUILLET EWES WHEN EXPOSED DURING APRIL AND JULY TO PRODUCE SEPTEMBER AND JANUARY LAMBS 1996 UPDATE

K.A. Ringwall, K.J. Helmuth, and T.C. Faller

INTRODUCTION

Seasonal infertility continues to be a biological puzzle. Previous studies have helped to isolate some of the components of seasonal infertility, but sheep as a whole continue to be very seasonal in their reproduction. The interactions of management with various types of sheep make predictable solutions difficult. Hopefully a long term genetic solution would be found that would aid sheep producers in obtaining a predictable lamb crop at different times of the year. The purpose of this project is to provide additional information regarding the potential of maintaining a closed fall lambing system with a December/January cleanup lambing through the selection of fall born ewes and rams.

PROCEDURE

Starting in 1986, Rambouillet ewes were randomly mated to Rambouillet rams and evaluated in a lambing system that expected the ewes to lamb three times in a two year period. Starting the spring of 1992 the flock was closed and these ewes are being evaluated in an April breeding season, with only a July clean up. Ewes were group mated to fall born Rambouillet rams during April (April 1 plus 36 days) and re-exposed in July (July 15 plus 36 days) to Suffolk/Columbia rams for a cleanup breeding season. Ewes and rams were mixed several times on the first day of breeding to assure good ram exposure. A random set of November bred ewes will be maintained as a control for future comparison.

The top 80% of the fall born ewe lambs and top 10% of the fall born ram lambs for growth (weaning weight and structural correctness) will be available as replacements. Mature ewes will be classified as either only lambing in the fall, lambing both fall and winter, lambing only in the winter, or failing to lamb as a three year old or older ewe. Ewes that failed to lamb as a three year old or older ewe, or were found to be unsound were culled from the trial.

RESULTS AND DISCUSSION

The influence of fall born ewe lambs is not known yet, early observations (table 1) would suggest that a fall lambing system with a January clean-up lambing will work in North Dakota. Currently, 93% of the mature ewes involved within the system are lambing on an annual basis. Approximately, two-thirds of the flock are lambing in the fall (table 1).

A continual concern is reduced body condition of the ewes following winter feeding or lactation. However, table 2 indicates that fall lambing tends to improve with age. Yearling ewes do not breed well in April (table 2) and ewes that are at or close to a condition score two also do not seem to breed well. The fall ewe lambs are first exposed at 10 months of age in July and the majority are lambing in December/January (table 3).

Table 3 indicates that the flock is improving in the ability to fall lamb. The flock started in 1992 with only one-third of the ewes lambing in the fall, and has increased to over 85% of the ewes lambing in the fall of 1995. This trial will be continued to obtain production information on at least three more generations of fall born ewes. After three generations, ewes will be co-mingled with the control ewes and all ewes will be evaluated in different lambing systems.

Table 1

ESTIMATED FLOCK PERFORMANCE FOR MATURE RAMBOUILLET EWES WHEN EXPOSED FOR SEPTEMBER LAMBING FOLLOWED WITH A CLEAN UP EXPOSURE IN JULY

	April Exposure	July Exposure	Percentage Failing To Breed
Pregnancy Percentage[a]	62.1	30.8	7.1
Lambing Percentage[b]	1.35	1.54	-.-

[a] Diagnosed pregnant by means of ultrasound evaluations.
[b] Lambing percentage equals the number of lambs born divided by the number of ewes lambing.

Table 2

REPRODUCTIVE PROLIFICACY AND PRE-BREEDING WEIGHTS AND CONDITION SCORES FOR RAMBOUILLET EWES DURING APRIL AND JULY WHEN EXPOSED AT MATURE, OR YEARLING AGES FOR THREE ESTROUS CYCLES AS LACTATING OR NON-LACTATING EWES[a] FOR 1992, 1993, 1994, AND 1995

BREEDING PERIOD	AGE	LACTATING COND	NUMBER EXPOSED	PRE-BREEDING WEIGHT	PRE-BREEDING COND[b]	PERCENT DIAGNOSED PREGNANT	LAMBING PERCENT
APRIL	1	DRY	304	112	2.8	15	1.20
	2	WET	257	121	2.5	59	1.13
		DRY	187	130	2.6	59	1.28
	3	WET	134	138	2.8	71	1.26
		DRY	222	141	2.8	84	1.39
	4	WET	75	141	2.7	72	1.38
		DRY	189	148	2.8	83	1.49
	5	WET	33	148	2.8	73	1.54
		DRY	111	150	2.8	90	1.37
	6	WET	7	158	2.7	100	1.40
		DRY	22	147	2.5	77	1.41
JULY	1	DRY	261	---	-.-	73	1.44
	2	DRY	190	---	-.-	82	1.52
	3	DRY	86	---	-.-	86	1.69
	4	DRY	61	---	-.-	84	1.69
	5	DRY	24	---	-.-	71	1.64
	6	DRY	2	---	-.-	100	2.00

[a] Lambing information from July 1995 breeding is not included.

[b] Ewe body condition score scale: 1=extremely thin, 2=thin, 3=moderate, 4=fat, 5=extremely fat.

Table 3

YEARLY REPRODUCTIVE PROLIFICACY AND PRE-BREEDING WEIGHTS AND CONDITION SCORES FOR RAMBOUILLET EWES DURING APRIL AND JULY WHEN EXPOSED AT MATURE, OR YEARLING AGES FOR THREE ESTROUS CYCLES[a] AS LACTATING OR NON-LACTATING EWES

TRIAL YEAR	BREEDING PERIOD	LACTATING CONDITION	NUMBER EXPOSED	PRE-BREEDING WEIGHT	PRE-BREEDING COND[b]	PERCENT DIAGNOSED PREGNANT	LAMBING PERCENT
1992							
MATURE							
	APRIL	WET	98	120	2.1	35	1.30
		DRY	93	125	2.4	38	1.52
	JULY	DRY	215	---	-.-	87	1.54
YEARLING							
	APRIL	DRY	140	97	2.3	9	1.00
	JULY	DRY	37	--	-.-	84	1.38
1993							
MATURE							
	APRIL	WET	164	129	2.9	59	1.20
		DRY	104	140	2.8	76	1.39
	JULY	DRY	211	---	-.-	76	1.54
YEARLING							
	APRIL	DRY	164	124	3.2	20	1.28
	JULY	DRY	36	---	-.-	28	1.11
1994							
MATURE							
	APRIL	WET	147	133	2.8	82	1.20
		DRY	228	140	3.1	84	1.29
	JULY	DRY	71	---	-.-	83	1.63
1995							
MATURE							
	APRIL	WET	97	141	2.6	84	1.33
		DRY	307	148	2.6	87	1.50
	JULY	DRY	54	---	-.-	78	N/A[c]

[a] All ewe were exposed March 20, 1992; July 17, 1992; March 25, 1993; July 14, 1993; April 14, 1994; July 19, 1994; April 11, 1995; and August 4, 1995.

[b] Ewe body condition score scale: 1=extremely thin, 2=thin, 3=moderate, 4=fat, 5=extremely fat.

[c] Lambing information from July 1995 breeding is not included.

Lean Lamb Production
1995 Update

P.T. Berg, T.C. Faller, W.R. Limesand, N.M. Maddux, B.L. Moore

Introduction

Since 1993, NDSU has been collecting identification factors that will aid sheep producers in producing lean and rapidly growing lambs. These factors are found in two separate objectives that are based on lamb sets with known sires in the Columbia, Hampshire and Suffolk breeds. Analysis are done prior to slaughter and during fabrication into wholesale cuts at the NDSU Meats Laboratory. Analysis of Preliminary data is still in progress for both of the objectives. The ultimate goal is to use these objective conclusions to establish a standard, effective EPD equation that can easily be applied by any sheep producer.

Part of this project is an evaluation of an electronic instrument which has the potential of predicting fat free mass in the live animal and its carcass. This instrument is a Bioelectric Impedance Analyzer (BIA). In theory, lean tissue conducts an electrical current differently than does fat. The BIA machine measures the amount of low energy current which is absorbed and dispersed in the body and a mathematical formula can then be developed which will predict fat free mass. This instrument has been used in carcass analysis under the first objective and both live and carcass analysis in objective two.

Objective 1 searches for actual formulas to predict lean tissue composition using lamb slaughter cutout data. All carcasses were fabricated into wholesale cuts, denuded of subcutaneous fat so that the muscle is exposed on 85% of the surface. The measurements and weights recorded during breakdown could be used as a predictor of Trimmed Retail Product (TRP). Based on this analysis, the most efficient TRP predictor should be that which balances accuracy and efficiency. The best TRP predictor should be compatible with packing plant procedures and easily incorporated into a processing line.

As of December thirty-first, 217 lambs have been cutout. Table 1 shows averages and data summaries for various measurements. Several individual measures and combinations of measurements were evaluated as predictors of TRP both as pounds and as percent of carcass weight. Wholesale cut weights are good for predictors of actual pounds of TRP, but have little value in predicting percent TRP. Individual cut weights are almost never available under practical conditions. Therefore, two formulas using BIA and one using only anatomical measures have been developed. These formulas give excellent accuracy, are quick and do not reduce carcass value. Time and space constraints limit the number of carcasses which can be trimmed of fat. The very high correlation between actual cutout and anatomically predicted retail product (R^2 = .94) suggests for most lamb carcasses prediction of retail product by the use of anatomical measures is satisfactory. Trimmed retail product may be predicted for carcass data using the following formula:

TRP # = 4.8 + (.58 * cold carc wt) + (1.39 * ribeye area) - (7.36 * adj fat) - (5.87 * body wall thick)

Table 1. Slaughter Cutout Data

Trait	Average	Trait	Average
Live Wt	134 lbs	Conformation Score	10.79
Cold Carc Wt	69 lbs	Lean Color Score	3.2
Ribeye Area	2.37	Trim Retail Product*	42.67# 62.11% Cold Carc
Adj Fat	0.19"	BIA Pred Lean Avg	42.64# 62.13% Cold Carc
Body Wall Thickness	0.92"	Anatomically Pred TRP	41.19# 59.7% Cold Carc
Kidney Fat	1.9 lbs	Volume (L*/(Rs+Xs)) TRP	42.78# 62.73% Cold Carc
USDA Yield Grade	2.28	Retail Product as % Live Wt	31.95%
Marbling	3.95	Sum Value IMPS	$117.92
Streaking	3.90	Sum Value TRP	$153.09
Leg Score	10.94	Marbling Streaking Code =	Traces = 200 Slight = 300 Small = 400

* Dependant Variable

Table 2. Wholesale Cutout Data

Cut	# Untrim	% of Carc Wt	Trim Cut Wt	Trim Wt as % of Untrim
Shoulder	14.92	21.75	13.61	91.24
Rack	6.67	9.71	5.48	82.41
Loin	6.13	8.93	4.92	80.74
Leg	21.52	31.44	18.67	87.00
Breast, Flank, Plate	16.26	23.65	----	----

One BIA formula uses an anatomical reference point for electrode positions similar to those used for electrode placement on the live animal. This formula is as follows:

BIA Lean C = 6.7178 + (.4818 * Cold CWT) - (.0314 * Rs) - (.0481 * Xc) + (.254 * LN) + (.0223 * Temp)

This formula has an R-squared of .91 or functions with 91% accuracy. The other BIA formula is designed for robotic use and is not presented here.

Objective 2 addresses genetic and environmental aspect of lean tissue accretion. We are only beginning to accumulate data which address this objective. Preliminary data, with very few numbers in each sire group, indicate there is tremendous differences among sires. Our data shows an average retail value per day age of $.70. Retail value was calculated by the following formula:

$ = (trim shoulder wt * $2.30) + (trim rack * $4.32) + (trim loin * $6.39) + (trim leg * $3.49 * .9) + (breast, flank, etc * $.85 * .5)

$ prices are from retail stores in the Fargo-Moorhead area.
Leg price is "boneless", wt is "bone in" hence the multiplier of .9 to get boneless wt.
Breast, shank, plate and flank yield approximately .5 of the wt as boneless stew/ground meat.

Maximum retail value per day of age among the current data set was $.92 while minimum value was $.32. Sire group averages ranged from $.81 to $.48. Sire group summary is only within the Columbia breed at this time and is based on relatively few observations. Within flock EPD's for retail value per day of age based on progeny average will be developed as observations within the various sire groups reach significant levels.

During 1995, 106 lambs with known sires were evaluated by BIA immediately prior to slaughter. After a 24h chill, the carcasses were also evaluated by BIA using anatomical references for electrode placement similar to those used on the live animal. Complete data sets were obtained on 74 of these lambs. ID tag loss was the single most prevalent reason for failure to compile a complete data set. The data summary is presented in Table 3. In addition, 92 lambs were slaughtered at J. Morrell on January 4, 1996. BIA evaluation was performed on the lambs at Hettinger on January 3, 1996. Full data sets were obtained on 71 of these lambs.

Table 3. Anatomically Predicted TRP Lamb Summary

Trait	Average	
Live Wt	127.7#	
Cold Carc Wt	67.9#	
Live Rs	31.0	
Live Xc	3.1	
Live Length	46.4"	
Cold Carc Rs	201.7	
Cold Carc Xc	62.7	
Cold Carc Length	43.5	
Ribeye Area	2.24"^{2}	
Adj Back Fat	.19"	
Body Wall Thickness	.81"	
Anatom Pred Lean	41.57#	60.6% of Carc
BIA Pred Lean Carc	42.36#	61.7% of Carc
BIA Pred Lean Live	41.57#	61.2% of Live
		32.6% of Live

Table 4. January 4, 1996 Slaughter Lambs

Trait	Average	
Live Wt (Hettinger)	129.8#	
Cold Carc Wt	64.4#	
Live Rs	29.3	
Live Xc	-4.6	
Live Length	41.5	
Ribeye Area	2.54"^{2}	
Adj Back Fat	.21"	
Body Wall Thickness	.96"	
Anatom Pred Lean	38.5#	59.7% of Carc
BIA Pred Live	38.5#	59.7% of Carc
		29.6% of Live

The lambs slaughtered at the NDSU Meat Lab had slightly lower live weight than the lambs processed at Morrell's, however, the carcass weight of the Fargo lambs were 2.5# heavier. The live weight basis for the Morrell group was a weight taken at Hettinger prior to shipping to Sioux Falls and no adjustment for shrink was used. This also most likely accounts for the lower prediction values for the Morrell lambs as compared to the Meat Lab group.

