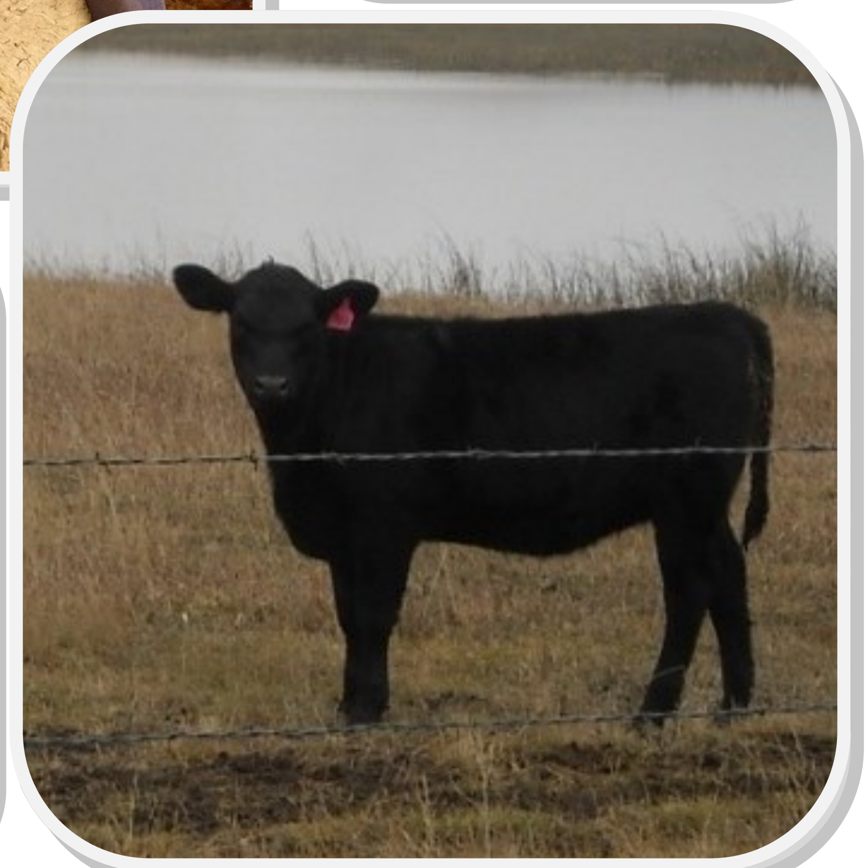

North Dakota State University

Hettinger Research Extension Center

2012 Annual Report

NDSU | HETTINGER
RESEARCH EXTENSION CENTER

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NORTH DAKOTA AGRICULTURE EXPERIMENT STATION

Hettinger Research Extension Center

HREC Research in Brief

- Integrated crops, livestock, range, and applied economics research
- Variety, herbicide, and crop production research
- Lamb and beef feedlot nutrition and management
- Reproductive management of fall, winter, and spring lambing ewes
- Alternative, co-product, and "Natural" feeds for ruminants
- Multiple-land use management including cropping systems, livestock, and wildlife as potential outputs
- Range monitoring techniques
- Land transfer patterns in SW North Dakota over the past 20 years

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NDSU HETTINGER Research Extension Center

The Hettinger Research Extension Center (HREC) was established from a gift of 160 acres by the residents of Adams County and the city of Hettinger in 1909. Original work at the HREC involved converting native prairie to farm land for the purpose of agronomic research. In 1912, through cooperation with the United States Department of Agriculture, a dry land farming trial began. In 1913 a herd of Guernsey and Jersey cows and bulls was purchased to aid local producers in the production of replacement dairy cattle. Following a brief closure during the Depression, the HREC continued to grow the research programs, focusing on agronomy and sheep breeding. In 1947, an option was secured for the purchase of an extra quarter of land to continue and expand sheep and agronomy research. In the 1980's the research programs were solidified with the addition of land bringing the total owned land to 1130 acres, and the hiring of an agricultural economist and an agronomist.

The HREC is a semi-arid site located in southwest North Dakota, providing the most southerly NDSU location in the non-glaciated portion of North Dakota as a site for its agronomy research program. The HREC also is located at the center of the North Dakota sheep industry, the focus of one of its animal research programs. Furthermore, the HREC is located an area of rapidly growing livestock feeding ventures, another focus of animal research at the HREC. Additionally, the HREC is located in a region where much of the land base is in the Conservation Reserve Program and Forest Service lands, which has resulted in additional research evaluating potential changes in the CRP program and how these changes may affect upland native and game bird populations. A new research program evaluating low-cost rangeland monitoring strategies on U.S. Forest Service lands has resulted in a significant increase in the quantity of rangeland, livestock, and wildlife interaction research conducted at the HREC throughout the Western Dakotas. Research at HREC involves the disciplines of animal science, range and wildlife science, agronomy, and agri-business and applied economics. Collaboration is with Main Station scientists, Branch Station scientists, U.S. Forest Service, grazing associations, university scientists from WY, SD, and MT, and USDA research entities in these research disciplines to improve the productivity of livestock and cropping systems and economic development of the region. Through these efforts, the center's research program has gained a national reputation for its involvement with sheep production systems as well as a strong regional and state reputation for its research in agronomy, multiple-land use, and applied economics.

AGRONOMY

- Distributed foundation seed produced at NDSU research centers, making new varieties available to southwest North Dakota producers.

- Conducted crop variety, forage, plant disease, and herbicide trials as well as off-station variety testing at Regent, Scranton, New Leipzig, Selfridge, and Mandan.
- Conducted biofuel trial in conjunction with other REC's.
- Evaluate new varieties and technologies for drought tolerant corn and wheat and preventing damage from wheat stem sawfly.

RANGE AND LIVESTOCK

- Began a multi-agency and discipline research project evaluating the reclamation of grazing lands inhabited by prairie dogs on the Standing Rock Sioux Reservation.
- Started new project evaluating rangeland restoration and wildlife habitat opportunities on the Elkhorn Ranch near Medora, ND.
- Evaluated the use of cover crops for soil health benefits and for fall grazing of pregnant ewes.

HREC Crops, Livestock, Range and Economics

- Conducted multiple research projects evaluating environmental and economic consequences of multiple-use management of agricultural lands in the Northern Great Plains including nesting success of upland birds, telemetry of upland chicks, and land transfer patterns in the region during the past 20 years.

- Continued research in "Value Added Animal Production"; a research program focused on evaluating forage, grain, byproduct, and marketing alternatives in calf backgrounding and lamb finishing.

- Evaluated supplementation strategies during pregnancy and their effect on embryonic death loss, fetal development, and potential feedlot and reproductive performance of offspring.

- Conduct the Dakota Fall Performance Ram Test; a 140 day Rambouillet Certificate of Merit program, one of three Rambouillet Ram Tests in the nation.

ECONOMICS

- Evaluation of opportunities and constraints created by changing land ownership patterns in the Northern Great Plains.

- Expanding Ruminant Livestock Production in the Northern Great Plains: An Assessment of Resources, Opportunities and Constraints.

OUTREACH

- Conduct annually the HREC Beef Day, Sheep School, Shearing School, Wool Classing School, Carcass Ultrasound School, Crops Tours, Crops Day, and Sportsmen's Night Out.

- Published "Importance of Range Monitoring" video.

- Published NDSU Sheep Research Report and Hettinger Crops Day Report and contributed to NDSU Beef and Range Report and Feedlot Research Report.

- In the past two years, published 8 refereed journal articles, 24 proceedings and abstracts, and co-authored over $3 million in grants and contracts directly at the Hettinger REC.

