MANAGEMENT STRATEGIES TO EFFECTIVELY

CONTROL LEAFY SPURGE IN RANGELAND

BY GRAZING SHEEP

(Progress report)

Timothy C. Faller, Paul Berg, 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 use 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. Unit cost of production is one of the critical factors impacting gross income and net profit for the sheep producer. Unit cost of production is also one of the critical control points for profitable beef production (Hughes, 1998)

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 utilizer 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, it offers the potential to reduce UCOP for both enterprises. An acceptable alternative may be to develop a cooperative structure that would establish sheep production units owned by cattle producers in areas where there are high concentrations of leafy spurge. These units might serve as a form of economic development for communities in the spurge impacted area. 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 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 software enterprise analysis was developed to assist sheep producers evaluate the economics of their operation (Nudell, 1994). Sheepbud is S.P.A. tested and 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 (TA) 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 breed type yearling replacement ewes mayl be added annually to keep numbers relatively constant. 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 yearling replacement ewes of an existent accelerated lambing flock. (HI).

High Intensity Approach (HI)

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 1.3 lambings annually and presenting 1.4 lambs per lambing. This provides nearly 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 fall born ewes which are similar age to the ewes in the other groups.

Traditional Approach (TA)

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 60 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 60 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 TA 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 financial analysis program to cross reference comparisons.

Duration

The data accumulated from four 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.)

1998 Results and Discussion

The results presented are preliminary and provided for discussion only. A detailed systems evaluation of the data will be conducted at the conclusion of the project. Tables 1-6 represent performance data for the ewes of the five management systems for the years 1995 through 1998. Tables 1 and 3 give production information for the various ewe types and management systems lambing in the project. Tables 2 and 4 indicate performance of the lambs born in the project to a 60 day weaning time. Lambs born and reared on grass were weighed at a similar date and left on the ewe. Table 5 indicates reproductive performance of a similar age group of Rambouillet ewes HI on an accelerated lambing project as a control and table 6 the performance of those HI generated lambs.

Tables 7-11 merge data to look at some other questions that have been popular producer questions. Again this assembly of data is for discussion purposes only as it will require at least one productive lifetime to get a feeling for differences in the systems of production.

*It should be specifically noted that there is no selection for performance during the course of this

project which will account for lower production because of deficiencies in maternal traits. The only criteria for removal from the trial is failure to perform reproductivly or total lack of milk production.

Table 7 merges data for the years 1995 through 1998 for the purpose of comparing breed, lambing time and system. Table 8 merges lambing times to compare breed and system. Table 9 merges breed types and lambing time to make a comparison of systems. Table 10 merges breed type and system to compare lambing times for the MA systems and further compares that to the LI system. Table 11 merges systems and lambing time to compare breeds. The HI control group data is not incorporated in any of the merged data sets.

Table 1. Reproductive performance of Rambouillet ewes under five different rearing strategies.

	JANUARY LAMBING				**MAY LAMBING**					
	1995-1997		**1998**		**1995-1997**			**1998**		
BREED TYPE	RXR	RXR	RXR	RXR	RXR	RXR	RXR	RXR	RXR	RXR
REARING TYPE	IN	OUT	IN	OUT	IN	OUT	PAST	IN	OUT	PAST
EWE AGE @ LAMBING IN MONTHS	35	35	50	50	39	39	39	54	54	54
EWES EXPOSED	98	98	29	30	86	92	88	29	32	31
EWES LAMBING	87	93	25	30	77	81	79	27	31	28
LAMBS BORN	151	156	42	62	117	119	*	44	43	*
LAMBS WEANED	125	122	34	38	82	87	79	35	33	28
LAMBS WEANED PER EWE EXPOSED	1.28	1.24	1.17	1.27	.95	.95	.90	1.21	1.03	.90

R = RAMBOUILLET

M = MONTADALE

PAST = PASTURE

IN = CONFINEMENT REARING

OUT = BARN AND LOT REARING

8 = NO RECORD

Table 2. Performance of lambs born of Rambouillet ewes reared on five different strategies.