For both groups which were evaluated by BIA alive, the prediction of TRP was quite accurate. The Morrell slaughter group had an R^2 value between the anatomically predicted pounds of Trimmed Retail Product (the dependant variable) and the BIA live prediction (independent variable) of 0.54. The lambs slaughtered at the NDSU Meat Lab had an R^2 of 0.84. The R^2 value represents the proportion of the variation in the dependant variable which is explained by the independent variable(s). If the variability among individual animals subjected to a 400 mile trip is considered, the explanation of over 50% of the variation in cutability by BIA can be considered very good. An R^2 of .84 for the lab lambs is highly acceptable and indicates BIA can be used to aid in selection of breeding stock which have a higher proportion of live weight represented as trimmed retail product.

Prospective

The Columbia selection portion of the Lean Lamb study is in its second year. Assignment of ewes to treatment groups (high lean (HL), low lean (LL) and control (CT)) was done in 1994. Ram lamb selection based on BIA was done at that time. Generation interval reduction trough mating of the ewes to the selected ram lambs was not successful. Ewes lambing to the ram lambs were very few so the first lambs of the selection study are expected in the spring 1996 lambing. Replacement ewe and ram lamb selection from the 1995 lamb crop based on BIA trimmed retail product index and Columbia breed standards has been completed. All lambs were weighed and subjected to BIA analysis at six months of age. The TRP index based on live BIA readings were used to rank the lambs. Only Columbia type score 1 and 2 were considered for replacement. The top indexing lambs from the HL and the low indexing lambs from the LL were selected as replacements.

Analysis on the BIA formulas in conjunction with the anatomical measures are in progress. At this point, numbers are few but data is being gathered. This future analysis will focus on breed and sire component comparisons. Breeding values will become possible for selected progeny groups. The ultimate outcome would then be to establish accurate, efficient and easily implemented EPD's for the sheep industry. Production within the sharp industry. Efforts on value based marketing are accelerating and our data clearly shows a need for sire evaluations if producers are to receive any benefit from increase in efficiency through improvement in lean growth.

THE EFFECTS OF VOMITOXIN (DON) FROM SCAB INFESTED BARLEY ON REPRODUCTIVE PERFORMANCE WHEN FED TO EWE LAMBS

R.G. Haugen, T.C. Faller, E.W. Boland,
H.H. Casper, and D.V. Dhuyvetter

INTRODUCTION

Vomitoxin (DON, deoxynivalenol) is a mycotoxin produced by fungi in scab infected grain. Under certain growing conditions (moisture and temperature), grain contamination occurs in the northern great plains region. Vomitoxin contaminated grain has been found to be unsuitable for human consumption and other nonruminant species such as swine. Many producers are looking for recommendations when using the contaminated grain for feeding livestock.

Research on the tolerable levels that sheep can consume of vomitoxin grain while not effecting performance is limited. This is especially true when investigating reproductive performance. The objective of this study was to investigate the effect of high levels of vomitoxin (greater than 20 ppm of the total ration) fed to ewe lambs during the flushing, breeding and gestation periods.

PROCEDURE

One hundred twenty speckle-faced ewe lambs born in April and May, 1994, were divided into 8 pens (15 ewes/pen) on November 9, 1994, ten days before breeding (flushing period). Four pens served as controls and four pens received contaminated barley. Ewe lambs were self-fed diets with an expected feed consumption of 3.5 pounds per head per day on an as fed basis.

Feeds were tested for moisture, protein, and vomitoxin levels. Rations were balanced to an equal protein and calculated energy content. On an as-fed basis, both diets were approximately 15% protein with TDN values of 65%.

Treated pens received barley that tested greater than 47 ppm vomitoxin (eight samples were collected with a range of 36.2 ppm to 74.8 ppm). The control pens received barley that tested less than 0.2 ppm. Hay used in the diets also tested less than 0.2 ppm vomitoxin. The expected level in the total ration of the treated pens after mixing was 25 ppm vomitoxin. Samples were collected from each pen every time the feeders were filled and tested for vomitoxin at the Veterinary Diagnostic Laboratory at NDSU.

Two rams were put into each pen on November 19, 1994, following the flushing period. Rams were removed on December 20, 1994.

One hundred thirteen ewe lambs were pregnancy tested using real time ultrasound on January 20, 1995, approximately 30 days after the rams were removed. Those ewe lambs determined pregnant continued on the experiment and were lambed out. Open ewe lambs were removed from the experiment. Seven lambs were removed during the early part of the experiment due to injuries, etc.

Weights were recorded on each ewe lamb when the experiment began, when rams were removed, and when the ewe lambs were ultrasound. Weights are recorded in Table 1.

Table 1. Mean Weights (lbs) of Ewe Lambs at Different Times

Pen	Beginning	Rams Removed	Ultrasound	# lambs
Control				
1C	98.1	116.5	129.5	15
3C	97.5	118.2	131.5	15
5C	100.0	120.9	136.1	13
7C	104.6	126.1	142.7	14
Mean	100.0	120.3	134.8	57
Std Dev	15.0	18.1	19.0	
Vomitoxin Treatment				
2T	94.9	114.9	128.1	15
4T	99.5	119.3	131.9	14
6T	98.3	118.1	133.5	13
8T	100.2	120.6	133.6	14
Mean	98.2	118.2	131.7	56
Std Dev	13.1	14.7	16.4	
Total				
Mean	99.1	119.2	133.3	113
Std Dev	14.1	16.5	17.8	

Vomitoxin effects on weights, weight gains, and pregnancy were determined during the gestation period. Lambing rates, lamb drop, baby lamb death losses, and birth weights of baby lambs were also recorded. Lambing rate is defined as those ewe lambs that actually lambed versus those diagnosed pregnant via ultrasound. Lamb drop is the number of baby lambs born divided by the number of ewe lambs that lambed. Analyses were performed to determine the effect of vomitoxin on these reproductive related traits. Number of observations at lambing time in each group are given in Table 2.

Table 2. Number of Observations

	Control	Vomitoxin	Total
Birth Weight	49 lambs (51 born)	56 lambs	105 lambs (107 born)
Lamb Drop	42 ewes	43 ewes	85 ewes
Dead Lambs at birth	3 lambs	8 lambs	11 lambs

Weight data, lamb drop, and baby lamb death loss were analyzed by analysis of variance using the General Linear Models Procedure of SAS (SAS 1990). Pen was used as the experimental unit and pen within treatment was used as the error term to test for treatment effects. Pregnancy diagnosis and lambing rate data were tested by Chi-Square analyses.

RESULTS

Performance data indicates no differences (P>.46) between control and vomitoxin treated lambs for any of the weigh periods (Table 3). Average daily gain (ADG) from the beginning of the experiment to the time ewes were ultrasound was also not affected (P>.53) by treatment.

Table 3. Ewe Lamb Weights and Gains Between Controls and Treated

Item, lbs.	Controls	Treated	SE
Initial WT	100.5	97.8	2.17
End of Breeding WT	121.1	117.8	2.89
Ultrasound WT	135.9	131.2	3.91
ADG (71 days)	0.50	0.47	0.026

There was no differences in pregnancy rate (P=.81) or lambing rate (P=.77) for either control or treated ewe lambs (Tables 4&5).

Table 4. Pregnancy Diagnosis with Ultrasound

	Pregnant	Open	% Pregnant
Control	49	8	86.0
Treated	49	7	87.5
Total	98	15	86.7

Table 5. Lambing Rate versus Ultrasound Diagnosis

	Lambed	Open	% Lambed
Control	42	7	85.7
Treated	43	6	87.8
Total	85	13	86.7

Lambing data indicated no differences in birth weights of baby lambs (P>.41) or lamb drop (P>.38) between control or vomitoxin treated ewe lambs (Table 6). However, there was a difference in baby lamb death loss as ewe lambs in the treated group had a higher lamb death loss rate (P<.03).

Table 6. Birth Weight, Lamb Drop and Baby Lamb Death Loss between Controls and Treated

Item	Controls	Treated	SE
Birth WT (lbs.)	11.89	11.45	0.304
Lamb Drop	1.22	1.29	0.048
Baby Lamb Death Loss	0.07	0.19	0.012

These results indicate that no differences were found as a result of feeding high levels of vomitoxin grain to ewe lambs in their early reproductive life.

The significant differences observed in death losses (19% versus 7%) at lambing raises questions as to the effect high levels of vomitoxin fed may have on baby lamb survival. Ewe lambs were on diets containing 25 ppm vomitoxin throughout pregnancy.

Studies done at the University of Minnesota/Crookston in 1994 and 1995 found no difference in lamb health at birth from mature ewes fed diets containing 12 ppm vomitoxin during gestation.

Studies done at the NDSU Carrington Experiment Station on pregnant heifers fed diets containing 10-13 pm vomitoxin found no differences in calf health or liveability.

Because the concentration of vomitoxin was nearly doubled in the present study compared to previous work, further investigations may be warranted to determine lamb survivability at different vomitoxin dosages. It will however, be difficult for producers to actually reach the vomitoxin levels that were fed to the ewe lambs in this study, under normal production feeding programs.

Safflower Oil Meal as a Feedstuff for Finishing Lambs - Final Report[1]

C. Poland[a], T. C. Faller[b] and N. R. Riveland[c]

Safflower oil meal (SFM) was utilized at several levels (from 0 to 60% SFM) in three separate experiments to evaluate the feeding value of SFM in self-fed lamb finishing diets. Diets were primarily composed of barley, alfalfa hay, SFM, barley straw and were balanced for vitamins and minerals to meet or exceed NRC requirements for finishing lambs. Although SFM was shown to not dramatically influence feed intake, average daily gain was reduced with increasing levels of SFM. These responses resulted in poorer feed conversions in finishing lambs fed higher levels of SFM. The price of SFM relative of barley needs to be reduced to offset the reduced feed conversions experienced by lambs consuming SFM.

Introduction

Safflower oil meal is a processing coproduct of safflower grain. Safflowers are becoming an emerging crop in western North Dakota. In years when the crushing of safflower is high, SFM is available at very attractive prices compared to other feedgrains and more traditional protein supplements.

There is limited information concerning the nutritional value of SFM. Work conducted in the early 1930's (Christensen, 1935) in ND using steers suggested that intakes of diets containing SFM or linseed oil meal were similar, but gains were reduced for steers consuming SFM. Safflower oil meal has a moderate level of protein (~21 %) and digestibility (~50% in cattle). Safflower oil meal is high in crude fiber, which seems to vary somewhat from 26 to 33%.

Materials and Methods

Six hundred crossbred lambs were used to investigate the potential of SFM as a feedstuff in lamb finishing diets. Three separate experiments were to conducted to achieve this goal.

In the first experiment (Exp 1), 152 January-born lambs (92 lbs average initial BW) were allotted by weight and sex into 8 finishing pens on May 31, 1994. Four dietary treatments were then assigned to the pens (2 pens/treatment). The dietary treatments were 0, 20, 40 and 60% SFM (as fed basis) with the balance of the diet made up of barley, alfalfa hay and barley straw (table 1). Nutritional composition of the major feed ingredients used in Exp 1 are reported in table 2. Vitamins and minerals (~2% of diet) were provided to meet or exceed NRC (1985) requirements. Lamb weights were recorded initially and at the conclusion of the study. The availability of SFM became a problem during Exp 1, which resulted in the premature conclusion of the trial on July 7, after 35 days on feed. This experiment was originally reported in the 1995 Western Dakota Sheep Day Report.

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The second experiment (Exp 2) was conducted utilizing 256 fall-born lambs (81.3 lbs average initial BW). This experiment was conducted similar to Exp 1, except that the dietary treatments were set at 0, 15, 30 and 45% SFM (table 1). These lambs were fed for 63 days (March 8 to May 11, 1995), after which the wether lambs that weighed 115 pounds or greater were slaughtered at a commercial packing plant and carcass data collected.

Due to what was felt was an abnormally large death loss (~ 5%) during Exp 2, a third experiment (Exp 3) was conducted utilizing 192 spring-born lambs (lbs average initial BW). The experimental protocol and dietary treatments of Exp 3 was similar to Exp 2. The major difference was that lambs were fed for a longer period in Exp 3 (100 days, September 18 to December 27, 1995).

Data were analyzed using pen as the experimental unit. Data from lambs that died during the course of an experiment was deleted from the respective pen data. Death loss was reported as number of lambs per treatment that died expressed as a percent of lambs starting a trial in that treatment.

Results

Feedlot performance of lambs in Exp 1 is summarized in table 3. Inclusion of SFM into lamb diets did not affect lamb performance during the 35-d feeding period. Although not statistically significant, average daily feed intake (AFI, $lbs \cdot head^{-1} \cdot day^{-1}$) was numerically greater and gains (ADG, lb/d) less at 60% SFM compared to the other levels of SFM. This resulted in numerically lower feed efficiency (gain/feed) for the highest level of SFM.

Based upon the numerical responses seen in Exp 1, the highest level of SFM was reduced in Exp 2 to 45%. Feedlot performance of lambs in Exp 2 is shown in table 4. Average daily feed intake ($P < .05$) was greatest in the two highest levels of SFM (30 and 45%), lowest in at 15% SFM and intermediate at 0% SFM. Average daily gain was highest at 0% SFM, lowest at 15% SFM and intermediate at the higher levels (30 and 45%) of SFM. These responses resulted in poorer ($P < .05$) feed conversion at 15% SFM when compared to 0% SFM. Overall, death loss in Exp 2 was approximately 5% and could not readily be attributed to any particular treatment (table 4).

The results of Exp 3 are presented in table 5. The only variable affected by increasing SFM was AFI. Feed intake ($P < .05$) was highest at 15 and 45% SFM, lowest at 30% SFM and intermediate at 0% SFM. Although not statistically significant, there was a numerical tendency for ADG and feed conversions to be reduced as level of SFM increased. Death losses were elevated (~ 4%) in Exp 3, similar to Exp 2, but taken together there does not seem to be a consistent problem related to the feeding of SFM.