HREC Research Faculty

Dr. Christopher Schauer, Director & Animal Scientist
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Dr. Benjamin Geaumont, Wildlife and Range Scientist
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NDSU HETTINGER Research Extension Center

Weather Data Summary - Hettinger

	$30^{o}F$	Normal $32^{o}F$
Date of Last Frost	May 11	May 18
Date of First Frost	September 12	September 20
Frost Free Days	**125**	**125**

Precipitation

Precipitation (inches)	2007 – 08	2008 - 09	2009 – 10	2010 – 11	2011-12	57 Year Average
Sept. – Dec.	1.26	6.23	4.66	4.80	0.69	3.31
Jan. – March	0.87	5.16	1.16	2.84	1.07	1.49
April	0.98	1.10	1.76	2.31	2.95	1.63
May	4.01	1.38	3.73	4.61	2.20	2.63
June	4.08	3.53	2.93	3.39	2.35	3.30
July	1.23	2.20	3.68	1.85	3.95	2.07
August	1.75	3.47	2.41	2.30	2.22	1.72
Total	**14.18**	**23.07**	**20.27**	**22.10**	**15.43**	**16.18**

Air Temperature

Average Temp. F^{o}	2008	2009	2010	2011	2012	57 Year Average
April	40.1	38.2	44.8	39.4	46.9	42.8
May	52.0	52.0	50.0	50.2	53.6	53.8
June	59.7	58.8	62.0	62.0	66.6	63.2
July	71.1	64.6	67.6	71.3	75.3	70.2
August	70.0	63.0	68.6	65.3	67.9	68.8
September	56.6	62.6	56.3	56.9	59.4	57.8

2012 Hard Red Spring Wheat Variety Trial at Hettinger

Variety	Days to Head	Plant Height	Test Weight	Grain Protein	Grain Yield 2010	Grain Yield 2011	Grain Yield 2012	Average Yield 2 yr	Average Yield 3 yr
	*	inches	lbs/bu	%	Bushels per acre				
Sabin	78	33	60.9	15.1	92.7	47.5	82.7	65.1	74.3
Reeder	78	37	58.2	16.6	86.1	49.4	73.0	61.2	69.5
Velva	78	37	57.6	15.7	77.4	49.0	79.1	64.0	68.5
Brennan	75	32	61.0	15.9	74.7	49.9	79.9	64.9	68.2
WB Digger	76	37	59.3	15.7	80.3	38.6	83.5	61.0	67.5
SY 605 CL	75	36	61.1	16.2	70.2	51.7	80.3	66.0	67.4
Elgin	77	39	58.8	16.3	73.2	50.1	77.0	63.6	66.8
Edge	77	34	58.8	16.8	76.9	48.5	74.5	61.5	66.6
Breaker	78	37	60.6	16.3	76.3	44.2	76.2	60.2	65.6
Samson	76	31	59.1	16.0	64.0	53.2	79.2	66.2	65.5
Kelby	76	33	61.2	16.0	67.2	49.9	78.4	64.2	65.2
Prosper	82	37	59.8	15.6	78.2	40.0	76.6	58.3	64.9
Jenna	76	38	58.5	16.5	73.4	48.9	72.0	60.4	64.8
Select	75	34	60.6	15.3	74.9	44.7	73.1	58.9	64.2
Howard	75	35	61.2	15.0	72.2	46.1	73.0	59.6	63.8
Steele-ND	77	38	59.2	16.7	78.9	38.6	72.2	55.4	63.2
Barlow	76	38	59.8	16.4	68.9	45.5	71.5	58.5	62.0
ND 901CL	78	37	60.3	17.2	76.5	38.9	69.0	54.0	61.5
Mott	82	38	59.7	16.5	70.0	39.3	73.2	56.2	60.8
RB07	75	34	59.9	16.0	63.6	35.8	79.5	57.6	59.6
Briggs	82	35	59.8	15.8	58.4	43.3	75.3	59.3	59.0
Faller	81	35	58.2	15.7	68.8	38.0	68.8	53.4	58.5
Glenn	75	38	61.6	16.7	62.5	39.5	71.4	55.4	57.8
Vantage	82	35	60.4	17.7	67.4	37.8	67.6	52.7	57.6
SY Soren	77	33	60.2	15.8		48.8	82.2	65.5	
Advance	77	34	62.0	14.2		44.0	84.9	64.4	
Forefront	75	38	60.0	15.7		46.0	75.7	60.8	
SY Tyra	78	32	56.0	15.1		37.0	82.5	60.8	
WB Mayville	77	33	59.3	16.2		41.6	76.6	59.1	
Rollag	76	35	61.1	16.5		35.2	80.4	57.8	
WB Gunnison	75	34	59.7	15.0		30.3	70.3	50.3	
Alpine	78	36	58.4	15.3			84.4		
Duclair	75	36	57.8	15.3			77.0		
Norden	78	34	60.5	15.3			76.5		
Trial Mean	77	36	59.7	16.0	75.4	42.1	75.9	--	--
C.V. %	0.9	3.6	1.3	1.9	6.6	6.6	4.6	--	--
LSD 10%	1	2	0.9	0.4	5.4	3.5	4.1	--	--

* Days to Head = the number of days from planting to head emergence from the boot.

Planting Date: March 28
Harvest Date: July 25
Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
Previous Crop: 2009 & 2011 = field pea, 2010 = HRSW.

2012 Hard Red Spring Wheat Variety Trial at Scranton

Cooperator: Justin Freitag, Scranton

Variety	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	%	------------- Bushels per acre -------------				
RB07	33	60.0	14.7	62.6	33.0	51.3	42.2	49.0
Velva	37	55.5	14.6	58.7	31.5	50.1	40.8	46.8
Glenn	40	58.5	16.4	60.5	27.8	50.7	39.2	46.3
Mott	39	56.8	16.5	61.3	34.3	43.3	38.8	46.3
Barlow	39	56.6	16.5	54.4	34.5	48.9	41.7	45.9
Steele-ND	37	53.9	15.1	55.6	30.1	46.0	38.0	43.9
Faller	37	51.8	15.7	59.9	28.0	41.1	34.6	43.0
Sabin	37	57.8	15.5		35.5	49.4	42.4	
SY Soren	33	57.2	16.1		29.7	53.1	41.4	
Select	38	57.7	13.9		29.9	51.2	40.6	
Prosper	37	53.4	14.9		28.9	44.0	36.4	
Elgin	40	57.9	13.9			58.2		
Trial Mean	37	56.6	15.4	58.2	28.7	49.3	--	--
C.V. %	2.7	2,6	5.1	5.2	5.2	5.8	--	--
LSD 10%	1	1.8	0.9	3.4	1.6	3.4	--	--

Planting Date: April 4
Harvest Date: July 30
Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
Previous Crop: HRSW
Note: The 2011 trial sustained moderate infections of bacterial leaf streak and barley yellow dwarf causing lower test weights and grain yields.

2012 Hard Red Spring Wheat Variety Trial at Regent

Cooperators: August and Perry Kirschmann, Regent

Variety	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	%	------------- Bushels per acre -------------				
RB07	33	60.0	14.7	47.6	35.2	53.6	44.4	45.5
Velva	37	55.5	14.6	49.3	34.9	52.4	43.6	45.5
Mott	39	56.8	17.5	51.5	33.8	45.2	39.5	43.5
Barlow	39	56.6	16.5	47.3	30.4	51.1	40.8	42.9
Glenn	40	58.5	16.4	48.3	27.0	53.0	40.0	42.8
Steele-ND	37	53.9	15.1	49.2	30.8	48.1	39.4	42.7
Faller	37	51.8	15.7	48.0	34.3	43.0	38.6	41.8
SY Soren	33	57.2	16.1		34.8	55.5	45.2	
Select	38	57.7	13.9		35.4	53.5	44.4	
Sabin	37	57.8	15.5		32.7	51.6	42.2	
Prosper	37	53.4	14.9		30.0	46.0	38.0	
Elgin	40	57.9	13.9			60.9		
Trial Mean	37	56.6	15.4	48.2	31.2	51.5	--	--
C.V. %	2.7	0.8	5.1	6.0	5.4	5.8	--	--
LSD 10%	1	1.8	0.9	3.1	1.8	3.5	--	--

Planting Date: April 4
Harvest Date: July 31
Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
Previous Crop: HRSW
Note: The 2011 trial sustained moderate infections of bacterial leaf streak and barley yellow dwarf causing lower test weights and grain yields.

2012 Hard Red Spring Wheat Variety Trial at Mandan

Cooperator: USDA-ARS, Mandan

Variety	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2009	2010	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	%	------------- Bushels per acre -------------				
Mott	41	59.3	12.2	67.0	71.1	69.1	70.1	69.1
Barlow	42	59.1	12.5	63.2	64.3	71.2	67.8	66.2
Faller	38	56.7	11.8	69.2	61.4	64.5	63.0	65.0
Steele-ND	38	58.8	12.0	54.6	64.6	66.5	65.6	61.9
Glenn	42	61.2	12.6	54.1	60.4	65.4	62.9	60.0
Velva	38	57.7	11.4		69.6	70.2	69.9	
RB07	35	58.3	12.5		62.9	69.0	66.0	
Sabin	38	59.9	11.9			77.4		
SY Soren	34	58.9	12.1			77.1		
Select	41	59.9	11.4			75.7		
Elgin	41	58.4	11.7			69.1		
Prosper	38	58.0	11.2			68.1		
Trial Mean	39	58.8	11.9	61.9	64.1	70.0	--	--
C.V. %	3.5	0.8	3.8	5.0	4.4	3.1	--	--
LSD 10%	2	0.6	0.5	3.4	3.0	2.6	--	--

Planting Date: April 3
Harvest Date: August 1
Seeding Rate: 1.1 million live seeds / acre (approx. 1.6 bu/A).
Previous Crop: 2008 & 2011 = HRSW, 2009 = field pea.