	JANUARY LAMBING				**MAY LAMBING**					
	1995-1997		**1998**		**1995-1997**			**1998**		
BREED TYPE	RXR	RXR	RXR	RXR	RXR	RXR	RXR	RXR	RXR	RXR
REARING TYPE	IN	OUT	IN	OUT	IN	OUT	PAST	IN	OUT	PAST
WEAN WT (LBS)	45.77	48.26	50.70	47.91	30.88	33.31	40.06	21.97	23.79	26.21
WEAN AGE DAYS	68.90	67.85	71.32	71.50	48.62	49.12	**48.23**	21.60	24.48	**23.04**
WEAN WT CORRECTED TO 60 DAYS (LBS)	39.8	42.5	42.6	40.2	38.0	40.6	49.7	43.0*	44.8*	53.9*
POUNDS LAMB WEANED PER EWE EXPOSED @ 60 DAYS	50.9	52.7	49.8	51.1	36.1	38.6	44.7	55.1	46.2	48.5

R = RAMBOUILLET

M = MONTADALE

WEAN AGE IN BOLD PRINT CALCULATED FROM AVERAGE OF OTHER SIMILAR GROUPS.

* 50 PERCENT OF AVE BIRTH WT. SUBTRACTED TO CORRECT TO SIXTY DAYS DUE TO EARLY WEAN WT.

Table 3. Reproductive performance of Montadale-Rambouillet cross ewes under five different rearing strategies.

	JANUARY LAMBING				MAY LAMBING					
	1995-1997		1998		1995-1997			1998		
BREED TYPE	MXR	MXR	MXR	MXR	MXR	MXR	MXR	MXR	MXR	MXR
REARING TYPE	IN	OUT	IN	OUT	IN	OUT	PAST	IN	OUT	PAST
EWE AGE @ LAMBING IN MONTHS	35	35	50	50	39	39	39	54	54	54
EWES EXPOSED	105	94	40	33	89	86	90	33	29	30
EWES LAMBING	90	84	34	31	84	82	85	32	29	29
LAMBS BORN	133	125	60	57	104	115		42	51	
LAMBS WEANED	111	98	55	42	81	91	88	31	39	47
LAMBS WEANED/PER EWE EXPOSED	1.06	1.04	1.38	1.27	.91	1.06	.98	.97	1.45	1.57

R = RAMBOUILLET

M = MONTADALE

PAST = PASTURE

IN = CONFINEMENT REARING

OUT = BARN AND LOT REARING

* NO RECORD

* ULTRASOUND UTILIZED TO DIAGNOSE DRY EWES ('96)

Table 4. Performance of lambs born of Montadale-Rambouillet cross ewes reared on five different strategies.

	JANUARY LAMBING				**MAY LAMBING**					
	1995-1997		**1998**		**1995-1997**			**1998**		
BREED TYPE	MXR	MXR	MXR	MXR	MXR	MXR	MXR	MXR	MXR	MXR
REARING TYPE	IN	OUT	IN	OUT	IN	OUT	PAST	IN	OUT	PAST
WEAN WT (lbs)	47.32	50.44	46.86	46.21	32.29	35.93	39.37	18.9	16.6	23.3
WEAN AGE DAYS	66.28	70.53	67.16	71.05	43.47	51.27	47.97	22.5	21.2	21.9
WEAN WT CORRECTED TO 60 DAYS (lbs)	41.2	42.9	41.7	38.9	44.6	42.0	49.2	50.4	46.9	64.1
POUNDS LAMB WEANED PER EWE EXPOSED @ 60 DAYS	43.7	44.6	57.6	49.3	40.6	44.6	48.2	48.9	68.0	100.6

R = RAMBOUILLET

M = MONTADALE

WEAN AGE IN BOLD PRINT CALCULATED FROM AVERAGE OF OTHER SIMILAR GROUPS.

Table 5. Reproductive performance of Rambouillet ewes HI on an accelerated lambing strategy.

BREED TYPE	R X R			
	1995	**1996**	**1997**	**1998**
LAMBING TIME	JAN/SEPT	JAN/SEPT	JAN/SEPT	JAN/SEPT
REARING TYPE	IN/OUT	IN/OUT	IN/OUT	IN/OUT
EWE AGE IN MONTHS	16/24	16/24	16/24	16/24
TOTAL EWES	98	121	93	116
EWES LAMBING	63/59	89/67	78/61	84/82
DRY EWES (TOTAL)	14	8	6	1
LAMBS BORN	81/88	114/90	113/69	121/99
LAMBS WEANED	64/76	90/86	79/55	71/70

R = RAMBOUILLET

IN = CONFINEMENT REARING

Table 6. Performance of lambs born of Rambouillet ewes HI on an Accelerated lambing strategy.