Carcass characteristics of lambs in Exp 2 and 3 was not affected by the inclusion of SFM into the diet of finishing lambs. Average carcass measurements are presented in table 6. Increasing hot carcass weight (HCW) linearly ($P < .05$) affected all carcass traits recorded, except for an overall confirmation score in Exp 3. This discrepancy seemed to relate to an abnormally large (probably erroneous) value recorded for one lamb in Exp 3. The rest of the carcass data for this lamb seemed reasonable. Rate constants for carcass measurements as a function of HCW are reported in table 7. Although not directly compared, the linear responses to increasing HCW were quite similar between the experiments. One possible exception may be a slower rate of increase in backfat thickness and yield grade as HCW increased in Exp 3.

Selected results from combining the three experiments into a single analysis are depicted in Figure 1. The overall response of AFI, ADG and gain efficiency (feed/gain) to an increasing level of SFM was not different between experiments ($P > .50$). Feed intake was not affected ($P = .14$) by increasing level of SFM, however AFI did differ between experiments. Exp 1 and 3 had similar AFI, while intake in Exp 2 was reduced. On the other hand, ADG was reduced ($P = .06$) by increasing level of SFM and did not differ ($P = .70$) between experiments. These two responses combined to increase the amount of feed required to produce a pound of gain as the level of SFM in the diet increased and to decrease the amount of feed required in Exp 2.

Conclusion

Overall, these experiments suggest that including safflower oil meal in the diet of finishing lambs does not dramatically affect feed intake. However, the efficiency of utilization of the feed is reduced as the level of safflower oil meal increases. This results in slower average daily gains as the level of safflower oil meal is increased. The use of safflower oil meal in finishing lamb diets (up to 60% of the diet) is mainly a cost consideration. The price of safflower oil meal relative to barley and soybean oil meal needs to be reduced to offset the poorer feed conversions experienced by lambs consuming safflower oil meal.

Table 1. Diets used in safflower oil meal experiments and calculated nutritional composition.

	Level of Safflower Oil Meal						
	0	15	20	30	40	45	60
Alfalfa hay	5	5	5	5	5	5	5
Straw	7	7	7	7	7	7	7
Barley	80	71	66	56	46	41	26
Soybean oil meal	6	0	0	0	0	0	0
Safflower oil meal	0	15	20	30	40	45	60
Additives[a]	2	2	2	2	2	2	2
Crude Protein	14.2		14.6		16.6		18.1
TDN	73.0		68.2		64.2		58.2
Ca	.95		1.1		1.5		1.7
P	1.75		2.38		3.1		3.7

[a] All diets contained 1% ground limestone, 0.5% trace mineral salt, 0.5% ammonium chloride and .05 vitamin A, D and E supplement.

Table 2. Nutritional composition of major feed ingredients used in Exp 1[a].

Item	Protein[b]	TDN[c]	Ca	P
Alfalfa hay	18.0	52	1.12[b]	.20[b]
Straw	4.1	40	.30[b]	.08[b]
Barley	13.0	80	.08[c]	.42[c]
Soybean oil meal	44.0	60	.27[a]	.63[b]
Safflower oil meal	22.5	50	.35[c]	1.01[c]

[a] Values expressed on a 90% dry matter basis.
[b] Chemically analyzed.
[c] Tabular value.

Table 3. Effects of feeding safflower oil meal on feedlot performance of growing lambs (Exp 1).

	Level of Safflower oil meal				
Item	0	20	40	60	SE
Initial weight, lb	92.2	94.4	89.7	91.7	-
Days on feed	35	35	35	35	-
Final weight, lb	107.1	108.2	104.5	103.3	-
Total gain, lb	14.8	13.8	14.8	11.6	2.01
Death loss, %	0	0	0	0	-
Daily feed intake, lb	4.21	4.14	4.14	4.66	.238
Average daily gain, lb	.42	.39	.42	.33	.057
Gain/feed efficiency	.101	.095	.102	.073	.014
Feed/gain efficiency	10.3	10.5	9.9	14.8	2.21

Table 4. Effects of feeding safflower oil meal on feedlot performance of slaughter lambs (Exp 2).

	Level of Safflower oil meal				
Item	0	15	30	45	SE
Initial weight, lb	81.9	81.7	81.8	79.9	-
Days on feed	63	63	63	63	-
Final weight, lb	112.6	99.6	107.0	105.0	-
Total gain, lb[a]	30.7[x]	17.9[y]	25.2[xy]	25.1[xy]	1.63
Death loss, %	1.5	10.9	3.1	4.7	-
Daily feed intake, lb[a]	3.32[xy]	3.16[y]	3.39[x]	3.39[x]	.037
Average daily gain, lb[a]	.49[x]	.28[y]	.40[xy]	.40[xy]	.026
Gain/feed efficiency[a]	.146[x]	.089[y]	.118[xy]	.118[xy]	.009
Feed/gain efficiency[a]	6.8[x]	11.1[y]	8.6[xy]	8.5[xy]	.62

[a] Main effect of treatment significant ($P < .05$).

[x,y] Means within a row with different superscripts differ ($P < .05$).

Table 5. Effects of feeding safflower oil meal on feedlot performance of slaughter lambs (Exp 3).

	Level of Safflower oil meal				
Item	0	15	30	45	SE
Initial weight, lb	76.6	74.4	73.5	75.6	-
Days on feed	100	100	100	100	-
Final weight, lb	120.8	114.8	107.8	108.7	-
Total gain, lb	44.3	40.4	34.3	33.1	2.85
Death loss, %	10.4	4.2	0	2.10	-
Daily feed intake, lb[a]	4.26[xy]	4.57[x]	4.02[y]	4.45[x]	.066
Average daily gain, lb[b]	.43	.40	.34	.33	.030
Gain/feed efficiency[b]	.100	.088	.086	.075	.008
Feed/gain efficiency[b]	10.0	11.4	11.9	13.5	1.08

[a] Main effect of treatment significant ($P < .05$).

[b] Probabilities of an overall treatment effect (.23, .27 and .30) and a linear component treatment effect (.07, .08 and .09) for average daily gain and gain/feed and feed/gain efficiency, respectively.

[x,y] Means within a row with different superscripts differ ($P < .05$).

Table 6. Carcass characteristics of slaughter lambs consuming diets containing different levels of safflower oil meal[a]

Item	Exp 2 n	Exp 2 mean	Exp 2 sd	Exp 3 n	Exp 3 mean	Exp 3 sd
Live weight, lb	-	-	-	83	130.0	9.9
Hot carcass weight, lb	62	62.6	5.4	83	64.0	5.9
Dressing percent, %	-	-	-	75	49.6	2.1
Leg score[a]	62	12.7	.9	81	11.4	.88
Confirmation score[a]	62	12.6	.80	81	11.5	3.86
Loineye area, in^2	61	2.28	.298	74	2.55	.280
Backfat, in	62	.24	.084	74	.21	.063
Adjusted backfat, in	-	-	-	74	.21	.060
Bodywall thickness, in	62	.74	.128	74	.95	.160
Flank streaking[b]	62	382.	64.3	81	341.	65.9
Quality grade[a]	62	12.3	.75	-	-	-
Yield grade	62	2.84	.84	73	2.52	.60
Trimmed retail product, lb	61	38.1	1.37	73	38.2	1.35

[a] Leg and confirmation scoring and quality grade: 11, average choice; 12, high choice.
[b] Flank streaking scoring: 300, slight and 400, small.

Table 7. Effect of increasing hot carcass weight on carcass characteristics of slaughter lambs consuming different levels of safflower oil meal[a]

Item	Exp 2	Exp 3
Dressing percent, %	-	.233
Leg score[a]	.007	.078
Confirmation score[a]	.085	-.011
Loineye area, in^2	.019	.013
Backfat, in	.008	.004
Adjusted backfat, in	-	.004
Bodywall thickness, in	.019	.019
Flank streaking[b]	5.03	3.80
Quality grade[a]	.087	-
Yield grade	.079	.040
Trimmed retail product, lb	.437	.459

[a] Leg and confirmation scoring and quality grade: 11, average choice; 12, high choice.
[b] Flank streaking scoring: 300, slight and 400, small.

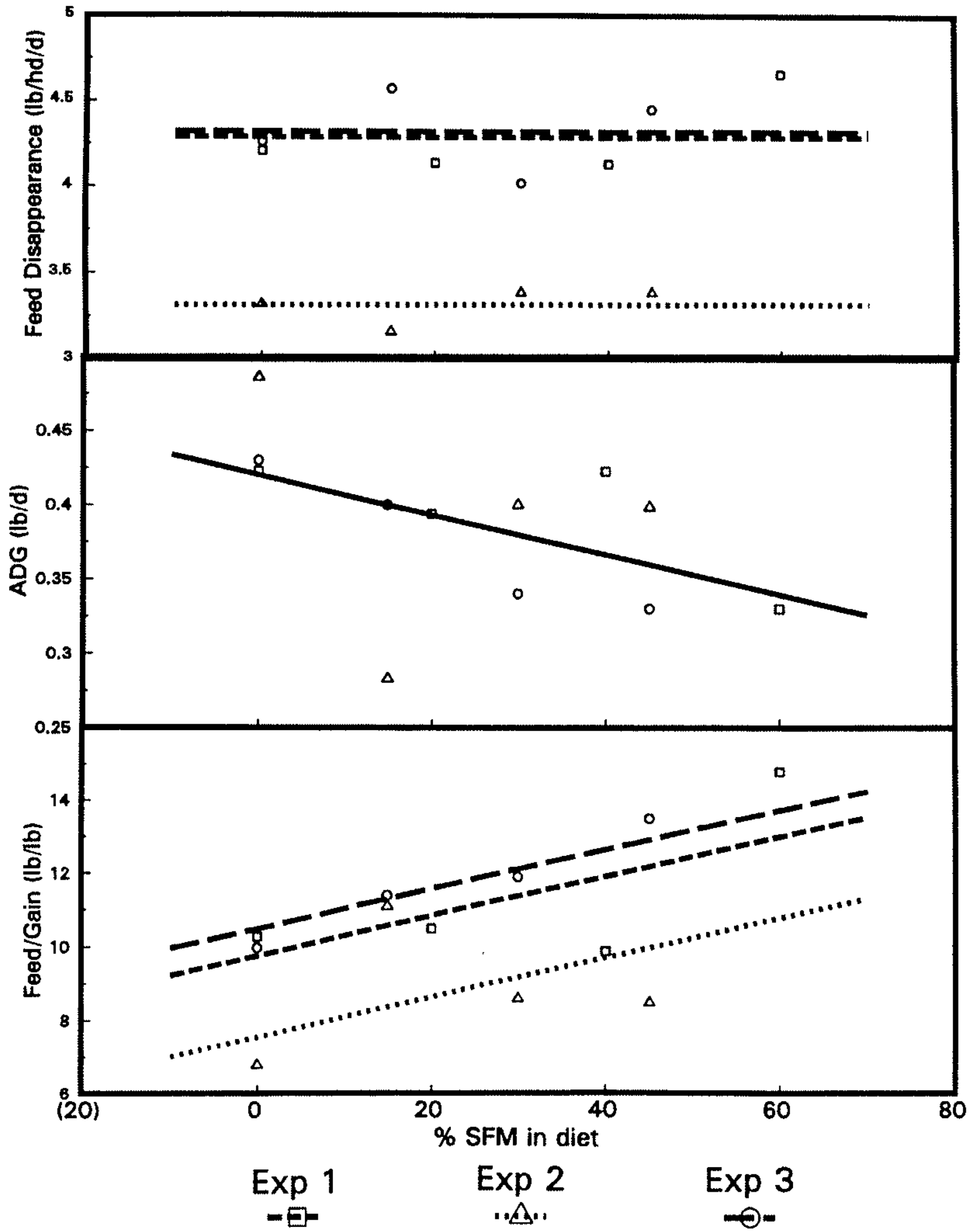

Figure 1. Effect of increasing level of safflower oil meal in finishing lamb diets on feed intake, aveage daily gain and feed efficiency.

MANAGEMENT STRATEGIES TO EFFECTIVELY CONTROL LEAFY SPURGE IN RANGELAND BY GRAZING SHEEP

Timothy C. Faller, Paul Berg, Kris Ringwall, Dan Nudell

Introduction and Justification

North Dakota has in excess of one million acres of rangeland that is impacted by the presence of leafy spurge. Most of the land is controlled (owned or rented) by producers of beef cattle. Severity of infestation is impacted by waterways, overhead electrical transmission lines, railways and roadways. Presence of trees, high water tables, waterways and environmentally protected plant and animal species are constraints to the usage of many herbicides as useful control methods. Increasing leafy spurge populations has negatively impacted economic well-being of many livestock producers in North Dakota.

Feed costs is the largest single component of total cost of production faced by sheep producers. Birth rate and survivability of lambs from birth to weaning are critical factors impacting gross income and net profit for the sheep producer.

The opportunity to reduce variable costs and increase cash flow while adequately controlling leafy spurge in an environmentally friendly manner is attractive for many North Dakota livestock producers. Cattle are a poor utilizer of leafy spurge plants as components of the range composition while many species of wildlife and small grazing ruminants are a very good utilizers of leafy spurge as a component of the range setting. Many livestock producers truly do not want to get heavily involved in the production of alternative species of livestock (primarily sheep and goats). Management strategies that will allow them to integrate with existing sheep producers, or potentially establish profitable associated enterprises that will reduce the presence of leafy spurge are attractive to many North Dakota livestock producers. To do so they need a smorgasbord of alternatives and hard numbers to represent the income and expense of such proposed arrangements.

The North Dakota sheep industry provides in excess of $10,000,000 new wealth annually (1993 ND Ag Statistics). Loss to the North Dakota Ag Economy is estimated to be in excess of 70 million annually from the impact and costs associated with controlling leafy spurge (Leistritz, 1991). The loss of the Federal Wool Incentive program will negatively impact the future of sheep producers in North Dakota. The potential exists to reduce costs for sheep producers by providing no-cost or low cost summer grazing and in turn improving range production for the sake of enhancing impacted beef producer's incomes.