2012 Winter Wheat Variety Trial at Hettinger

Variety	Spg Plant Stand*	Heading Date	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2009	2010	2012	Average Yield 2 yr	3 yr
	%	June	inches	lbs/bu	%	------------- Bushels per acre -------------				
Radiant	84	7	35	59.0	13.5	46.5	83.1	72.9	78.0	67.5
Boomer	69	11	33	57.3	13.3	53.4	79.3	67.5	73.4	66.7
Overland	90	5	31	58.9	13.1	45.2	80.2	73.8	77.0	66.4
Decade	79	6	30	59.6	14.5	54.4	75.3	68.4	71.8	66.0
Lyman	81	6	31	59.3	14.1	49.5	72.3	73.7	73.0	65.2
Accipiter	53	11	31	57.5	13.3	51.0	84.3	58.3	71.3	64.5
Jerry	81	9	35	58.8	13.9	44.3	78.5	66.3	72.4	63.0
Hawken	83	5	27	58.3	14.1	52.4	65.3	68.6	67.0	62.1
Wesley	81	5	27	57.8	14.0	43.6	71.6	66.4	69.0	60.5
Art	73	6	29	58.6	14.4	36.2	74.5	59.7	67.1	56.8
Peregrine	45	10	35	55.0	13.7	44.5	68.5	46.9	57.7	53.3
Ideal	78	8	30	59.6	12.6		76.6	66.3	71.4	
WB Matlock	76	9	33	59.5	13.2			67.2		
Carter	79	8	28	58.6	14.0			66.2		
SY Wolf	76	6	30	58.4	14.0			62.2		
McGill	81	6	33	58.3	12.6			61.8		
Robidoux	76	5	29	57.3	13.5			61.4		
Settler CL	64	7	28	57.9	12.9			57.9		
Trial Mean	75	7	31	58.0	13.7	46.7	74.5	63.7	--	--
C.V. %	13	20	4	1.8	1.7	7.7	5.4	7.7	--	--
LSD 10%	11	2	1	1.3	0.3	4.1	4.7	5.8	--	--

* Spring Plant Stand: Visual estimation of plant stand in the spring after green up (see note below).

Planting Date: September 26, 2011
Harvest Date: July 27, 2012
Seeding Rate: 1 million live seeds / acre (approx. 1.4 bu/A).
Previous Crop: 2008, 2009 & 2011 = HRSW.
Note: The 2012 trial had very poor fall germination and emergence (less than 1%) prior to freeze up.
It is believed that most seed germination and vernalization took place during early spring.

2012 Winter Wheat Variety Trial at Mandan

Cooperator: USDA-ARS, Northern Great Plains Research Lab., Mandan

Variety	Winter Survival	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	%	lbs/bu	%	------------- Bushels per acre -------------				
Overland	95	58.9	11.6	51.4	34.0	90.0	62.0	58.5
Art	90	57.3	12.2	44.7	31.9	77.9	54.9	51.5
Decade	94	56.0	11.6	49.6	30.0	69.2	49.6	49.6
Wesley	93	56.7	12.0	50.1	19.6	73.3	46.4	47.7
Jerry	91	56.5	11.1	47.0	19.7	73.7	46.7	46.8
Lyman	89	57.8	12.3	47.3	25.8	67.1	46.4	46.7
Boomer	90	55.6	11.5	48.3	22.1	66.2	44.2	45.5
Hawken	93	57.3	12.5	45.9	20.1	64.0	42.0	43.3
Accipiter	83	56.1	10.8	44.4	19.2	60.7	40.0	41.4
Peregrine	73	57.6	11.6	44.5	22.7	55.3	39.0	40.8
Carter	93	54.1	12.1	40.0	19.5	55.7	37.6	38.4
Radiant	94	54.3	11.4	38.4	20.6	45.8	33.2	34.9
SY Wolf	89	58.3	10.9		32.2	87.7	60.0	
WB Matlock	90	58.1	11.2		21.4	77.9	49.6	
McGill	93	57.2	11.2			76.5		
Settler CL	89	58.3	10.6			74.8		
Robidoux	89	56.5	10.8			73.2		
Ideal	90	57.3	11.2			70.8		
Trial Mean	89	56.6	11.5	45.1	23.5	69.5	--	--
C.V. %	6.9	2.4	4.7	15.4	24.2	17.3	--	--
LSD 10%	7	1.6	0.6	8.1	6.7	14.2	--	--

Planting Date: September 27, 2011
Harvest Date: August 1, 2012
Seeding Rate: 1 million live seeds / acre (approx. 1.4 bu/A).
Previous Crop: 2009 & 2010 = HRSW, 2011 = field pea.
Note: The 2011 trial sustained severe foliar and head disease infestations.

2012 Durum Variety Trial at Hettinger

Variety	Days to Head	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	*	inches	lbs/bu	%	------------- Bushels per acre -------------				
Westhope	79	39	58.9	14.1	79.8	43.1	67.4	55.2	63.4
Wales	82	40	58.3	14.4	85.4	39.0	64.0	51.5	62.8
AC Commander	81	36	57.8	14.1	81.7	33.5	72.9	53.2	62.7
DG Max	79	40	59.3	14.4	77.2	39.0	69.9	54.4	62.0
Maier	82	38	58.5	14.8	80.4	34.4	64.8	49.6	59.9
AC Navigator	81	36	57.5	13.5	77.9	26.4	73.2	49.8	59.2
CDC Verona	82	39	57.0	15.7	80.5	35.2	60.5	47.8	58.7
Grande D'oro	81	41	58.7	14.1	77.0	36.2	62.7	49.4	58.6
Ben	79	43	57.9	14.2	76.2	37.2	62.5	49.8	58.6
Carpio	82	39	54.0	14.2	80.8	35.0	59.6	47.3	58.5
Dilse	82	41	57.4	15.3	79.3	34.7	61.5	48.1	58.5
Alkabo	81	39	57.6	14.0	75.5	34.8	64.9	49.8	58.4
Lebsock	78	38	58.7	13.8	77.4	33.7	63.4	48.6	58.2
Pierce	81	40	58.2	13.6	75.6	35.9	62.9	49.4	58.1
Strongfield	82	39	58.3	14.7	79.5	28.0	66.4	47.2	58.0
Alzada	75	36	57.6	14.1	74.6	28.9	69.6	49.2	57.7
DG Star	78	41	58.0	14.0	74.9	32.8	65.0	48.9	57.6
Rugby	77	43	57.8	14.9	71.8	40.1	60.3	50.2	57.4
Grenora	79	38	56.5	14.5	77.6	34.6	58.3	46.4	56.8
Mountrail	82	39	55.9	13.9	81.4	34.5	53.6	44.0	56.5
Tioga	80	40	57.4	15.6	74.8	28.1	64.2	46.2	55.7
Divide	79	39	57.9	14.6	77.5	30.5	56.7	43.6	54.9
WB-Belfield	75	33	58.8	13.8		32.7	66.9	49.8	
Trial Mean	80	40	58.2	14.2	79.8	37.7	64.5	--	--
C.V. %	1.4	4.1	1.5	4.2	4.4	5.7	4.9	--	--
LSD 10%	1	2	1.0	0.7	3.8	2.3	3.7	--	--

* Days to Head = the number of days from planting to head emergence from the boot.

Planting Date: March 29
Harvest Date: July 23
Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).
Previous Crop: 2009 = canola, 2010 = field pea, 2011 = hrsw.

2012 Durum Variety Trial at Scranton

Cooperator: Justin Freitag, Scranton

Variety	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	%	------------- Bushels per acre -------------				
Carpio	40	57.0	15.8	51.2	32.9	50.2	41.6	44.8
Tioga	42	59.1	13.9	50.5	32.9	50.4	41.6	44.6
Alkabo	39	59.3	14.4	49.9	31.4	50.4	40.9	43.9
Grenora	36	57.4	14.7	54.0	31.9	44.1	38.0	43.3
Divide	40	58.4	14.3	44.9	32.1	49.5	40.8	42.2
Mountrail	39	55.2	15.1	51.1	33.5	39.6	36.6	41.4
Maier	38	58.5	14.4		32.1	49.7	40.9	
Trial Mean	39	57.7	14.5	50.3	32.3	48.2	--	--
C.V. %	3.8	1.4	5.8	4.0	4.1	4.7	--	--
LSD 10%	2	1.0	1.0	2.3	NS	2.7	--	--

NS = no statistical difference between varieties.

Planting Date: April 4
Harvest Date: July 30
Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).
Previous Crop: HRSW
Note: The 2011 trial sustained moderate infections of bacterial leaf streak and barley yellow dwarf causing lower test weights and grain yields.