BREED TYPE	R X R			
	1995	**1996**	**1997**	**1998**
LAMBING TIME	JAN/SEPT	JAN/SEPT	JAN/SEPT	JAN/SEPT
WEAN WT (LBS)	39.3/42.9	44.7/32.6	41.6/41.6	41.6/36.2
WEAN AGE (DAYS)	64.3/65.2	62.9/56.1	66.7/63.6	59.3/57.6
WEAN WT (LBS) CORRECTED TO 60 DAYS	36.6/39.6	42.6/34.9	37.4/39.2	42.0/37.6

TOTAL LBS OF LAMB PRODUCED/EWE @ 60 DAYS (lbs)	56.6	56.5	55.0	49.7

R = RAMBOUILLET

* =EXTREMELY WET CONDITIONS IN LOTS

Table 7. Merged data for the years 1995 - 1998 for the purpose of comparing breed, lambing time and system.

	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
EWES EXPOSED	145	123	127	128	122	115	120	115	124	119
EWES LAMBING	124	113	112	123	116	111	114	104	112	107
LAMBS BORN	193	176	193	218	146	166		161	162	
LAMBS BORN/EWES EXPOSED	1.33	1.43	1.52	1.70	1.20	1.44		1.40	1.31	
LAMBS WEANED	166	140	159	160	113	133	135	117	120	107
LAMBS WEANED/EWES EXPOSED	1.14	1.14	1.25	1.25	.93	1.16	1.13	1.02	.97	.90

Table 8. Merged lambing times to compare breed and system.

BREED TYPE AND SYSTEMS						
BREED TYPE	MXR	MXR	MXR	RXR	RXR	RXR
REARING TYPE	IN	OUT	PAST	IN	OUT	PAST
EWES EXPOSED	267	238	120	242	247	119
EWES LAMBING	240	224	114	216	235	107
LAMBS BORN*	339	342	114	216	235	
LAMBS WEANED	279	273	135	276	280	107
LAMBS WEANED/EWE EXPOSED	1.04	1.20	1.13	1.14	1.13	.90

* DOES NOT INCLUDE PASTURE BORN LAMBS

Table 9. Merged breed types and lambing time to make a comparison of systems.

LAMBING SYSTEMS			
	IN	**OUT**	**PAST**
EWES EXPOSED	509	485	239
EWES LAMBING	456	459	221
LAMBS BORN*	692	722	
LAMBS WEANED	555	553	242
LAMBS WEANED /EWE EXPOSED	1.09	1.14	1.01

* DOES NOT INCLUDE PASTURE BORN LAMBS

Table 10. Merged breed type and system to compare lambing times for the MI systems and further compares that to the LI system.

LAMBING TIME AND SYSTEM			
	MI		LI
	JANUARY (In & Out)	MAY (In & Out)	MAY (Past)
EWES EXPOSED	523	476	239
EWES LAMBING	472	445	221
LAMBS BORN*	780	635	
LAMBS WEANED	625	483	242
LAMBS WEANED/EWE EXPOSED	1.20	1.14	1.01

* DOES NOT INCLUDE PASTURE BORN LAMBS

Table 11. Merged systems and lambing time to compare breeds. The HI control group data is not incorporated in any of the merged data sets.

	BREEDS	
	MXR	RXR
EWES EXPOSED	625	608
EWE LAMBING	578	558

LAMBS BORN*	681	733
LAMBS WEANED	687	663
LAMBS WEANED/ EWE EXPOSED	1.10	1.09
CORRECTED # LAMB @ 60 DAYS	49.75	46.49

*DATA DOES NOT INCLUDE PASTURE BORN LAMBS

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.

As this project has moved forward through a productive lifetime of the ewes involved the LI group has been extremely interesting to observe. Productivity of the Montadale x Rambouillet crossbred ewes has steadily improved and straight Rambouillet ewes has decreased. Two factors appear to be influencing the data; 1) more large teats are developing on the Rambouillet ewes as they age as compared to the crossbred ewes. 2) prolificacy is greater for the Rambouillet ewes than the crossbred ewes. Both factors may have negative effects on attempting to pasture lamb unattended.

The increasing success of the crossbred ewes for unattended pasture lambing opens up the necessity of further research to see if the system can be perfected and if there are breeds with greater potential than those tested. While this research was initiated to support a systems approach to leafy spurge control the outcome also indicates potential for low input farm flock enterprises not based solely on invasive weed control.

References

Leistritz, F.L., D.E. Bangsrud and J.A. Leith. 1994. Economic Impact of Leafy Spurge in North Dakota. Leafy Spurge News Vol XVI Issue 1.

National Agricultural Statistics Service 1993. Sheep and Lamb Inventory. USDA, Washington, D.C.

Nudell, D.J., Where Will My Business Records Take Me. 35th Annual Western Dakota Sheep Day Progress Report.

Hughes H., 1998. "Profit Benchmarks For Northern Plains Beef Cow Herds", Market Advisor Jan 22, 1998.