The Sheepbud Shepherd IMS enterprise analysis was developed to assist sheep producers evaluate the economics of their operation (Nudell, 1994). Sheepbud Shepherd IMS is presently being S.P.A. tested and will be available to be used as a method of cross referencing the different strategies developed to control leafy spurge in the rangeland.

Experimental Procedure

Actual production associated with a variety of research trials at Hettinger Research Center will be evaluated economically to provide numerous strategies to be presented to industry for application. The strategies will address three different primary approaches to incorporating small ruminant animals in grazing plans focused on controlling leafy spurge. The strategies will be categorized on the basis of intensity of sheep production. Primary focuses will be: High Intensity (HI), Traditional Approaches (TI) and Low Intensity (LI). Data will be collected on; longevity, lamb survivability and routine production measures. An initial flock of 400 ewes will be established composed of 200 each of rambouillet and Montadale x Rambouillet ewes. Half of each group will be born in 1993 and the other half in 1994. Similar numbers from each year and breed type will be initially assigned to each of five management strategies. The five management strategies will be compared to an existent accelerated lambing flock of 500 ewes (HI).

High Intensity Approach

Rambouillet ewes and rams will be utilized to increase the incidence of out of season mating. The attempt will be to select all replacements from fall born lambs of a closed flock of 500 ewes. Ewes will be mated and allowed to lamb in January and September as often as possible. Presently this flock of ewes is lambing at 1.4 lambings annually and presenting 1.5 lambs per lambing. This provides in excess of two lambs born per ewe annually. A 56 day weaning strategy will allow ewes to graze leafy spurge infested rangeland without the presence of lambs to reduce losses to predators under both lambing times. Both sets (January lambing and September lambing ewes) will summer graze leafy spurge at the Missouri River Correctional Center (MRCC), Bismarck, North Dakota. The High intensity group will be limited to 1993 and 1994 fall born ewes which is similar age to the ewes in the other groups.

Traditional Approach (TI)

Rambouillet and Montadale x Rambouillet cross ewes that lamb in January and are exposed to lamb once annually with resulting production to be weaned at 56 days of age and put in the feedlot will be compared to genetically similar ewes that will lamb in April-May, weaning weights will be taken at 56 days. Both groups will be shed lambed with half to be reared in confinement and half in outside lots.

Low Intensity Approach (LI)

Rambouillet and Montadale x Rambouillet cross ewes of similar genetic background to the TI group will be mated to begin lambing mid-may. The intent is to begin lambing on the range at the onset of the time ewes begin grazing leafy spurge. The intent of this group is to measure if the sheep operation can support itself with the primary interest being to improve the range resource for the benefit of the beef cow. Also of interest will be observing the bonding mechanism as described at the Jornada Experiment Range site in New Mexico. Bonding of sheep to cattle would be of advantage to sustaining the sheep component of this strategy.

Economic Procedure

The approach will be to measure actual production figures and imply sound economics using the Sheepbud Shepherd IMS financial analysis program to cross reference comparisons.

Duration

The data accumulated from five lambing years for each of the strategies will be utilized to evaluate economic viability of the treatments. Data from the multi-species trial will be utilized to measure effectiveness of leafy spurge control and the impact on species composition at the site. (Economic impact should be known in five years, however, it may take longer to acquire full knowledge of impact on the range site.)

1995 Results and Discussion

The results presented are preliminary and are provided for discussion only. A detailed evaluation of the data will be conducted at the conclusion of the project. Table 1 gives production information for the various ewe types lambing the first time in the project. Table 2 indicates performance of the lambs born in the project to a 60 day weaning time. Those lambs reared on grass were weighed at 60 days of age and not weaned at that time. Table 3 indicates reproductive performance of a similar age group of ewes on an accelerated lambing project and table 4 the performance of their lambs.

Table 1. Reproductive performance of Rambouillet and Montadale-Rambouillet cross ewes under five different rearing strategies.

	JANUARY LAMBING				MAY LAMBING					
BREED TYPE	MXR	MXR	RXR	RXR	MXR	MXR	MXR	RXR	RXR	RXR
REARING TYPE	IN	OUT	IN	OUT	IN	OUT	PAST	IN	OUT	PAST
EWE AGE @ LAMBING IN MONTHS	20	20	20	20	24	24	24	24	24	24
EWES EXPOSED	18	18	20	20	18	18	18	20	20	21
EWES LAMBING	15	16	17	20	17	17	18	19	19	21
DRY EWES	3	2	3	0	1	1	0*	1	1	0*
LAMBS BORN	25	27	29	31	22	24	21	33	34	25
LAMBS WEANED	19	21	21	27	20	20	18	26	22	18
LAMBS WEANED PER EWE EXPOSED	1.06	1.17	1.05	1.35	1.11	1.11	1.0	1.30	1.10	.86
PERCENT REARED OF THOSE BORN	76	78	72	87	91	83	86	79	65	72

R = RAMBOUILLET
M = MONTADALE
PAST = PASTURE
IN = CONFINEMENT REARING
OUT = BARN AND LOT REARING
* NO RECORD

Table 2. Performance of lambs born of Rambouillet and Montadale-Rambouillet cross ewes reared on five different strategies.

	JANUARY LAMBING				MAY LAMBING					
	MXR	MXR	RXR	RXR	MXR	MXR	MXR	RXR	RXR	RXR
WEAN WT (lbs)	45.11	51.48	43.43	52.96	38.15	35.03	44.06	35.46	37.73	39.39
WEAN AGE DAYS	66.79	70.67	72.57	67.15	58.5	57.85	**58.18**	56.62	57.18	**56.9**
WEAN WEIGHT CORRECTED TO 60 DAYS (lbs)	40.8	43.8	36.0	47.4	39.0	36.6	45.6	37.8	39.6	41.4
POUNDS LAMB WEANED PER EWE EXPOSED @ 60 DA	43.1	51.1	37.8	64.0	43.3	40.7	45.6	49.1	43.6	35.5

R = RAMBOUILLET
M = MONTADALE
WEAN AGE IN BOLD PRINT CALCULATED FROM AVERAGE OF OTHER SIMILAR GROUPS.

Table 3. Reproductive performance of Rambouillet ewes on an accelerated lambing strategy.

BREED TYPE	RXR
LAMBING TIME	JAN/SEPT
REARING TYPE	IN
EWE AGE @ LAMBING TIME MONTHS	16/24
TOTAL EWES	98
EWES LAMBING	63/59
DRY EWES (BOTH LAMBINGS)	14
LAMBS BORN	81/88
LAMBS WEANED	64/76
% REARED OF THOSE BORN	79/86

R = RAMBOUILLET

IN = CONFINEMENT REARING

Table 4. Performance of lambs born of Rambouillet ewes on an Accelerated lambing strategy.

BREED TYPE	RXR
LAMBING TIME	JAN/SEPT
WEAN WEIGHT (LBS)	39.29/42.91
WEAN AGE (DAYS)	64.35/65.22
WEAN WT CORRECTED TO 60 DAYS (LBS)	36.6/39.6
TOTAL LBS OF LAMB PRODUCED PER EWE @ 60 DAYS (LBS)	56.57

R = RAMBOUILLET

Summary

Environmentally the need is to control leafy spurge with reduced reliance on herbicide exists. This research is needed to preserve the role of the sheep industry in North Dakota agriculture and to improve the economic viability of impacted beef producers.

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Use of Melengestrol Acetate (MGA) and Estradiol 17β to Synchronize out of Season Mating in Ewes

Preliminary Report

Jim Kirsch, Wes Limesand and Dale Redmer
NDSU Experiment Station, Fargo, 1995

INTRODUCTION

Animal agriculture must become more efficient to keep up with the ever growing demands of efficiently produced food and fiber. The sheep industry has the opportunity to fulfill this need. However, improvement in sheep production technologies have not been greatly utilized. Parker et. al. (1983) reported that fewer than 15% of commercial breeding ewes gave birth to more than one lamb. On the average, the number of lambs weaned per ewe per year in the nation has been one or less (CRIS, 1990).

Sheep are known to be seasonal breeders, exhibiting increased breeding activity with increasing day length. Genetically selecting breeds of sheep with less seasonal restrictions has been one method. Another method has incorporated hormones to induce breeding activity in the non-breeding season. Melengestrol acetate (MGA), an orally active synthetic progestogen, has been utilized widely in the beef cattle industry to control estrus in feedlot heifers and also as a synchronization product. Oral progestagens also have been used for estrus synchronization in the cycling ewe. The administration of medroxyprogesterone acetate (Hinds et. at. 1961) for periods of 14 to 16 days has resulted in good synchronization during the synchronized estrus. Tilton et. al. (1966) has shown that cycling ewes respond to MGA treatment with a high degree of synchrony when fed for 15 days. It was observed in some breeds such as Dorset and Rambouillet, do exhibit some cyclic activity during the non-breeding season. The percent mated and percent lambing increased over Hampshire and Suffolk sheep under the same treatment of 0.2 mg MGA/hd/day for 15 days (Tilton et. al. 1967). Quispe et. al. (1994) has shown that a significantly higher percentage of ewes (79.5%) that were fed 0.22 mg/hd/day of MGA for 14 days exhibited a synchronized estrus compared to the non-treated ewes (33.5%). Synchronization was also shown to be maintained through the second post treatment estrus, with 71.9% of the ewes exhibiting an estrus with 72 hours. Keisler, (1992) demonstrated that feeding MGA from 8 to 14 days can be used with little apparent change in response rate.

Berardinelli et. al. (1980) reported in ewe lambs that peripheral progesterone increases for a 1 to 4 day period before puberty. The source of this circulating progesterone prior to puberty is produced by luteal tissue in the ovary. Peripheral progesterone must increase during a 2 to 3 day period prior to the luteinizing hormone surge which results in the first normal 14 day luteal phase (Ryan and

Foster, 1978). They suggested that the transient prepubertal rise of progesterone was caused by either premature ovulation or follicular luteinization within the ovary.

Over the past several years, an increasing number of ewes in Minnesota and North Dakota are estrous synchronized with a combination of estradiol and MGA. The basis for this treatment regimen is unclear. Because of the potential impact of adopting a more labor intensive treatment regimen than has been used previously, we have designed a study to determine the benefits of using estradiol 17β in combination with MGA for out of season breeding. This study was setup to investigate if feeding MGA for 8 days with or without estradiol 17β injected at 30 hours after the last MGA feeding has any benefit in inducing a fertile synchronized out of season estrus in the ewe.

PROCEDURE

21 Suffolk, 20 Columbia, 20 Hampshire and 30 crossbred non-lactating ewes from age 2-5 years were fed MGA (0.25 mg/hd/day) for 8 days. At 30 hours post MGA feeding, one-half of the ewes in each group were injected intramuscularly with 20 µg estradiol 17β in sesame oil or oil alone (1 cc). Intact fertile rams were placed with the ewes at the time of injection. Rams were brisket painted daily to aid in estrous detection. Rams remained with the ewes for an additional estrous cycle. Blood samples (10 ml) were taken from each ewe by jugular puncture beginning 1 day prior to MGA treatment and continuing until 5 days after the last feeding of MGA. Progesterone, estradiol and luteinizing hormone concentrations were determined in all samples by radioimmunoassay. All blood samples were stored at -20 C until analyzed for hormone content.

Data collected was the proportion of ewes lambing, lambing data, number of lambs born, percent bred but not lambing, number of responders and synchrony of estrus.

All animals were housed at the NDSU Research Center. MGA was purchased from a feed mill at Barnesville, MN at a cost of approximately $2.00/hd.

RESULTS AND DISCUSSION

The preliminary results are presented in Table 1. Table 1 indicates that the majority of estradiol-treated ewes exhibited estrus signs, however, did not lamb to synchronization.

Ewes that were fed MGA for 8 days followed by an injection of control oil tended to have more total ewes lambing due to synchronization and doubled the total lambs born vs. estradiol-treated. Allowing rams to remain with ewes for an additional cycle tended to favor the control ewes with more than two times the number of ewes lambing and twice the number of lambs born compared to the estradiol treated-ewes. It appears that breed differences were noted. Suffolk and

Crossbred ewes that received MGA and control oil appeared to respond due to the synchronization as compared to Columbia ewes. Crossbred ewes that received estradiol 17β and MGA showed an increase in ewes lambing compared to Suffolk, Hampshire or Columbia. At this time, no hormone data is available.

Please keep in mind that these data are based on only the first year of the trial. Due to the preliminary nature of this study and low numbers in each breed, plans to replicate this study are under consideration.

Table 1. 1995 Synchronized Ewe Data

	Pen 1	Pen 2	Pen 3	Pen 4	Pen 5	Pen 6	Pen 7	Total
Breed	Suffolk	Hampshire	Suffolk	Columbia	Crossbred	Columbia	Hampshire	
No. of Control Ewes	5	5	5	5	15	5	5	45
No. of Control Ewes Synchronized	3	1	4	4	9	2	1	24
No. of Control Ewes Lambing from Synchronized Estrus	3 (4)	1 (2)	2 (3)	0 (0)	6 (8)	0 (0)	0 (0)	12 (17)
No. of Control Ewes Lambing from 2nd Cycle	0 (0)	2 (4)	0 (0)	2 (2)	6 (9)	1 (2)	2 (3)	13 (20)
No. Estradiol Trt Ewes	5	5	6	5	15	5	5	46
No. of Estradiol Trt Ewes Synchronized	5	4	4	3	11	4	3	34
No. of Estradiol Trt Ewes Lambing from Synchronized Estrus	1 (1)	0 (0)	0 (0)	1 (1)	3 (4)	1 (1)	1 (1)	7 (8)
No. of Estradiol Trt Ewes Lambing from 2nd Cycle	0 (0)	1 (1)	0 (0)	1 (1)	3 (6)	1 (2)	0 (0)	6 (10)

For each breed, 1 ram was exposed to 10 ewes.
( ) = Number of lambs born

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Grazing And Haying On CRP Lands

Paul Nyren, William Barker, Bob Patton, Brian Kreft, Charles Lura, Dennis Whitted, Kevin Sedivec, Tim Faller, Don Stecher, Jim Nelson and Jeff Printz

Introduction

The Conservation Reserve Program (CRP) began in 1985. In North Dakota about 2.9 million acres of cropland were retired. Nationwide, the acreage retirement was over 36 million acres. The objectives of the program were to reduce soil erosion, increase herbaceous cover, and provide financial incentives for participants. Shortly after the program began, researchers and land management agencies across the nation developed research studies to examine the benefits of the program and to determine how well it fulfilled its objectives.