2012 Durum Variety Trial at Regent

Cooperators: August and Perry Kirschmann, Regent

Variety	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	%	------------- Bushels per acre -------------				
Tioga	41	58.0	17.3	48.7	23.7	40.6	32.2	37.7
Grenora	37	57.3	15.5	48.7	25.6	38.1	31.8	37.5
Alkabo	36	58.2	16.2	45.9	26.9	37.1	32.0	36.6
Carpio	38	56.1	16.0	47.8	30.9	30.1	30.5	36.3
Divide	38	57.8	16.4	45.8	26.9	33.5	30.2	35.4
Mountrail	38	56.6	15.5	47.6	26.3	28.8	27.6	34.2
Maier	37	58.1	16.3		25.6	39.2	32.4	
Trial Mean	38	57.6	16.0	47.4	27.3	36.0	--	--
C.V. %	3.8	0.8	2.4	4.8	6.9	5.4	--	--
LSD 10%	2	0.5	0.5	NS	2.1	2.4	--	--

NS = no statistical difference between varieties.

Planting Date: April 4
Harvest Date: July 31
Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).
Previous Crop: HRSW
Note: The 2011 trial sustained moderate infections of bacterial leaf streak and barley yellow dwarf causing lower test weights and grain yields.

2012 Durum Variety Trial at Mandan

Cooperators: USDA-ARS, Mandan

Variety	Plant Height	Test Weight	Grain Protein	----- Grain Yield ----- 2009	2010	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	%	------------- Bushels per acre			-------------	
Divide	46	59.6	10.4	69.6	69.2	76.9	73.0	71.9
Alkabo	46	58.7	11.1	70.2	67.1	78.2	72.6	71.8
Tioga	49	60.4	11.7	66.8	65.6	82.4	74.0	71.6
Grenora	44	58.1	13.1	68.1	71.7	72.5	72.1	70.8
Mountrail	45	56.8	11.5	63.0	70.0	57.1	63.6	63.4
Carpio	47	58.2	13.2		69.0	80.2	74.6	
Maier	46	59.3	12.1			73.7		
Trial Mean	46	58.5	11.8	67.1	68.8	75.4	--	--
C.V. %	2.4	1.0	3.4	4.2	4.1	3.3	--	--
LSD 10%	1	0.7	0.5	3.2	NS	3.0	--	--

Planting Date: April 3
Harvest Date: August 1
Seeding Rate: 1.25 million live seeds / acre (approx. 2.2 bu/A).
Previous Crop: 2008 = HRSW, 2009 & 2011 = field pea.

2012 Barley Variety Trial at Hettinger

Variety	Plant Height	% Plump	Test Weight	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	>6/64	lbs/bu	%	------------- Bushels per acre -------------				
2 Row Varieties									
Haxby	34	87	47.4	13.0	115.5	82.1	85.6	83.8	94.4
Conlon	34	94	45.3	12.7	106.4	80.9	80.2	80.6	89.2
Rawson	35	94	44.6	11.7	106.7	66.7	87.3	77.0	86.9
CDC Copeland	38	79	44.8	13.6	107.3	63.4	79.0	71.2	83.2
Pinnacle	36	91	44.2	12.0	113.3	59.4	71.7	65.6	81.5
AC Metcalfe	36	83	39.6	13.9	102.6	56.8	54.7	55.8	71.4
Conrad	35	84	43.6	13.4		71.1	91.0	81.0	
6 Row Varieties									
Innovation	35	87	41.8	13.5	110.8	89.4	102.5	96.0	100.9
Tradition	35	83	42.9	12.9	117.4	91.1	93.5	92.3	100.7
Lacey	37	82	44.9	13.1	111.9	84.1	91.0	87.6	95.7
Celebration	37	81	41.8	13.8	106.1	70.2	99.5	84.8	91.9
Quest	37	82	41.3	13.4	109.1	72.3	90.6	81.4	90.7
Stellar-ND	36	81	42.0	12.9	113.5	61.7	94.3	78.0	89.8
Trial Mean	36	85	43.3	12.8	113.8	76.6	91.0	--	--
C.V. %	3.9	5.2	9.8	4.2	4.7	6.8	5.1	--	--
LSD 10%	2	2	5.0	1.7	5.8	5.4	5.5	--	--

Planting Date: March 29
Harvest Date: July 25
Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
Previous Crop: 2008, 2009 & 2010 = field pea.

2012 Barley Variety Trial at Scranton

Cooperator: Justin Freitag, Scranton

Variety	Plant Height	Test Weight	% Plump	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	>6/64	%	------------- Bushels per acre -------------				
2 Row Types									
Rawson	38	47.4	92	11.1	87.8	54.4	80.4	67.4	74.2
Pinnacle	38	46.0	84	11.3	72.9	30.0	81.1	55.6	61.3
Conlon	37	46.5	93	11.3			86.7		
6 Row Types									
Innovation	36	47.7	83	10.5		56.7	88.4	72.6	
Quest	40	45.9	73	12.4		54.6	72.5	63.6	
Celebration	37	46.4	63	11.7	78.6		85.1		
Trial Mean	38	46.6	81	11.4	84.8	50.3	82.4	--	--
C.V. %	4.6	1.3	9.9	3.7	5.1	3.1	5.0	--	--
LSD 10%	2	0.8	10	0.5	3.6	1.8	5.1	--	--

Planting Date: April 4
Harvest Date: July 30
Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
Previous Crop: HRSW.
Note: The 2011 trial sustained moderate infections of barley yellow dwarf causing lower test weights and grain yields.

2012 Barley Variety Trial at Regent

Cooperators: August and Perry Kirschmann, Regent

Variety	Plant Height	Test Weight	% Plump	Grain Protein	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	>6/64	%	------------- Bushels per acre -------------				
2 Row Types									
Rawson	34	47.9	93	12.3	76.9	43.6	65.3	54.4	61.9
Conlon	37	48.4	95	13.4	76.4	33.5	69.1	51.3	59.7
Pinnacle	38	47.7	88	13.5	83.8	39.5	48.8	44.2	57.4
6 Row Types									
Innovation	35	46.8	84	13.8		42.4	67.2	54.8	
Quest	39	47.7	84	14.0		42.2	50.9	46.6	
Celebration	36	46.6	83	13.7	84.8		52.4		
Trial Mean	36	47.5	88	13.4	77.8	40.1	58.9	--	--
C.V. %	5.7	1.8	5.0	5.3	3.9	6.6	6.2	--	--
LSD 10%	NS	1.0	5	0.9	3.4	3.0	4.5	--	--

NS = no statistical difference between varieties.

Planting Date: April 4
Harvest Date: July 31
Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
Previous Crop: HRSW.
Note: The 2011 trial sustained moderate infections of barley yellow dwarf causing lower test weights and grain yields.

2012 Barley Variety Trial at Mandan

Cooperator: USDA-ARS, Mandan

Variety	Plant Height	Test Weight	% Plump	Grain Protein	----- Grain Yield ----- 2009	2010	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	>6/64	%	------------- Bushels per acre -------------				
2 Row Types									
Pinnacle	41	40.6	91	11.1	79.4	89.4	43.1	66.2	70.6
Rawson	39	41.1	92	11.1	73.3	86.5	45.9	66.2	68.6
Conlon	39	40.1	88	11.7	72.2	79.5	41.9	60.7	64.5
6 Row Types									
Celebration	40	41.1	84	12.1	83.7	90.1	36.6	63.4	70.1
Innovation	41	42.4	88	11.1			51.4		
Quest	41	41.6	82	11.0			49.8		
Trial Mean	40	41.1	88	11.4	81.1	87.5	44.8	--	--
C.V. %	3.0	3.2	2.8	3.5	3.9	2.7	5.6	--	--
LSD 10%	2	NS	3	0.5	3.6	2.6	3.1	--	--

NS = no statistical difference between varieties.

Planting Date: April 3
Harvest Date: August 1
Seeding Rate: 750,000 live seeds / acre (approx. 1.4 bu/A).
Previous Crop: HRSW.