The CRP contracts began to expire in 1995, but Congress may extend the program through 2002. While the regulations and goals for the extended program are still under negotiation, USDA officials suggest that, "The new contracts will result in the CRP containing the most environmentally sensitive lands with regard to erosion, wildlife, water quality and other high priority values."

In preparation for this time of decision-making, the Agricultural Stabilization and Conservation Service (ASCS) granted permission to NDSU to conduct a 5-year haying and grazing study on four CRP sites in North Dakota. This research began in 1992 and the study sites are shown in figure 1.

The objectives of this study are to determine:

1. The floristic composition and structure of CRP lands and to note changes in floristic composition and structure due to grazing and haying over a 5-year period.
2. The production and utilization of CRP land vegetation under a seasonlong and twice-over rotation grazing system.
3. The production and quality of hay from CRP lands.
4. The economic returns from grazing and haying CRP lands (see page 6).
5. The success of game and non-game wildlife species on CRP lands (p. 10).

Procedure

The four study locations in North Dakota are in Stutsman, Ward, Adams and Bowman counties. In Stutsman, Ward and Bowman counties, the grazing treatments include a twice-over rotation grazing system using three pastures and a seasonlong grazing system with one pasture. Each study location has an area that is hayed each year. The Adams County site is comprised of four pastures. A different pasture is hayed each year while the other three are grazed using a twice-over rotation system. Exclosures have been set up on silty sites at each location. These will be neither grazed nor hayed and will serve as control areas.

Since 1992, cow-calf pairs were used to graze the Stutsman and Ward counties locations. The Adams County location used a multi-species grazing system with yearling heifers and yearling ewes each year of the study. The Bowman County location used yearling heifers in 1992, cow-calf pairs in 1993 and 1995, and bred heifers in 1994. The livestock are weighed at the beginning and end of the grazing season and the average daily gain and gain per acre are calculated for each grazing treatment.

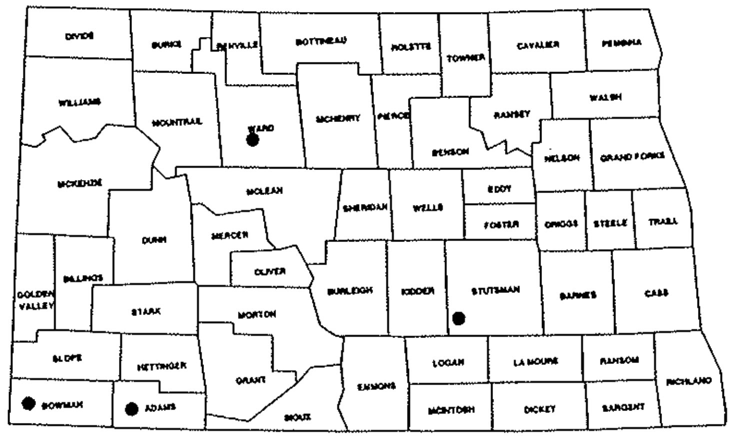

Figure 1. North Dakota CRP Study Sites.

Forage production and utilization are determined using exclosure cages and a paired plot clipping technique on each range site in each grazing treatment pasture.

Changes in the plant community are monitored by sampling percent frequency of occurrence and density per square meter, and percent basal cover of all plant species on each range site. Floristic composition and structure data are sampled using frequency quadrats and point frames. Frequency, basal cover, and density are determined by these methods. Each year, 50 nested frequency frames are placed along permanent transects to determine species composition.

The amount of basal cover, litter and bare ground are sampled by using a 10-point frame. Fifty 10-point frames are read along each permanent transect. These data will indicate any changes in the amount of actual soil surface occupied by plants or covered by litter from previous years' growth. This is important when predicting the impact that haying or grazing might have on the vegetation's soil holding capacity. The data were checked for errors in plant identification and data entry by comparing the change in the abundance of each species between years for each site with Cochran's Corrected Chi Square Test and Fishers Exact Test using Calcfreq, a computer program which operates on Lotus 1-2-3. Analysis of variance was performed to detect changes in species abundance. An arcsine transformation was used to normalize frequency, and basal cover data.

Table 1. Total forage production in lbs/acre and percent utilization on 4 CRP study locations 1992-1995.

		1992		1993		1994		1995		4-Yr Average	
Location	Treatment	Lb/ac	% Util[1]	Lb/ac	% Util	Lb/ac	% Util	Lb/ac	% Util	Lb/ac	% Util
Adams	Hayed	2660	-	1500	--	1440	-	3620	--	2305	--
	Non-Grazed	--	-	-	--	1886	-	4810	--	3348[2]	--
	Twice-Over Rotation	3488	58	4009	53	2236	71	6146	56	3970	60
Bowman	Hayed	5740	-	2860	-	1600	-	4880	-	3770	-
	Non-Grazed	-	-	3527	-	3008	-	4065	-	3533[3]	-
	Season-long	3600	38	6717	27	7607	27	8113	37	6509	32
	Twice-Over Rotation	3991	53	4140	50	4292	51	6600	51	4756	51
Stutsman	Hayed	4920	-	3480	-	3240	-	4480	--	4030	-
	Non-grazed	2076	-	1948	-	2658	-	4778	--	2865	-
	Season-long	2902	67	5006	39	5601	46	6434	37	4986	47
	Twice-Over Rotation	2937	59	5685	56	4996	64	7518	52	5284	58
Ward	Hayed	1620	--	1800	--	2100	-	--	--	1840[3]	-
	Non-grazed	1380	-	2944	-	2880	-	2738	-	2486	--
	Season-long	2971	41	7907	51	7391	47	5672	46	5985	46
	Twice-Over Rotation	2408	52	5413	63	4861	66	4642	73	4331	64

[1]Util- Percent utilization [2]2-year average [3]3-year average

Table 2. Four-year average livestock production on four CRP locations in North Dakota in 1992-1995.								
					Cows 4-Year Average		Calves 4-Year Average	
Grazing System	No. of acres	Years	Average Number and Type of Animals	Average Grazing Season Length (Days)	ADG (lb)	Gain/A (lb)	ADG (lb)	Gain/A (lb)
Bowman								
Season-long	131	1992	24 yearling heif.	126	1.81[1]	41.45[1]		
	131	1993, 1995	20 cow-calf pr.	126	0.76[2]	13.92[2]	2.50[2]	46.44[2]
	131	1994	30 bred heif.	126	1.05[1]	31.98[1]		
Twice-Over Rotation	225	1992	52 yearling heif.	126	1.59[1]	45.93[1]		
	225	1993, 1995	46 cow-calf pr.	126	0.81[2]	20.19[2]	2.54[2]	64.36[2]
	225	1994	56 bred heif.	126	1.27[1]	42.04[1]		
Stutsman								
Season-long	135	All	32 cow-calf pr.	125	1.74	51.47	3.04	89.14
Twice-Over Rotation	235	All	55 cow-calf pr.	125	1.54	44.79	2.96	86.35
Ward								
Season-long	70	All	16 cow-calf pr.	113	1.12	29.41	2.93	76.02
Twice-Over Rotation	208	All	49 cow-calf pr.	113	0.76	22.97	2.80	71.85
Adams							Sheep	
Twice-Over Rotation	232		60 yearling heif.	119	1.23	38.31		
			121 yearling ewes				0.32	19.62

[1]1-year [2]2-year average

Table 3. Changes in species composition ($p \leq 0.05$) on Bowman Co. CRP sites since 1992.		
	Silty Sites	Overflow Sites
Species seeded in 1988	crested wheatgrass intermediate wheatgrass alfalfa	crested wheatgrass intermediate wheatgrass alfalfa
Decreased since 1992	common dandelion yellow foxtail	common dandelion
Increased since 1992	crested wheatgrass horse-weed peppergrass white sage	crested wheatgrass horse-weed peppergrass western wheatgrass
Fluctuated	annual bromes Russian thistle western wheatgrass yellow sweetclover smooth brome	American vetch annual bromes intermediate wheatgrass yellow foxtail yellow sweetclover
Increased on non-grazed	Japanese brome	--
Increased on hayed	--	alfalfa
Increased on seasonlong	downy brome horse-weed yellow sweetclover	annual bromes
Increased on twice-over rotation	annual bromes	annual bromes intermediate wheatgrass wild buckwheat
Decreased on non-grazed	alfalfa	--
Decreased on hayed	intermediate wheatgrass western wheatgrass	intermediate wheatgrass yellow sweetclover
Decreased on seasonlong	--	common dandelion intermediate wheatgrass yellow sweetclover
Decreased on twice-over rotation	yellow sweetclover	--

Models Used

Abundance = year + treatment + (year x treatment) was used to test for interactions between years and treatments.

Abundance = year was used to test for differences in abundance of species between years.

(Abundance year 2 - abundance year 1) = treatment was used to test for differences in abundance of species due to treatments.

Fisher's least significant difference test was used to compare means. All tests were performed at a significance level of p=0.05.

Results

Table 1 shows the annual forage and hay production and the four-year average production on the Adams, Bowman, Stutsman, and Ward counties sites. Precipitation in 1995 was excellent at all these study locations as is indicated by total forage and grass production. Percent utilization on the grazed CRP acreages was very acceptable. Pastures are sampled before and after each rotation on the twice-over rotation system and at the beginning, middle and end of the grazing season on the seasonlong system. The nutrient data for the hayed treatments was not available at this writing.

Table 2 shows the type of grazing system, the number and type of animals used on each system, grazing season length, the 4-year average daily gain and the 4-year average gains per acre on all sites.

At the Adams County location, twelve-month-old ewe lambs were grazed with replacement beef heifers in 1993. Gains were 0.42 lb/head/day in a 128-day grazing period. Eight-month-old lambs grazing in the same setting for 100 days in 1994 gained 0.38 lb/head/day. In 1995, gains for both the yearling heifers and 7-month-old ewe lambs were below the 4-year average with heifers gaining 1.06 lb/head/day and ewes at 0.10 lb/head/day. Grasshopper infestations late in the grazing season may account for the lower gains in 1995. Generally, these gains are acceptable, and are excellent for preparation of either eight or twelve-month-old ewe lambs for fall breeding. By comparison, similar lambs in the feedlot gained 0.5-0.7 lbs/head/day.

This would indicate that these CRP grassland tracts can be used efficiently for livestock production. Options for utilizing CRP grass-legume plantings include grazing eight-month-old fall born lambs or twelve-month-old spring born lambs. Fall born lambs could be grazed for the lean lamb slaughter market. Ewe lambs 12-14 months old would be used as replacement breeding stock only. If not used as breeding stock, marketing for slaughter directly off pasture as premium quality lamb is a viable option.

At the Stutsman County location in 1995, the calves averaged daily gains of 3.18 lbs/head on the twice-over rotation system and 3.24 lbs/head on the seasonlong system. Average daily gains for the cows on the rotation and seasonlong systems at this site were 1.53 and 1.83 lbs/head, respectively. In Ward County, the calves gained an average of 3.02 lbs/head/day on the seasonlong

Table 4. Changes in species composition (p ≤ 0.05) on Ward Co. CRP sites since 1992.

	Silty Sites	Overflow Sites
Species seeded in 1987	alfalfa slender wheatgrass western wheatgrass yellow sweetclover	alfalfa slender wheatgrass western wheatgrass yellow sweetclover
Decreased since 1992	alfalfa crested wheatgrass field milk-vetch intermediate wheatgrass	alfalfa intermediate wheatgrass kochia peppergrass wild buckwheat
Increased since 1992	yellow foxtail	–
Fluctuated	American vetch downy brome flixweed Russian thistle wild buckwheat wildoats	downy brome quackgrass wildoats yellow foxtail
Increased on non-grazed	downy brome field sowthistle	–
Increased on hayed	field sowthistle quackgrass yellow foxtail	Canada thistle
Increased on seasonlong	field sowthistle flixweed quackgrass yellow foxtail	alfalfa common dandelion flixweed wildoats yellow sweetclover
Increased on twice-over rotation	quackgrass wild buckwheat	Canada thistle common dandelion curly dock downy brome flixweed foxtail barley goat's beard smooth brome wild buckwheat wildoats
Decreased on non-grazed	western wheatgrass	–
Decreased on hayed	downy brome	yellow sweetclover
Decreased on seasonlong	western wheatgrass	–

Table 5. Changes in species composition (p ≤ 0.05) on clay sites in Adams Co. CRP since 1992.

Species seeded in 1987	alfalfa intermediate wheatgrass western wheatgrass
Decreased since 1992	common dandelion downy brome kochia rough pigweed Russian thistle yellow foxtail
Increased since 1992	field sowthistle intermediate wheatgrass yellow sweetclover
Fluctuated	alfalfa annual bromes western wheatgrass
Increased on non-grazed	field sowthistle
Decreased on non-grazed	field bindweed field pennycress

Table 6. Changes in species composition (p ≤ 0.05) on Stutsman Co. CRP sites since 1992.

	Silty Sites	Overflow Sites
Species seeded in 1987	alfalfa intermediate wheatgrass smooth brome tall wheatgrass yellow sweetclover	alfalfa intermediate wheatgrass smooth brome tall wheatgrass yellow sweetclover
Decreased since 1992	Japanese brome Russian thistle slender wheatgrass tall wheatgrass	Japanese brome prickly lettuce tall wheatgrass
Increased since 1992	common dandelion field sowthistle smooth brome	bareground common dandelion field sowthistle smooth brome wormwood yellow wood sorrel
Fluctuated	charlock mustard horse-weed intermediate wheatgrass and quackgrass narrow-leaved goosefoot wild buckwheat yellow sweetclover	charlock mustard narrow-leaved goosefoot Russian thistle Total plant basal cover wild buckwheat yellow sweetclover
Increased on non-grazed	smooth brome	–
Increased on hayed	litter wild buckwheat yellow sweetclover	alfalfa western rock jasmine
Increased on seasonlong	blue lettuce common dandelion western ragweed	Flodman's thistle horse-weed yellow wood sorrel
Increased on twice-over rotation	common dandelion litter	alfalfa horse-weed kochia narrow-leaved goosefoot smooth brome western rock jasmine
Decreased on non-grazed	tall wheatgrass	–
Decreased on hayed	intermediate wheatgrass and quackgrass	Intermediate wheatgrass and quackgrass tall wheatgrass
Decreased on seasonlong	litter skeletonweed	charlock mustard
Decreased on twice-over rotation	alfalfa tall wheatgrass	tall wheatgrass

system and 2.83 lbs/head/day on the rotation treatment. The cows on the twice-over rotation system gained 0.76 lbs/day while cows on the seasonlong pasture averaged 1.19 lbs/head/day. In 1995, the Bowman County location showed gains of 2.45 and 2.47 lbs/head/day for the rotation and seasonlong systems, respectively, while cows gained 0.74 lbs/head/day on the rotation and 0.64 lbs/day on the seasonlong system.

A major concern for range managers and livestock producers concerning the use of CRP lands for production agriculture is how well will these stands respond to grazing and haying pressures. In other words, will the species composition remain desirable? Tables 3, 4, 5 and 6 show the species composition changes that have occurred since 1992 as determined by sampling with frequency quadrats each year. While the tables indicate changes in the seeded species, this may be due to natural succession. Total forage production and species composition changes have remained very acceptable and data indicates that these CRP tracts can be successfully grazed.

Most land managers would prefer to see these highly erodible land (HEL) acreages remain in grass to protect them from soil erosion. Economic returns are possible and at the same time water quality and wildlife benefits are realized (see reports on the following pages). ●

Soil Conservation Service
Plant Materials Center
Bismarck, North Dakota

Project No.: 38A339X Hettinger, North Dakota

Project Title: Field evaluation of cool-season grasses for pasture, range, wildlife habitat, and protection of surface and ground water.

Cooperators:
USDA, Soil Conservation Service (SCS); in cooperation with the North Dakota State University (NDSU), Hettinger Research and Extension Center (HREC); Adams County Soil Conservation District (ACSCD); and Mr. Joseph Clement, private landowner.

Location:
Legal Description; SE1/4 sec. 24, T. 129, R. 96, Adams County, North Dakota. Approximately 2 miles south of Hettinger.

Objective:
The objective of this study is to evaluate the performance and adaptation of native and introduced cool-season grass species and varieties for use in pastures, range, wildlife habitat, and water quality projects in southwestern North Dakota and surrounding regions of South Dakota, Montana, and Wyoming.

Site Information:
One hundred and one different varieties or experimental lines were seeded in 6 ft. x 25 ft. plots on April 6, 1992. Plots were replicated three times. Seeding rate varied with species but followed recommended seeding rates as specified in the North Dakota SCS Technical Guide. Species with no specified seeding rates were generally planted at 20-25 seeds/ft^2. Soil at the site is a Vebar-Flasher fine sandy loam, which is typically low in organic matter and available water capacity.

Summary:
The plots were off to a good start following the April 6, 1992, seeding. Moisture conditions in 1992 and 1993 were excellent, resulting in dense stands. Forage production was also abundant in 1993. Droughty conditions in the summer of 1994 reduced forage yields considerably. Weeds were abundant in 1992 and 1993 but were chemically controlled. Weeds were not severe in 1994. Overall, production was slightly greater in 1995 compared to 1994. No forage was clipped in several plots of replication 3 due to severe contamination from other grass species in 1995. Residue is managed using a spring burn.

The evaluation period is scheduled for 6 years. Forage production will be determined annually for the last 5 years of the project. Yields are expected to vary considerably on an annual basis. It is suggested that long-term production averages are generally more meaningful than annual comparisons. Stand densities, disease resistance, and seed production are other critical factors in determining overall plant performance.

PROJECT: 38A339X Hettinger, North Dakota

PROJECT TITLE: Field evaluation of cool season grasses for pasture, rangeland, wildlife habitat, and protection of surface and groundwater.

Table HE-2: Plant performance 1992-1994. Seeding Date: April 6, 1992.

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	WEED (2) COMPETITION 93	STAND (3) DENSITY 92	STAND (3) DENSITY 93	STAND (4) RATING 94	STAND (4) RATING 95	PLANT (5) HEIGHT 93	PLANT (5) HEIGHT 95	(6) DISEASE 93	SEED (7) PRODUCTION 93	SEED (7) PRODUCTION 94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	FORAGE YIELD (lb/ac) (9) 1994	FORAGE YIELD (lb/ac) (9) 1995
FAIRWAY WHEATGRASS																
1. Parkway	2.0	1.7	1.7	53	75	3.3	3.3	28	21	2.0	2.3	5.7	3.7	2260A	838B	985B
2. Kirk	3.3	2.7	2.0	52	68	3.3	2.7	31	29	2.0	1.3	4.3	3.0	2961A	1235B	1395B
3. SD-77	3.7	3.0	1.7	39	64	2.0	2.3	30	27	2.0	1.0	4.0	2.0	3187A	1632AB	1843AB
4. Ephraim	3.3	3.7	1.7	40	59	3.0	4.0	26	25	2.0	2.7	5.0	3.7	1957A	1346AB	1435B
5. Ruff	3.7	3.3	1.7	48	69	3.0	2.7	29	25	2.0	1.7	4.7	2.0	2864A	1198B	1322B
6. NEAC1	3.7	2.3	2.7	46	56	3.3	2.3	24	21	2.0	2.0	4.3	2.0	1962A	1079B	1478B
7. NEAC2	3.7	2.3	2.3	48	66	2.7	2.3	29	25	2.0	1.7	4.7	2.0	3454A	1377AB	1950AB
CRESTED WHEATGRASS																
8. Summit	3.3	3.0	1.7	45	62	3.0	3.7	30	31	2.0	1.7	3.3	2.3	2777A	2207A	2478A
9. Nordan	4.0	4.3	2.7	41	66	3.0	3.0	31	33	2.0	2.0	2.7	2.7	3382A	1609AB	1466B
10. NEAD1	3.0	3.7	1.7	45	72	2.7	3.3	31	29	2.0	1.7	4.3	3.7	2458A	1017B	1106B
FAIRWAY x CRESTED CROSS																
11. Hycrest	3.3	2.7	1.7	42	68	3.0	2.7	32	28	2.0	1.3	4.3	2.3	2688A	1330AB	1363B
12. Hycrest #2	3.0	2.7	1.3	40	61	3.0	4.3	28	27	1.7	1.7	3.3	3.3	2475A	1586AB	1602AB
SIBERIAN WHEATGRASS																
13. P-27	5.3	4.7	3.0	38	51	3.3	4.0	33	32	2.0	1.3	4.7	3.7	2860A	1340AB	1893AB

(1) Emergence and stand uniformity seven weeks after seeding, 5/21/92. Rating: 1=excellent, 5=fair, 9=no emergence.

(2) Weed competition, 7/21/92 and 8/17/93. Rating: 1=none, 5=moderate, 9=severe.

(3) Density estimate; percent of full rows in sample frames, 100% equals full frame, 7/21/92.

(4) Stand within plot, 8/16/94, 8/30/95. Rating: 1=excellent, 5=fair, 9=poor.

(5) Plant height average in inches, 8/17/93, 8/30/95.

(6) Disease problems (primarily stem and leaf rust), 8/17/93. Rating: 1=none, 5=moderate, 9=severe.

(7) Seed production potential, using number of culms as an indicator, 8/17/93, 8/16/94. Rating: 1=excellent, 5=fair, 9=poor.

(8) Vigor (overall plant health), 8/30/95. Rating: 1=excellent, 5=fair, 9=poor.

(9) Forage yield measured as lb/ac oven dry matter, 8/17/93, 8/16/94, 8/30/95. Comparison of means is by Student-Newman-Keul's Multiple Range Test (1993) and Duncan's New Multiple Range Test (1994, 1995), means with same letter for each species grouping (separated by line) are not significantly different (P=.05).

* Entries preceeded by an asterisk are not replicated, forage production data was not collected.

** Only replications 1 and 2 analyzed, no harvest in replication 3 due to severe contamination.

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
INTERMEDIATE WHEATGRASS																
14. Chief	3.0	4.7	1.7	52	60	1.3	1.7	42	38	2.0	1.3	4.7	1.3	4040A	2050A	3008A
15. Clarke	2.7	3.3	2.0	60	75	1.7	2.3	42	33	2.0	1.7	4.7	2.0	4806A	1811A	2748A
16. Reliant	2.0	1.3	1.0	58	77	1.0	2.0	44	35	2.0	1.3	5.0	2.7	4330A	2135A	2805A
17. Oahe	1.7	2.3	1.3	56	61	2.3	1.7	42	35	2.0	1.7	6.3	3.0	3919A	1593A	2829A
18. SD-54	2.0	1.3	1.0	47	66	1.7	2.0	44	38	2.0	1.7	4.3	2.3	5526A	2184A	2665A
19. *Tegmar	1.0	1.0	1.0	88	48	---	---	31	--	2.0	2.0	---	---	----	----	----
20. *Greenar	---	---	1.0	--	58	---	---	37	--	2.0	2.0	---	---	----	----	----
21. Slate	1.3	1.7	1.3	64	70	2.0	1.3	43	38	2.0	2.0	3.7	2.7	3510A	1829A	2469A
22. NETI1	2.7	3.7	2.0	64	64	1.7	1.3	45	40	2.0	1.3	4.7	1.7	3897A	2390A	3163A
23. NETI2	1.7	2.0	1.3	60	70	1.7	1.7	43	39	2.0	1.7	4.0	1.3	4081A	2197A	3228A
24. NETI3	2.0	2.0	1.7	58	60	1.0	1.3	44	41	2.0	1.3	3.3	1.3	4619A	2615A	3213A
25. NE50C3	3.0	2.7	2.0	48	70	1.3	1.7	42	42	2.0	2.0	3.3	1.7	4213A	3014A	3392A
26. NECASPIAN3	2.0	2.7	1.3	62	60	1.0	1.7	47	39	2.0	1.0	3.0	2.0	4592A	2506A	3585A
27. *Amur	---	1.0	1.0	41	40	---	---	43	--	2.0	2.0	---	---	----	----	----
PUBESCENT WHEATGRASS																
28. Greenleaf	3.0	3.3	2.0	56	67	1.7	1.3	44	37	2.0	2.0	6.7	1.7	3978A	2220A	2665A
29. MDN-759	2.7	2.0	1.0	55	64	2.0	2.7	42	35	2.0	2.0	5.3	3.0	3583A	2001A	2630A
30. Manska	2.0	2.3	1.3	44	63	1.3	1.7	41	33	2.0	1.7	3.7	2.0	4300A	2693A	3704A
31. *Topar	---	1.0	1.0	58	52	---	---	31	--	2.0	2.0	---	---	----	----	----
32. *Luna	---	1.0	1.0	60	50	---	---	39	--	2.0	2.0	---	---	----	----	----
TALL WHEATGRASS																
33. Orbit	3.3	5.3	1.7	49	61	2.0	2.3	48	52	2.0	2.0	4.0	2.0	4397A	2151A	2371A
34. Alkar	3.3	4.7	1.7	40	66	2.7	4.0	46	47	2.0	2.0	3.7	3.3	4664A	2162A	2530A
35. Platte	3.0	4.3	1.3	54	63	2.0	2.3	51	45	2.0	2.0	3.0	2.3	3536A	1894A	2652A
36. *Jose	---	1.0	1.0	82	70	---	---	53	--	2.0	2.0	---	---	----	----	----
37. *Largo	---	2.0	1.0	46	51	---	---	53	--	2.0	2.0	---	---	----	----	----
QUACKGRASS																
38. RS Hoffman	3.3	3.3	1.0	48	63	1.3	1.3	38	26	2.0	3.3	7.7	2.7	3454A	1327A	984

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
BLUEBUNCH x QUACK CROSS																
77. RS-1 Hybrid N	3.3	4.0	1.7	40	67	1.7	2.3	44	27	2.0	2.3	7.0	2.7	3768A	1588A	1762A
78. RS-1 Hybrid R	3.0	3.0	1.7	53	64	2.0	2.0	38	26	2.0	3.0	7.0	3.7	3434A	1864A	1782A
SMOOTH BROMEGRASS																
39. Magna	3.3	2.7	1.0	40	77	1.3	1.3	35	37	2.0	2.3	5.3	2.3	3999A	1883AB	1751ABC
40. S-7133	3.0	3.7	2.0	37	66	3.3	2.7	34	33	2.0	3.7	6.7	3.0	2826A	1234ABC	709C
41. Manchar	3.3	3.0	2.0	42	76	1.3	3.7	32	33	2.0	2.0	3.7	3.7	2888A	1389ABC	1040BC
42. Rebound	3.7	2.7	1.3	44	80	1.0	2.7	31	35	2.0	3.3	8.0	3.3	2684A	1388ABC	1248ABC
43. Cottonwood	4.7	3.0	1.0	38	80	1.0	1.7	33	37	2.0	3.3	5.7	2.3	3190A	2016A	1888AB
44. Lincoln	3.0	2.0	1.7	44	76	1.7	2.0	30	31	2.0	3.3	6.7	2.7	3033A	1782AB	2206A
SMOOTH x MEADOW CROSS																
45. S-9183	3.7	2.7	1.7	38	64	3.7	3.3	34	32	2.0	2.7	6.3	2.7	2843A	849C	827BC
MEADOW BROMEGRASS																
46. Fleet	1.7	2.0	1.0	53	76	1.0	1.0	34	18	2.0	4.0	8.0	1.7	3668A	785C	957BC
47. Paddock	2.7	2.0	1.0	54	73	2.0	2.0	32	15	2.0	5.7	8.3	2.7	3139A	841C	1215ABC
48. Regar	2.7	4.3	1.0	33	74	2.3	2.3	29	19	2.0	6.7	8.7	2.0	2855A	1045BC	1203ABC
ORCHARDGRASS																
49. *Paiute	---	3.0	2.0	76	41	---	---	26	--	2.0	8.0	---	---	----	----	----
RUSSIAN WILDRYE																
50. Mayak	4.7	4.0	3.0	40	57	3.3	3.0	40	19	2.0	4.3	9.0	4.0	2105A	282A	520A
51. Swift	4.7	5.0	2.3	26	53	2.7	3.0	40	23	2.0	5.0	9.0	2.7	2439A	738A	599A
52. Cabree	4.3	3.3	1.7	36	63	3.7	4.7	37	13	2.0	3.0	8.7	4.3	2255A	449A	455A
53. Vinall	3.0	4.3	3.0	27	62	3.7	3.0	41	13	2.0	3.3	8.7	3.7	2101A	429A	566A
54. Mankota	5.7	5.3	3.0	41	56	4.0	3.7	42	25	2.0	3.0	8.0	3.7	2327A	504A	714A
55. MDN-1831	5.7	5.7	1.7	31	49	4.0	3.7	40	13	1.7	2.7	8.3	4.3	2356A	548A	516A
56. Bozoisky Select	5.3	4.0	1.7	40	56	0	3.3	46	25	2.0	2.0	8.3	3.0	2513A	620A	809A
57. PI-272136	4.3	2.3	1.7	29	56	3.3	4.3	43	13	2.0	4.0	8.3	3.7	2112A	339A	331A
58. Syn A NL	5.3	5.7	2.0	29	52	5.0	3.7	42	21	2.0	3.3	8.3	2.7	2571A	680A	922A