2012 Oat Variety Trial at Hettinger

Variety	Days to Head	Plant Height	Test Weight	----- Grain Yield ----- 2010	2011	2012	Average Yield 2 yr	3 yr
	*	inches	lbs/bu	------------- Bushels per acre -------------				
Jury	77.0	43.3	33.2	162.8	116.1	135.3	125.7	138.1
Stallion	80.0	42.3	33.0	151.2	120.6	139.0	129.8	136.9
AC Pinnacle	81.5	38.2	29.9	159.6	117.5	133.0	125.2	136.7
Furlong	81.3	38.4	29.4	154.7	122.7	131.1	126.9	136.2
CDC Minstrel	81.0	37.8	30.8	154.9	112.1	140.4	126.2	135.8
Newburg	78.0	42.3	32.0	152.7	122.9	126.2	124.6	133.9
Shelby 427	74.0	38.5	35.4	142.2	127.5	127.1	127.3	132.3
Killdeer	79.3	36.1	30.1	151.0	113.7	131.0	122.4	131.9
Souris	81.0	35.7	32.1	155.9	113.5	118.3	115.9	129.2
Rockford	81.0	41.7	33.4	145.8	113.5	126.9	120.2	128.7
Beach	78.8	42.4	32.2	149.0	113.9	120.3	117.1	127.7
Leggett	81.0	36.8	31.7	154.4	95.4	124.6	110.0	124.8
Morton	81.0	43.4	31.5	135.7	112.1	115.5	113.8	121.1
HiFi	81.3	40.4	31.4	140.1	103.8	111.5	107.6	118.5
Otana	81.0	44.3	31.6	139.6	67.2	141.6	104.4	116.1
CDC Dancer	81.3	41.0	31.4	145.9	67.7	118.9	93.3	110.8
Hytest	78.0	41.5	36.3	121.9	70.2	120.5	95.4	104.2
Horsepower	74.0	33.8	33.9			132.9		
Naked (hulless) Varieties								
Buff	74.0	32.2	35.2	103.2	114.5	88.2	101.4	102.0
Stark	82.3	38.9	31.9	95.8	90.9	94.8	92.8	93.8
Trial Mean	80	40	32.3	143.8	104.1	124.3	--	--
C.V. %	1.0	4.1	3.4	5.8	4.1	3.8	--	--
LSD 10%	1	2	1.3	9.1	4.6	5.6	--	--

* Days to Head = the number of days from planting to head emergence from the boot.

Planting Date: March 29
Harvest Date: July 23
Seeding Rate: 750,000 live seeds / acre (approx. 1.7 bu/A).
Previous Crop: 2009 = mustard, 2010 & 2011 = field pea.

2012 Oat Variety Trial at Mandan

Cooperator: USDA-ARS, Mandan

Variety	Plant Height	Test Weight	----- Grain Yield -----			Average Yield	
			2009	2010	2012	2 yr	3 yr
	inches	lbs/bu	------------- Bushels per acre -------------				
Rockford	44	36.4	172.4	142.7	136.4	139.6	150.5
Killdeer	41	34.8	166.7	142.2	140.4	141.3	149.8
Souris	41	32.6	159.0	139.7	105.1	122.4	134.6
Morton	49	32.2	154.1	133.2	107.9	120.6	131.7
Newburg	49	33.2			144.4		
Jury	50	35.3			127.6		
Trial Mean	46	34.1	157.8	137.1	127.0	--	--
C.V. %	2.8	2.3	4.1	3.1	3.0	--	--
LSD 10%	2	1.0	7.1	4.7	4.7	--	--

Planting Date: April 3
Harvest Date: August 1
Seeding Rate: 750,000 live seeds / acre (approx. 1.7 bu/A).
Previous Crop: HRSW.

2012 Winter Rye Variety Trial at Hettinger

Variety	Heading Date	Plant Height	Test Weight	------ Grain Yield ------ 2010	2011	2012	Average Yield 2 year	3 year
		inches	lbs/bu	--------------- bushels per acre ---------------				
Dacold	June 6	38	49.5	105.1	103.2	71.1	87.2	93.1
Hancock	June 1	44	51.0	92.9	93.1	63.5	78.3	83.2
Spooner	June 2	44	48.2	73.8	82.5	48.9	65.7	68.4
Aroostok	May 22	46	48.2	66.3	73.6	46.0	59.8	62
Wheeler	June 4	47	44.0	53.2	43.9	33.1	38.5	43.4
Ensi	June 5	48	50.5			51.0		
Trial Mean		44	49.0	79.1	73.5	55.4	--	--
C.V. %		4.9	2.5	4.1	4.2	15.4	--	--
LSD 10%		3	1.5	3.5	3.4	10.5	--	--

Planting Date: September 26, 2011
Harvest Date: July 26, 2012
Seeding Rate: 1 million live seeds / acre
Previous Crop: 2009 = hrsw, 2010 & 2011 = field pea.
Note: The 2012 trial was seeded into dry soil and had less than 5% seedling emergence on November 30.

2012 Safflower Variety Trial at Hettinger

Variety	Plant Height	Oil Content	Test Weight	------ Seed Yield ------ 2010	2011	2012	Avg. Yield 2 year	3 year
	inches	%	lbs/bu	-------------- pounds per acre ---------------				
Linoleic Types								
Cardinal	28	42.0	42.3	3015	1607	2381	1994	2334
Finch	27	42.6	42.1	2444	1785	2073	1929	2101
NutraSaff	27	48.6	32.3	2458	938	1366	1152	1587
00B1597-3	29	45.3	38.1		1951	2115	2033	
Oleic Types								
Hybrid 1601	27	44.3	39.0	3361	1791	2993	2392	2715
Hybrid 9049	28	39.5	41.2	3184	2100	2601	2350	2628
MonDak	26	43.6	39.0	2831	2078	2358	2218	2422
Montola 2003	25	45.1	38.5	2898	2057	2060	2058	2338
Trial Mean	27	43.9	39.3	2793	1777	2272	--	--
C.V. %	3.2	3.5	1.8	5.3	8.0	10.6	--	--
LSD 10%	1	1.9	1.0	140	140	320	--	--

Planting Date: March 30
Harvest Date: August 16
Seeding Rate: 300,000 live seeds / Acre (approx. 22 lbs/A).
Previous Crop: 2009 = oat, 2010 = barley, 2011 = hrsw.

2012 Flax Variety Trial at Hettinger

Variety	Plant Height	Test Weight	----- Seed Yield ----- 2009	2011	2012	Average Yield 2 yr	3 yr
	inches	lbs/bu	------------ Bushels per acre ------------				
York	20	56.3	40.8	28.8	22.0	25.4	30.5
Prairie Thunder	19	56.4	42.0	28.2	18.4	23.3	29.5
CDC Arra	20	55.2	42.0	26.5	16.4	21.4	28.3
CDC Bethume	21	55.0	41.1	23.4	20.4	21.9	28.3
Prairie Grande	21	55.5	40.1	27.5	16.9	22.2	28.2
Prairie Blue	20	55.7	39.4	26.4	17.8	22.1	27.9
Nekoma	21	56.2	39.1	25.1	16.8	21.0	27.0
Pembina	22	55.6	37.9	23.4	18.4	20.9	26.6
Carter*	20	56.0	40.6	24.1	14.4	19.2	26.4
Hanley	21	--	40.2	24.7	14.3	19.5	26.4
Webster	20	55.8	34.5	27.1	15.4	21.2	25.7
Lightnin	22	55.5	39.3	23.3	12.8	18.0	25.1
Trial Mean	21	55.7	39.2	25.6	17.0	--	--
C.V. %	7.2	1.1	6.9	10.2	11.8	--	--
LSD 10%	NS	NS	2.9	2.8	2.4	--	--

* Yellow seed type.
NS = no statistical difference between varieties.

Planting Date: March 30
Harvest Date: August 2
Seeding Rate: 40 lbs/A
Previous Crop: 2008 = HRSW, 2010 & 2011 = Barley.

2012 Canola Variety Trial at Hettinger

Brand	Variety	Type	Plant Height	Oil Content	Seed Yield 2011	Seed Yield 2012	Seed Yield 2 yr Avg.
		*	inches	%	pounds per acre	pounds per acre	pounds per acre
Cargill	v1050	RR,H	36	41.0		1136	
Cargill	V12-1	RR,H	35	41.2		1119	
Cargill	v2035	RR,H	35	40.5	1825	943	1384
Cargill	v2045	RR,H	36	42.9		1066	
BrettYoung	6070 RR	RR,H	38	42.0	2417	1111	1764
BrettYoung	6040 RR	RR,H	39	39.5	1937	1156	1546
Integra	7150 R	RR,H	36	41.9	1951	1038	1494
Integra	7152 R	RR,H	35	42.9	2002	1154	1578
Mycogen	Nexera 1012 RR	RR,H	41	44.4	2130	814	1472
Mycogen	Nexera 1016 RR	RR,H	37	41.7	2084	836	1460
Mycogen	Nexera 2012 CL	CL,H	42	44.8		722	
Mycogen	Nexera 2016 CL	CL,H	37	44.7		878	
Croplan	HyCLASS 940	RR,H	35	41.6	1842	1223	1532
Croplan	HyCLASS 947	RR,H	36	41.4		943	
Croplan	HyCLASS 955	RR,H	32	42.4	2140	1019	1580
Croplan	HyCLASS 988	RR,H	40	43.5	2142	872	1507
Croplan	HyCLASS 930	RR,H	34	41.3		927	
Proseed	45 Caliber	RR,H	39	41.6		846	
Star	Star 402	RR,H	39	43.4		886	
Trial Mean			37	42.2	1858	984	--
C.V. %			6.4	4.2	7.3	10.5	--
LSD 10%			3	2.1	145	123	--

* Type: RR = Roundup Ready, CL = Clearfield, H = hybrid.