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
MAMMOTH WILDRYE																
59. ND-691	3.0	3.7	2.0	18	45	3.7	4.3	35	22	2.0	7.7	7.3	3.0	3301A	1433AB	2145A**
60. PI-478832	3.3	4.0	2.0	30	50	2.0	4.0	38	27	2.0	6.7	7.0	2.7	4234A	2088A	3055A**
61. Volga	4.3	4.0	3.0	20	42	4.3	5.3	38	26	2.0	7.3	7.3	4.0	2779A	1609AB	2256A**
EUROPEAN DUNEGRASS																
62. ND-2100	7.0	7.3	7.7	6	19	7.3	8.3	20	14	1.3	9.0	8.7	6.7	1048B	540B	501B**
ALTAI WILDRYE																
63. Prairieland	2.7	3.3	1.7	40	66	1.3	3.0	38	23	2.0	7.7	8.0	3.0	3137A	1555A	1535A**
64. Pearl	3.0	4.0	2.0	33	66	3.3	3.7	38	20	2.0	6.7	7.0	4.0	3104A	1171A	1253A**
65. Eejay	3.3	5.3	3.0	31	62	2.3	2.0	38	27	2.3	8.0	8.0	2.0	3507A	1643A	1648A**
BEARDLESS WILDRYE																
71. Shoshone	5.0	6.0	2.7	9	60	1.3	1.0	27	17	2.0	8.0	9.0	1.3	2223B	1098A	1762A**
DAHURIAN WILDRYE																
66. Arthur	2.3	1.7	1.7	58	71	2.3	3.0	46	31	2.0	1.0	1.7	3.3	4049	955	1143
BASIN WILDRYE																
67. M-718	6.0	5.3	4.0	9	33	5.0	4.7	43	43	7.0	7.7	7.0	3.3	2196A	1758A	2724A
68. PI-478831	2.7	2.0	2.3	32	72	4.0	3.3	40	33	7.0	7.3	7.3	3.3	1498A	1624A	1706A
69. Magnar	4.3	5.7	2.3	26	57	3.0	5.0	44	36	4.0	5.7	6.3	3.3	2431A	2112A	1674A
CANADA WILDRYE																
70. *Mandan	---	2.0	1.0	59	51	---	---	41	--	2.0	1.0	---	---	----	----	----
BEARDLESS BLUEBUNCH																
72. *Whitmar	---	3.0	3.0	69	59	---	---	26	--	2.0	5.0	---	---	----	----	----

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG. 92	WEED (2) COMPETITION 92	93	STAND (3) DENSITY 92	93	STAND (4) RATING 94	95	PLANT (5) HEIGHT 93	95	(6) DISEASE 93	SEED (7) PRODUCTION 93	94	(8) VIGOR 95	FORAGE YIELD (lb/ac) (9) 1993	1994	1995
BLUEBUNCH WHEATGRASS																
73. PI-232127	1.3	3.0	2.0	45	58	2.3	3.3	27	27	3.0	6.7	7.3	3.0	1933A	995A	1530A
74. PI-232128	2.0	3.7	2.0	32	50	2.3	3.3	28	17	2.0	7.3	8.3	2.7	2262A	1212A	1216A
75. Goldar	1.0	3.7	2.0	57	79	2.0	2.3	27	14	2.0	6.7	8.3	2.7	2332A	941A	1487A
76. Secar	1.3	3.0	2.0	61	80	2.7	2.7	28	28	3.3	6.3	8.0	3.7	1975A	1294A	1318A
SHEEP FESCUE																
79. *Covar	---	4.0	7.0	9	22	---	---	20	--	1.0	3.0	---	---	----	----	----
HARD FESCUE																
80. *Durar	---	3.0	5.0	16	38	---	---	28	--	1.0	2.0	---	---	----	----	----
INDIAN RICEGRASS																
81. Mandan 57-2	5.0	6.3	5.3	26	37	6.7	8.3	24	18	2.0	3.0	2.3	7.0	2160A	323A	0
82. Nezpar	5.0	4.0	3.7	19	49	5.7	6.3	28	27	2.0	2.3	4.0	4.7	1960A	403A	0
83. *Paloma	---	6.0	8.0	24	24	---	---	20	--	2.0	3.0	---	---	----	----	----
CANBY BLUEGRASS																
84. *Canbar	5.0	6.0	8.0	2	25	---	---	16	16	5.0	3.0	---	---	----	----	----
GREEN NEEDLEGRASS																
85. Lodorm	3.7	5.7	2.3	45	67	2.3	4.0	36	35	2.0	2.3	2.3	2.3	3322A	1331A	1308A
86. SD-93	3.0	4.0	2.3	23	56	4.3	4.0	35	33	2.0	3.0	3.3	2.3	2196A	1035A	1113A
GREEN NEEDLEGRASS x RICEGRASS CROSS																
87. *Mandan	---	6.0	6.0	24	54	---	---	31	--	2.0	3.0	---	---	----	----	----
STREAMBANK WHEATGRASS																
88. *Sodar	---	6.0	5.0	54	73	---	---	26	--	5.0	5.0	---	---	----	----	----

PROJECT: 38A339X Hettinger, North Dakota

SPECIES/ENTRY/NO.	(1) EMERG.	WEED (2) COMPETITION		STAND (3) DENSITY		STAND (4) RATING		PLANT (5) HEIGHT		(6) DISEASE	SEED (7) PRODUCTION		(8) VIGOR	FORAGE YIELD (lb/ac) (9)		
	92	92	93	92	93	94	95	93	95	93	93	94	95	1993	1994	1995
THICKSPIKE WHEATGRASS																
89. Elbee	2.0	3.0	1.7	48	71	1.7	1.7	28	9	2.0	3.0	8.3	4.0	2046B	412B	547A
90. Critana	3.7	4.0	2.0	43	68	2.0	1.7	26	13	3.7	4.3	8.0	3.0	2480A	711A	1223B
WESTERN WHEATGRASS																
91. Walsh	3.7	4.3	2.3	50	74	1.3	1.0	24	25	2.0	7.0	8.0	3.0	2253A	983B	1871B
92. Rodan	3.3	4.0	1.3	53	79	1.0	1.3	26	22	2.0	6.0	8.3	2.3	3780A	2205AB	2440B
93. *Rosana	---	6.0	3.0	54	57	---	---	22	--	2.0	6.0	---	---	----	----	----
94. Flintlock	3.0	4.0	2.0	36	54	1.3	1.3	31	29	2.0	5.7	8.0	1.3	3575A	2730A	4263A
95. *Barton	---	6.0	3.0	24	50	---	---	26	--	2.0	5.0	---	---	----	----	----
96. *Arriba	---	6.0	3.0	53	49	---	---	30	--	2.0	4.0	---	---	----	----	----
SLENDER WHEATGRASS																
97. Revenue	2.7	1.7	2.0	71	64	2.0	2.7	39	35	2.0	1.0	1.3	2.3	4146A	2011A	2063A
98. Adanac	1.7	2.0	2.3	69	62	1.7	2.3	37	33	2.7	1.3	1.3	1.7	2559B	1143A	1057B
99. Pryor	4.0	2.7	2.3	35	50	4.3	3.7	33	33	2.7	1.7	2.3	3.3	2082B	1367A	1046B
100. *San Luis	---	6.0	3.0	36	59	---	---	35	--	3.0	1.0	---	---	----	----	----
101. Primar	2.0	2.0	2.3	40	62	3.3	2.3	36	33	2.3	1.7	2.3	2.0	2831B	1185A	1469AB

SECTION II

GUEST SPEAKER SECTION

PRESENTED BY

RAMONA EISENBARTH, R.N.
CUSTER DISTRICT HEALTH UNIT
NEW LEIPZIG, NORTH DAKOTA

AT THE

37TH ANNUAL SHEEP DAY

HETTINGER RESEARCH EXTENSION CENTER
HETTINGER, NORTH DAKOTA

FEBRUARY 14, 1996

Q-FEVER

What is Q-fever?

Q-fever is a disease carried by animals and is caused by a small microbe called a rickettsia. The particular rickettsia causing Q-fever is called *Coxiella burnetti*.

What animals carry Q-fever?

Cattle, sheep, goats, and ticks are the primary carriers of the disease, but many other animals may be infected. Cats, at the time they have kittens, have been shown to be a source of infection.

What are the symptoms of Q-fever?

The organism that causes Q-fever often infects people and causes no symptoms at all. When it does cause disease it is most often a respiratory disease. The most prominent symptom is a fever ranging from 104-105 F, many people feel better when this fever subsides. Severe headache, muscle aches, and chest pains often occur. Occasionally inflammation of the liver occurs. On rare occasions Q-fever causes infertility, abortions, neurologic signs, or inflammation of the lining of the chest or heart.

A particular strain of Q-fever can cause a chronic infection of the heart. This strain appears to be a different one than the one usually causing infection in the United States. People who already have a problem with one of their heart valves are particularly susceptible to this strain.

What are the symptoms of Q-fever in animals?

Generally animals show no signs of being infected, however it may occasionally cause abortion.

How is Q-fever spread among animals?

Q-fever is spread from animal to animal by ingestion of the organism, by infected ticks, and by inhalation. When an animal becomes infected the Q-fever organism localizes in the uterus and the mammary gland; therefore, the products of these two organs will be infected.

How are people infected with Q-fever?

Q-fever microbe is shed in the milk, urine, and feces. The usual mode of infection is by inhaling the microbe. Animals, particularly sheep, shed large numbers of organisms during the birth process as the placenta and uterine fluids of these animals will be heavily contaminated and the stress of birthing allows them to flourish unchecked by the animals immune system. Cows shed the bacteria in the milk and pasteurization temperatures are set so the microbe is killed during the pasteurization process. Generally drinking of raw infected milk will not cause the disease, but will result in an immune response.

Normally ticks are not important in the infection of humans; however, if wool is heavily contaminated with tick feces workers involved in the processing of this wool may become infected. Slaughterhouse workers are also at risk due to the aerosolization of the microbe during the butchering process.

Transmission of the disease from person to person is very unusual.

How long after being exposed to Q-fever do signs appear?

Signs will show up in 14 to 39 days, but on average it takes 20 days for signs to appear.

How is Q-fever diagnosed?

Because Q-fever resembles many other diseases it is often overlooked as a cause of disease in humans; therefore, it is important that health care workers be aware of exposure to animals that may be carrying the disease. A simple blood test which detects antibodies to the Q-fever organism may be used to confirm diagnosis.

How is Q-fever treated?

Q-fever is treated with antibiotics. In the case of chronic infection of the heart the antibiotic therapy must be continued for long periods of time.

How can Q-fever be prevented?

Caution when assisting an animal with the birth process and proper disposal of placentas and dead fetuses is important. Burying of these materials may be warranted if Q-fever is a concern. Drinking of raw milk should be discouraged. Straw and manure from lambing and calving pens should be handled carefully to prevent the aerosolization of the microbe.

Unfortunately the Q-fever organism is resistant to many chemical disinfectants and to drying. It may last up to 150 days in the soil. A 1% bleach solution has been shown to kill the organism.

An experimental vaccine is available for those having a high risk of infection. Those having possible prior exposure should be tested for the presence of antibodies to the disease as a severe local reaction to the vaccine may occur if they are vaccinated. An animal vaccine is available, but there is little evidence that its use would be a cost effective means of preventing the disease in people.

As little as one Q-fever organism may cause infection in humans, in fact, outbreaks of Q-fever in humans have been linked to sheep flocks being herded past the homes of those infected.

TABLE 1. Incidence of Eleven Most Common Agricultural Acquired Infections*		
Infectious Disease	1989	1980-1989
Anthrax	0	5
Ascariasis	NA†	NA
Brucellosis	95	1479
Encephalitis	981	8589
Leptospirosis	93	637
Tetanus	63	721
Tularemia	152	2305
Rabies	1	10
Rocky Mountain spotted fever	NA	NA
Q fever	NA	NA
Staph infections	NA	NA

*Adapted from CDC Summary of Notifiable Diseases in the U.S., MMWR 39:3, 1989.
†NA = not available as a reportable infection.

RESPIRATORY RISKS ASSOCIATED WITH AGRICULTURE

TABLE 2. Respiratory Infectious Diseases Associated with Agricultural Work		
Bacterial Disease	Source	Agent
Q fever	Livestock--sheep, cattle	*Coxiella burnetii*
Anthrax	Livestock	*Bacillus anthracis*
Brucellosis	Cattle, pigs	*Brucella sp.*
Psittacosis	Turkeys	*Chlamydia psittaci*
Tularemia	Sheep	*Francisella tularensis*
Mycobacterial disease	Poultry, cattle	*Mycobacterium avium-intracellulare complex*
Leptospirosis	Cattle, sheep	*Leptospira interrogans*
Fungal Disease		
Coccidiomycosis	Farming contaminated soil, Southwest U.S., Mexico	*Coccidioides immitis*
Histoplasmosis	Ranching, poultry waste	*Histoplasma capsulatum*

From: Cordes, D.H. and Rea, D.F. (Editors), Health Hazards of Farming: Occupational Medicine: State or the Art Reviews. July - September, 1991. Volume 6, Number 3.

Q FEVER PRESENCE AMONG NORTH DAKOTA SHEEP PRODUCERS

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Custer District Health Unit

The 1993 lambing season was routine for a south central North Dakota sheep producer. A few weeks later the 37 year old male became ill and thought he had the flu. His symptoms included a cough, fever, chills, fatigue, headache, loss of appetite and loss of weight. Area doctors referred him to the Mayo Clinic which established a diagnosis of Q fever following a bone marrow biopsy. Recovery followed appropriate antibiotic treatment.

As a result of the diagnoses of Q fever among this man and other individuals in sheep production, the North Dakota Department of Health, in conjunction with the National Institute of Occupational Safety and Health (NIOSH), initiated a study to determine the presence of the antibody to Q fever among sheep producers in North Dakota.

A list of approximately 2,500 producers was provided by the Agriculture Stabilization Conservation Service (ASCS). Each individual on this list was sent a letter with information on Q fever and the intent of the study. A 10% random sample of producers in each county was selected and the producer was contacted by telephone by an Agricultural Occupational Health Nurse. The nurse provided further information regarding the study and requested the voluntary participation of all persons on the farm/ranch who had engaged in agricultural activities within the past 10 years. A blood sample was collected and a questionnaire to identify possible risk factors was administered to voluntary participants.

The study was conducted from May to October in 1994. The blood samples were analyzed by the Walter Reed Army Institute laboratory. The results indicated that 17 of 496 (3.4%) blood samples tested had significant antibody levels indicating past or present infection with Q fever.

The individuals with positive results came from throughout the state with thirteen from the southern half of the state. Nine were male and 8 were female. Significant antibody levels were found in all age groups from 20 to 61+. Five farms with reactors had less than 10 sheep and ten reactors had over 100 sheep. Thirteen of the positives were among those who had been in 10 or more years of production and 14 of the total had been in active production during the previous 12 months. One reactor reported not being involved with lambing activities while 11 reported over 10 years of involvement.

Further analysis of the results is in progress to provide information regarding risk factors for infection. The results will be used to provide recommendations for measures to help prevent infection among those at risk.

Since the study, four persons in Southwest North Dakota have been identified and treated for Acute Q fever. Persons becoming ill while working with animals need to report activities to their physician for diagnosis and treatment. Currently, some of the medications used in treatment are tetracycline, doxycycline, quinolones, and rifampin. Chronic Q fever may lead to liver and heart involvement.

Producers need to be alert to the possibility of disease transmitted from animals and seek early medical care to avoid serious complications. Always practice good hygiene and protect self by using gloves, respirators, and protective clothing to decrease the chance of infection.

SECTION III
MANAGEMENT SECTION

TIMOTHY C. FALLER
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MR. ROGER HAUGEN
EXTENSION LIVESTOCK SPECIALIST
NORTH DAKOTA STATE UNIVERSITY

37TH ANNUAL SHEEP DAY

HETTINGER RESEARCH EXTENSION CENTER
HETTINGER, NORTH DAKOTA

FEBRUARY 14, 1996

SHEARING MANAGEMENT

Timothy C. Faller

Hettinger Research Extension Center

Animal production systems are in a constant state of flux. Producers are always making decisions that eventually effect their profitability. Some decisions such as breed selection and sire selection are of a long term nature. Normal management decisions may have long term effects but in general are thought of as only effecting profitability on an annual basis. Time of shearing is one of those management choices that is made on an annual basis and really only effects profitability in one given year. Producers have already made a decision when they wish to lamb and this decision may effect if they decide to shear prior to or after parturition. The potential hazard of environmental and climatic change are essential in determining time of shearing.

The following is a list of considerations for producers when deciding which shearing date might fit them best.

ADVANTAGES

1. Reduced space requirements based on removing the annual wool clip or the provision of needed space for the baby lambs which are soon to arrive. If you shear after lambing you must provide space for the ewe, the wool and the lambs.

2. Warmer and drier lambing facilities are very positive advantages to consider when making shearing time decisions. Wool has a very absorbent characteristic which tends to keep more moisture in the lambing facility when the ewes are in full fleece. Wool is also an excellent insulator which reduces the effect of body heat when the ewes are housed inside in full fleece.

3. It is a well known fact that newborn lambs will find the teat more easily when the udder is bare. If your system requires shearing after lambing then you should shear away all wool from the udder to assist the newborn lamb in finding the teat. You may do this individually as the ewes lamb providing that you are usually present at lambing. If not you should crutch the whole brood ewe flock just prior to the first lamb being born. Crutching does increase variable costs.

4. More ewes will tend to lamb indoors when you allow them to go outside during the day for feeding purposes if they are shorn as opposed to not. Producers may experience a reduced problem with chilled udders when the ewes are shorn and fed outside than when they are crutched and fed outside.

5. A much cleaner wool clip is a major advantage to shearing prior to the onset of lambing. Most wool contamination from the lambing process comes from bedding techniques, lambing fluids, and normal body fluids associated with parturition.

6. Many times a wool break occurs because of the lambing process. It occurs because of normal fevers and stress associated with lambing. If it does occur it is better to have the break on the outside of the fleece than on the inside.

7. Paint brands will remain more legible when the ewe is branded and in short fleece as opposed to the long staple. Shearing after lambing may set up the incidence of having to re-brand the ewes and again increasing variable costs.

8. A major advantage of shearing prior to lambing is that the producer has an opportunity to evaluate and pick up body condition if the ewes are found to be too thin. The producer may find that only certain individuals are too thin possibly because of age differences or the presence of internal parasites. To use this management tool effectively it would suggest that shearing should occur about thirty days prior to the onset of lambing.

9. The most effective time to treat for external parasites is when the ewe is freshly shorn. The elimination of both internal and external parasites prior to lambing is just one less stress the ewe must contend with at this very important time.

After considering the advantages of shearing prior to lambing producers should not fail to equally weigh the disadvantages which may not be as numerous but may be the limiting factors for his operation.

DISADVANTAGES

1. If the sheep producer has selected a very severe or variable climatic time as his best time to lamb and availability of quality housing is limited the sheep producer may chose to shear after lambing. In a future year the producer might adjust his lambing time to better mesh lambing time with the desire to shear in advance of lambing.

2. Taking the wool off the ewes body when it is cold or inclement increases her energy requirement. This clearly says that a shorn ewe requires more feed during bad weather than a ewe with her wool coat on.

After you weigh the pros and cons of shearing time it would appear that most but not all sheep operations would profit by selecting a shearing date prior to the onset of lambing. The producer that does select to shear prior to lambing is faced with some additional management considerations.

Many producers perform a wide array of management tasks approximately 25-35 days prior to the start of lambing. Shearing, treating for internal and external parasites, vaccinating for enterotoxemia, and trimming hooves are all routine management tasks that fit well together. Actual shearing date selection, lining up quality shearers, providing dry, clean housing, and climatic conditions of the date selected are all factors that will influence success of accomplishing actual shearing on the date selected.

Management associated with harvesting of the sheep producers second crop is a very important factor in determining ultimate profitability of the total sheep enterprise.

FLOCK CALENDAR OUTLINE

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The following guidelines are neither inclusive nor intended to fit every sheep operation. Each operation is different, therefore each "calendar of events" should be tailored to each flock's needs.

PRIOR TO BREEDING

1. Bag and mouth ewes and cull those that do not meet requirements.

2. Replace culled ewes with top-end yearlings or ewe lambs.

3. Keep replacement ewe lambs on growing ration.

4. Evaluate sires:

    a. Be sure they are vigorous, healthy and in good breeding condition.

    b. Rams should be conditioned at least a month before the breeding season. Flush rams in poor condition.

    c. Allow at least two mature rams (preferably three) or four buck lambs per 100 ewes.

    d. Use production records if available.

5. Flush ewes:

    a. 1 pound grain/day two weeks to five weeks before breeding (usually 17 days).

    b. If ewes are over-conditioned, the effect of flushing will be lessened.

6. Vaccinate all ewes for vibriosis and enzootic abortion (EAE) 50 days prior to breeding and booster 21 days later all ewe lambs and new ewes in the flock.

7. Identify all ewes and rams with ear tags, paint brands or tattoos.

BREEDING

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

2. Use a ram marking harness or painted brisket to monitor breeding. Soft gun grease with paint pigment mixed in works well for painting the brisket. A color sequence of orange, red and black is recommended with colors being changed every 17 days.

3. Leave rams in NO LONGER than 51 days (35 days is more desirable).

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

4. Remove rams from ewes after the season (don't winter rams with ewes).

PRIOR TO LAMBING - EARLY PREGNANCY (First 15 Weeks)

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

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

3. An exception to the above is feeding pregnant ewe lambs. They should receive good quality roughage and grain (about 20 percent of the ration) during this period.

LAST SIX WEEKS BEFORE LAMBING

1. Trim hooves and treat for internal parasites.

2. Six to four weeks before lambing feed 1/4 to 1/3 pound grain/ewe/day.

3. Shear ewes before lambing (even up to one to two weeks prior is satisfactory). Keep feeding schedule regular and watch weather conditions immediately after shearing (cold).

4. Vaccinate ewes for enterotoxemia.

5. Control ticks and lice immediately after shearing.

6. Four weeks before lambing increase grain to 1/2 to 3/4 pound/ewe/day (usually done immediately after shearing).

7. Give A-D-E preparations to ewes if pastures and/or roughage are or have been poor quality.

8. Feed selenium-vitamin E or use an injectable product if white muscle is a problem. **Caution** Don't do both.

9. Check facilities and equipment to be sure everything is ready for lambing.

10. Two weeks before lambing increase grain to 1 pound per ewe per day.

LAMBING

1. Be prepared for the first lambs 142 days after turning the rams in with the ewes, even though the average pregnancy period is 148 days.

2. Watch ewes closely. Extra effort will be repaid with more lambs at weaning time. Saving lambs involves a 24-hour surveillance. Additional help at this time is money well spent.

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

4. Grain feeding the ewes during the first three days after lambing is **not** necessary!

5. Be available to provide assistance if ewe has troubles.

6. Disinfect lamb's navel with iodine as soon after birth as possible.

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

8. Use additional heat sources (heat lamps, etc.) in cold weather.

9. Brand ewe and lambs with identical number on same sides. Identify lambs with ear tags, tattoos or both.

10. Turn ewe and lambs out of jug as soon as all are doing well (one to three days).

11. Bunch up ewes and lambs in small groups of four to eight ewes and then combine groups until they are a workable size unit.

12. Castrate and dock lambs as soon as they are strong and have a good start (two days to two weeks of age). Use a tetanus toxoid if tetanus has been a problem on the farm (toxoids are not immediate protection. It takes at least 10 days for immunity to build).

13. Vaccinate lambs for soremouth at one to two weeks of age if it has been a problem in the flock.

14. Provide a place for orphaned lambs. Make decision on what lambs to orphan as soon after birth as possible for the best success. Few ewes can successfully nurse more than two lambs.

END OF LAMBING TO WEANING

1. Feed ewes according to number of lambs suckling. Ewes with twins and triplets should receive a higher plane of nutrition.

2. Provide creep feed for lambs (especially those born during the winter and early spring).

3. Vaccinate lambs for overeating at five weeks and seven weeks of age.

WEANING

1. Wean ewes from lambs, not lambs from the ewes. If possible, remove ewes from pen out of sight and sound of lambs. If lambs have to be moved to new quarters, leave a couple of ewes with them for a few days to lead the lambs to feed and water locations.

2. Lambs should be weaned between 50 and 60 days of age or when they weigh at least 40 pounds and are eating creep and drinking water. The advantage of early weaning is that the ewe's milk production drops off to almost nothing after eight weeks of lactation.

3. Grain should be removed from the ewe's diet at least one week prior to weaning and low quality roughage should be fed. Restriction of hay and water to the ewe following weaning lessens the chance of mastitis to occur. Poorer quality roughage should be fed to the ewes for at least 10 to 14 days following weaning.

4. Handle the ewes as little as possible for about 10 days following weaning. Tight udders bruise easily. If possible, bed the area where the ewes will rest heavily with straw to form a soft bed for the ewes to lay on.

WEANING TO PRE-BREEDING

1. If ewes go to pasture, treat for internal parasites.

2. Feed a maintenance ration to the ewes. Put ewe lambs that lambed back on a growing ration once they have quit milking.

3. Adjust ewe's conditions so they can be effectively flushed for next breeding season. Don't get ewes too fat prior to breeding.

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 but will cost approximately $1.00 per pound and each lamb will require from 15 to 20 pounds.

2. Use good equipment. Self priming nipple and tube assemblies have been found to be excellent for starting orphans. Many types of feeding systems can be homemade.

3. Start on nurser quickly. Young lambs start easier. Check ewe's 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 Formaldehyde solution commercially available that retards bacterial growth in milk (1 cc/gallon milk).

6. Vaccinate to protect against overeating. For immediate short term (two weeks) protection use antitoxin. For long term protection use bacterial toxoids (cl. perfringens 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 ounce 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.

SHEEPBARNS AND EQUIPMENT PLANS

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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'x72', Feeder Lamb Barn	3.00
MW 72506	240 Ewe and Lambing Barn, 40'x104'	3.00
MW 72507	500 Ewe and Lamb Feeding Barn, 74'x256'	3.00
MW 72508	12' x 16' Portable Lamb Feeding Shed	2.00
MW 72509	40 Ewe and Lambing Barn, 24x32'	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 90 page booklet was revised in 1994. It includes barn and layout planning plus plans for fences and sheep equipment.)	10.00
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