Planting Date: April 16
Harvest Date: July 30
Previous Crop: HRSW
Note: 2012 seed yields were severely impacted by hot temperatures during flowering.

2012 Chickpea Variety Trial at Hettinger

	Plant	Test	-------- Seed Yield --------			--- Avg. Yield ---	
Variety	Height	Weight	2009	2011	2012	2 yr	3 yr
	inches	lbs/bu	---------------- Pounds per Acre ----------------				
Large Kaboli Types							
Sawyer	17	53.7	798	1090	2242	1666	1377
Sierra	18	53.5	287	457	1457	957	734
Dylan	15	49.2	199	145	1445	795	596
Troy	15	50.5	172	192	1219	706	528
Small Kaboli Types							
B-90	18	57.4	2024	1029	2813	1921	1955
CDC Frontier	18	54.3	1750	1106	2855	1980	1904
CDC Luna	16	51.1	1281	1114	3134	2124	1843
Desi T*ypes*							
CDC Anna	16	54.1	1895	1692	2651	2172	2079
Trial Mean	17	53.0	943	777	2227	--	--
C.V. %	12.4	3.2	22.0	35.0	6.6	--	--
LSD 10%	NS	2.1	225	98	180	--	--

NS = no statistical difference between varieties.

Planting Date: April 12
Harvest Date: August 8
Seeding Rate: 175,000 live seeds / Acre.
Previous Crop: 2008 & 2010 = HRSW, 2011 = durum

2012 Lentil Variety Trial at Hettinger

Variety	Plant Height	1000 Seed wt.	Test Weight	------ Seed Yield ------ 2010	2011	2012	Avg. Yield 2 year	3 year
	inches	grams	lbs/bu	-------------- pounds per acre ---------------				
Large Green Types								
Pennell	12	71.4	57.0	1128	1551	1928	1740	1536
CDC Greenland	12	62.2	58.6	872	1254	1698	1476	1275
Riveland	11	67.8	57.6	743	1010	1388	1199	1047
Medium Green Type								
CDC Richlea	11	51.8	60.4	1154	1463	1986	1724	1534
Small Green Types								
CDC Viceroy	13	32.8	63.8	1446	1710	1962	1836	1706
Essex	12	43.8	62.2		1252	1875	1564	
Small French Green Type								
CDC Lemay	11	32.6	63.6	1570	1140	1689	1414	1466
Medium Red Type								
CDC Red Rider	13	44.6	61.9	1663	1984	2067	2026	1905
Small Red Types								
CDC Rouleau	12	38.0	61.7	1749	1656	1776	1716	1727
CDC Redberry	11	43.0	62.4	1390	1870	1876	1873	1712
Extra Small Red Type								
CDC Rosetown	11	31.8	64.6	1498	1711	2130	1920	1780
Spanish Brown Type								
Morena	12	37.8	64.7		1260	2094	1677	
Trial Mean	11	43.7	61.3	1321	1484	1932	--	--
C.V. %	10.4	5.1	0.9	11.8	6.9	5.8	--	--
LSD 10%	1	2.7	0.7	174	111	133	--	--

Planting Date: March 29 Harvest Date: August 2
Seeding Rate: 550,000 live seeds / Acre.
Previous Crop: 2009, 2010 & 2011 = HRSW.

2012 Clearfield Lentil Variety Trial at Hettinger

Variety	Plant Height	1000 Seed wt	Test Weight	Seed Yield 2010	Seed Yield 2011	Seed Yield 2012	Avg. Yield 2 year	Avg. Yield 3 year
	inches	grams	lbs/bu	pounds per acre				
Large Green Type								
CDC Imigreen-CL	13	50.8	59.7			1212		
Medium Green Type								
CDC Impress-CL	13	41.0	58.3	1543	1760	1795	1778	1699
Small Red Types								
CDC Maxim-CL	12	33.4	62.2	2255	1874	2039	1956	1850
CDC Impact-CL	12	28.6	63.6	1593	1841	1557	1699	1664
Extra Small Red Types								
CDC Impala-CL	13	27.6	63.0	2215	1712	1807	1760	1911
CDC Imperial-CL	12	24.0	62.4	2290	1620	1567	1594	1826
Trial Mean	13	34.2	61.5	1888	1755	1663	--	--
C.V. %	14.0	3.7	0.9	6.6	4.6	5.5	--	--
LSD 10%	NS	1.6	0.7	120	77	112	--	--

NS = no statistical difference between varieties.

Planting Date: March 29 Harvest Date: August 2
Seeding Rate: 550,000 live seeds / Acre.
Previous Crop: 2009, 2010 & 2011 = HRSW.

2012 Field Pea Variety Trial at Hettinger

Variety	Brand	Days to Bloom	Plant Height	1000 Seed wt	Protein Content	Test Weight	Seed Yield 2010	Seed Yield 2011	Seed Yield 2012	Avg. Yield 2 year	Avg. Yield 3 year
		*	inches	grams	%	lbs/bu	-------------- bushesl per acre				---------------
Yellow Types											
CDC Golden	Alt. Seed Str.	63	21	167	23.7	67.5	64.4	60.9	47.2	54.0	57.5
Korando	Pulse USA	58	22	214	23.4	66.3	51.5	64.4	53.0	58.7	56.3
SW Midas	Pulse USA	65	21	155	22.8	66.9	53.5	58.5	48.9	53.7	53.6
DS Admiral	Pulse USA	63	23	191	23.9	66.7	50.3	59.8	48.7	54.2	52.9
Agassiz	Meridian Seed	63	23	179	23.9	67.1	53.7	58.6	44.9	51.8	52.4
Gunner	Paulson Pre. Seed	64	28	170	25.3	67.8		60.1	47.9	54.0	
Vegas	JB Farms	63	22	166	24.6	68.2		59.5	47.5	53.5	
Bridger	Great N. Ag.	61	24	173	22.5	66.4			52.2		
Navarro	Great N. Ag.	57	20	188	22.9	65.2			50.8		
Mystique	Pulse USA	63	23	185	23.5	67.2			49.7		
Green Types											
SW Arcadia	Pulse USA	62	16	157	22.6	65.3	52.2	51.3	52.1	51.7	51.9
K2	Pulse USA	59	21	149	23.2	66.5	47.4	55.4	44.8	50.1	49.2
CDC Striker	Alt. Seed Str.	62	19	153	22.7	65.7	46.0	47.0	49.7	48.4	47.6
Cruiser	Pulse USA	63	23	165	24.0	65.6	48.0	44.0	44.9	44.4	45.6
Majoret	Pulse USA	66	20	168	24.7	67.8	49.3	46.3	41.3	43.8	45.6
Shamrock	Legume Matrix	67	22	183	24.9	69.5		51.0	36.9	44.0	
Aragorn	Pulse USA	62	21	155	23.4	64.4			43.8		
Viper	Pulse USA	62	25	172	23.1	65.1			43.5		
Trial Mean		61	22	171	23.5	66.5	52.1	55.5	47.2	--	--
C.V. %		2.1	6.9	8.2	3.0	1.3	6.1	4.9	5.1	--	--
LSD 10%		2	2	17	0.8	1.0	2.9	3.4	2.9	--	--

* Days to Bloom = the number of days from planting to 10% bloom.

Planting Date: April 12
Seeding Rate: 330,000 live seeds / Acre.
Harvest Date: July 16
Previous Crop: 2009 & 2010 = hrsw, 2011 = durum.

2012 Conventional Soybean Variety Trial at Hettinger

Variety	Maturity Group	Test Weight	Oil Content	Seed Protein	------ Seed Yield ------ 2010	2011	2012	Avg. Yield 2 year	3 year
		lbs/bu	%	%	-------------- bushels per acre ---------------				
Sheyenne	0.8	55.0	19.3	28.9	33.1	43.9	38.5	41.2	38.5
Ashtabula	0.4	54.1	20.5	27.8	28.2	37.8	33.6	35.7	33.2
Cavalier	00.7	54.3	18.6	30.3	26.6	37.5	30.5	34.0	31.5
ProSoy	0.8	54.3	18.6	31.5	25.9	34.3	34.4	34.4	31.5
Traill	00.0	55.7	19.0	30.8	26.6	37.8	22.6	30.2	29.0
Trial Mean		54.7	19.2	30.4	26.8	37.7	31.6	--	--
C.V. %		1.8	2.2	2.0	9.2	3.4	4.9	--	--
LSD 10%		NS	0.5	0.8	3.7	1.8	1.9	--	--

NS = no statistical difference between varieties.

Planting Date: April 16
Harvest Date: September 4
Seeding Rate: 150,000 live seeds / Acre.
Row Spacing: 30"
Previous Crop: 2009 = barley, 2010 & 2011 = oat.

2012 Grassy Weed Control with Spring Herbicide Applications in Winter Wheat

Eric Eriksmoen, Hettinger, ND

'Jerry' HRWW was seeded no-till into dry soil on October 10, 2011. Persistent dry fall conditions resulted in less than 1% winter wheat emergence prior to freeze up and a very poor crop stand during the growing season. Spring post-emergence treatments were applied on April 14, 2012 to 2 ½ leaf wheat and to tillering downy brome (dobr), 2 leaf Japanese brome (jabr), 1 leaf wild oat (wiot) and 1 leaf Persian darnel (peda) with 55^o F, 45% RH, cloudy sky, moist soil conditions and a south wind at 7 mph. Treatments were applied with a tractor mounted CO_2 propelled plot sprayer delivering 10 gpa at 30 psi through PK-01E80 nozzles to a 5 foot wide area the length of 10 by 28 foot plots. The soil is classified as a silt-loam with a pH of 6.2, OM of 3.2% and had 85% fall hrsw residue ground cover (4300 lbs/A). The trial was a randomized complete block design with four replications. The trial had an application of 21 oz/A WideMatch herbicide on June 2 to control broadleaf weeds. Weed populations for downy brome, Japanese brome, wild oat and Persian darnel were 3, 6, 0.5 and 0.25 plants /ft^2 respectively. Plots were evaluated for crop injury on April 23, May 18, June 2 and July 7, and for weed control on June 2 and July 7. The trial was not harvested.

			4/23	5/18	- June 2 -		---------------- July 7 ----------------				
	Treatment	Product rate	inj	inj	inj	dobr	inj	dobr	jabr	wiot	peda
		oz/A	--------------------------- Percent control ---------------------------								
1	PowerFlex HL+Act. 90+AMS	2 + 0.5% +1.5 lb	0	0	0	85	0	95	96	32	99
2	Olympus Flex+Act. 90+AMS	3.5 + 0.5% + 1.5 lb	0	0	0	75	0	90	97	65	0
3	Olympus + Act. 90	0.9 + 0.5%	0	0	0	90	0	97	99	62	3
4	Maverick + Act. 90	0.67 + 0.5%	0	0	0	45	0	91	94	9	33
5	Untreated		0	0	0	0	0	0	0	0	0
6	Axial XL	16.4	0	0	0	10	0	1	2	84	99
7	Osprey + Act. 90 + AMS	3.25+0.5%+64	0	0	0	67	0	21	46	1	3
	C.V. %		0	0	0	26	0	27	31	39	66
	LSD .05		NS	NS	NS	20	NS	23	29	21	28

NS = no statistical difference between treatments

Summary

Crop injury (leaf speckling) was minor when observed (less than 1%) and diminished quickly. PowerFlex HL, Olympus Flex, Olympus and Maverick treatments provided very good season long control of downy brome and Japanese brome. None of the treatments were very effective on wild oat, however, Olympus Flex, Olympus and Axial XL treatments provided significantly better control than the other treatments. PowerFlex HL and Axial XL treatments provided excellent season long control of Persian darnel.

Effects of natural service and artificial insemination breeding systems on pregnancy rates and days to conception

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The objectives of this study were to determine pregnancy rates and days to conception in a breeding system that incorporates estrous synchronization and fixed-time artificial insemination with the use of cleanup bulls versus a traditional bull breeding system. For the current experiment, cattle receiving a timed artificial insemination had reduced days to conception; however, pregnancy rates increased if cattle were cyclic at the start of the breeding season when receiving a timed artificial insemination treatment versus the noncyclic timed artificial insemination treatment group. Cattle producers may observe improved pregnancy rates in cyclic cattle than noncyclic cattle and also see a greater proportion of calves born earlier in the calving season if they implement a fixed-time artificial insemination protocol.

Summary

Crossbred beef cows and heifers (n = 480 and 86, respectively) were used to compare the effects of two breeding systems on pregnancy rates and days to conception. Cattle were stratified by age and body condition score (BCS), and assigned randomly to one of two treatments: 1) Females exposed to natural service bulls for the duration of the breeding season (NS; n = 284) or 2) females exposed to estrous synchronization and a fixed-time AI [d 0; 7-d Co-Synch + CIDR (Busch et al., 200)], followed by exposure to natural service bulls for the duration of the breeding season (TAI, n = 282). Bulls were introduced on day one and both treatments were managed as a cohort in the same pastures. Blood samples were collected on day minus 20 and minus 10 to determine cyclic status. On day 49 and again at least 40 days after bull removal from pastures, transrectal ultrasonography was used to determine pregnancy status and fetal age. Overall, 42.8 percent of cattle were cyclic at the beginning of the breeding season. Treatment by cyclic status interactions ($P < 0.01$) were present for the proportion of cows detected pregnant on the first pregnancy check (day 49), the proportion of cows pregnant at the end of the breeding season and days from the beginning of the breeding season to conception. A greater proportion ($P < 0.05$) of cyclic cattle in the TAI (88 percent) had a viable fetus detected on the first pregnancy check compared with cyclic cattle in the NS treatment (74 percent), noncyclic cattle in the TAI treatment (75 percent) and noncyclic cattle in the NS treatment (77 percent). A greater proportion ($P < 0.05$) of cyclic cattle in the TAI treatment (94 percent) was pregnant at the end of the breeding season, compared with noncyclic cattle in the TAI treatment (84 percent), whereas cyclic (88 percent) and noncyclic (89 percent) cattle in the NS treatment were intermediate. Both cyclic (11.6 ± 1.4 d) and noncyclic (14.5 ± 1.4 d) cattle in the TAI treatment became pregnant

earlier in the breeding season ($P < 0.05$) compared with cyclic (19.9 ± 1.4 d) and noncyclic (17.9 ± 1.4 d) cattle in the NS treatment. Breeding systems for beef cattle that incorporated TAI altered pregnancy rates and decreased days to conception, compared with natural service breeding systems.

Introduction

The area of production very critical in terms of profit potential in beef cow-calf operations is the ability of a cow to give birth and raise a healthy calf until weaning (Dickerson, 1970). Reproductive performance is variable among herds (Larson et al., 2006; Dahlen et al., 2010) and estimates indicate the beef industry loses $2.8 billion in revenue as a result of infertility (Lamb et al., 2011). Incorporating estrous synchronization (ES) and AI into beef operations may result in improved reproductive performance, weaning weight, carcass quality and genetic value, along with reduced calving difficulty (Sprott, 2000).

The implementation of fixed-time AI protocols has resulted in similar pregnancy rates to protocols that require heat detection (Lemaster et al., 2001) without added labor for heat detection. These fixed-timed AI protocols allow every cow in the herd an opportunity to become pregnant on the first day of the breeding season.

Experiments have used cleanup bulls after the use of ES and AI (Geary et al., 2001; Stevenson et al., 1997) but lack the use of a traditional breeding system as a control. Natural service with no ES protocol needs to be used as a control to determine the overall effect of an ES and AI breeding system. For example, Sa Filho et al. (2009) reported significantly greater pregnancy rates when AI and ES were used compared with natural service in *Bos indicus* cattle.

Due to the limited number of studies comparing various breeding systems, the current experiment was designed to examine reproductive efficiency in cattle treated to a fixed-time AI followed by cleanup bulls versus a natural service breeding system. Moreover, these findings will help cattle producers better decide the management for their operation.

Procedures

This project was approved by the Institutional Animal Care and Use Committee of North Dakota State University. A combination of crossbred Angus cows and heifers (n = 566) were used in two locations: 1) Central Grasslands Research Extension Center (CGREC; n = 86 heifers and n = 405 cows) and 2) Hettinger Research Extension Center (HREC; n = 81 cows). All animals were stratified by age, BCS and days postpartum (cows only), then assigned to one of two treatments in a completely randomized design: 1) natural service (NS, n = 284), exposed to natural service bulls for the duration of the breeding season or 2) artificial insemination (TAI, n = 282), exposed to ES [7-d Co-Synch + CIDR (Larson et al., 2006)] and a fixed-time AI (day 0) followed by exposure to natural service bulls (cleanup bulls) for the duration of the breeding season.

Bulls were turned out to pastures with all cattle on day one, and both treatments were managed as a cohort in the same pastures. All bulls passed a breeding soundness exam (Barth et al., 2000) and were stocked at a rate of 30 cows/bull and 15 heifers/bull. The breeding season for the CGREC and HREC was 49 and 63 days, respectively.

Blood samples for all females were collected on day minus 20 and minus 10 via coccygeal venipuncture into 10 milliliters Vacutainer tubes containing sodium heparin (BD, Franklin Lakes, N.J) and analyzed for concentrations of progesterone. Cattle were considered cyclic if progesterone levels were greater than 1 nanogram per milliliter (ng/mL) (Perry et al., 1991).

Transrectal ultrasonography (Aloka 500 with a 5 MHz linear probe) was used to determine the presence of a viable fetus on day 49 (to determine if pregnancy was due to AI) and again at least 40 days after the bulls were removed from breeding pastures. The crown-rump length of each fetus identified was measured as a determinant of fetal age.

Results and Discussion

At the initiation of the breeding season, 42.8 percent of all cattle were cyclic. The mean days postpartum was 65.6 days (range of 21 to 99 days) for suckled cows at the time of 0 (the day of AI for cattle in the TAI treatment). Treatment by cyclic status interactions ($P < 0.01$) were observed for the proportion of cows detected pregnant on day 49, the proportion of cows pregnant at the end of the breeding season and days from the beginning of the breeding season to conception (days to conception).

A greater proportion ($P < 0.05$) of cyclic cattle in the TAI treatment (88 percent, 104 of 118) had a viable fetus detected on day 49 of the breeding season, compared withcyclic cattle in the NS treatment (74 percent, 88 of 119), noncyclic cattle in the TAI treatment (75 percent, 122 of 163) and noncyclic cattle in the NS treatment (77 percent, 120 of 156).

Geary et al. (2001) reported no difference in TAI pregnancy rates between cyclic and non-cyclic cattle receiving two different ES protocols. In contrast, Stevenson et al. (1997) stated cyclic cattle that receive ES and AI had greater pregnancy rates to AI than noncyclic cattle.

Overall pregnancy rates to the AI for cattle in the TAI treatment were 55 percent in the current study. The use of the ES and AI allowed more cattle to become pregnant on the first day of the breeding season. This reduction in the number of nonpregnant cows at the start of the breeding season would allow bull stocking rate to be reduced. The bulls needed for an operation that utilizes ES and AI on a whole herd basis may be reduced by half, recouping most, if not all, expenses needed for ES and AI (Johnson and Jones, 2008).

Producers should evaluate the bull purchase price, maintenance and health costs, and interest on purchases and compare them with the additional costs of ES and AI to determine whether this is a management practice that would improve profitability for their operation. In addition, nutritional status of cattle and compliance with ES protocol schedules need to be excellent to obtain satisfactory pregnancy rates from AI and cleanup bull breedings.

A greater proportion ($P < 0.05$) of cyclic cattle in the TAI treatment (94 percent, 111 of 118) were pregnant at the end of the breeding season, compared with noncyclic cattle in the TAI treatment (84 percent, 136 of 162), whereas cyclic (88 percent, 105 of 119) and noncyclic (89 percent, 140 of 157) cattle in the NS treatment were intermediate. Interestingly, fewer noncyclic cattle in the TAI treatment were pregnant at the final pregnancy check, compared with cyclic cattle in the TAI treatment.

In contrast to our study, Stevens et al. (1997) reported no differences in final pregnancy rates among cyclic and noncyclic of cows and heifers that received an ES protocol with an injection of GnRH. Another note, although different within the TAI treatment, season-ending pregnancy rates were similar between cattle in the TAI treatment and cattle in the NS treatment. This goes against a common theory that states ES protocols may initiate cyclicity in a proportion of noncyclic cattle and result in greater overall pregnancy rates at the end of the breeding season compared with a system of natural service breeding.

The discrepancy between our season-ending pregnancy rates and stated theory require further verification to substantiate common industry claims.

Cyclic (11.6 ± 1.4 d) and noncyclic (14.5 ± 1.4 d) cattle in the TAI treatment became pregnant earlier in the breeding season ($P < 0.05$), compared with cyclic (19.9 ± 1.4 d) and noncyclic (17.9 ± 1.4 d) cattle in the NS treatment. The decreased days to conception are due primarily to the greater proportion of cattle bred to AI on the first day of the breeding season. The reduction in days to conception potentially could reduce the calving season length and labor needed with a more concentrated calving season (Sprott, 1999).

However, the length of the calving season is dictated by the length of the breeding season. Rodgers et al. (2012) reported the calving date was altered by ES and AI, but the length of the calving season was not different, compared with that of the natural service treatment. If days to conception are a true indication of date of calving in the current study, cattle in the TAI treatment would have calves earlier in the calving season with the potential to be heavier at weaning.

Cattle producers who implement a timed artificial insemination breeding system may see reduced days to conception and an increase in their cyclic cattle pregnancy rates. This study still is ongoing, and calving season and calf performance will be evaluated to determine the weaning and postweaning effects of the two different breeding systems. In addition, cattle will be managed according to their assigned breeding system for multiple years to look at the long-term effects of AI breeding systems compared with bull breeding.

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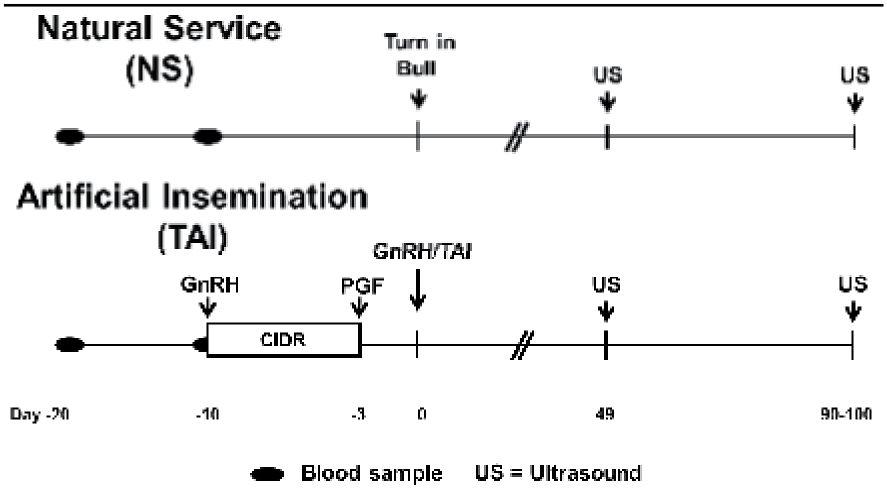
Figure 1. Schematic of experimental treatments



Influence of the Amount and Supplementation Frequency of Protein on Utilization of Low-Quality Forage by Ruminants[1]

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[1]This document is part of the Oregon State University – 2012 Beef Research Report. Please visit the Beef Cattle Sciences website at http://beefcattle.ans.oregonstate.edu.
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When providing supplemental CP to ruminants consuming low-quality forage at extended intervals, such as once every 10 days, it is possible for managers to maintain acceptable forage intake, digestibility of nutrients, and cow performance by reducing the amount, and cost, of supplement provided.

Summary

Three experiments were conducted to evaluate the effect of amount and frequency of crude protein (CP) supplementation on ruminants consuming low-quality forage. Treatments were arranged in a 2 × 3 factorial design (two levels of CP provided daily, once every 5 days, or once every 10 days) with an unsupplemented control. The greater level of CP was estimated to meet ruminal requirements for degradable intake protein and the lower level was 50% of the greater level. Soybean meal (SBM) was used as the CP supplement. Seven steers (661 ± 20 lb; Experiment 1) and 7 wethers (68 ± 1 lb; Experiment 2) were used in duplicate 4 × 7 incomplete Latin square designed experiments to determine the influence of treatments on nutrient intake and digestion. Experimental periods were 30 days with feed and digesta collected on d 19 through 28 and day 21 through 30, respectively, for estimation of nutrient digestibility.

Eighty-four cows (1,231 ± 9 lb; 4.8 ± 0.04 body condition score; BCS) in the last third of gestation were used in Experiment 3 to evaluate treatment effects on weight and body condition score (BCS) change. Treatments were evaluated using the following contrasts: 1) Control vs CP supplementation, 2) Full CP vs Half CP, 3) linear effect of supplementation frequency, 4) quadratic effect of supplementation frequency, 5) Interaction of linear effect of supplementation frequency and level of CP, and 6) Interaction of quadratic effect of supplementation frequency and level of CP.

Hay intake by steers increased ($P = 0.03$) with CP supplementation but only tended to increase ($P = 0.08$) with Full CP compared with Half CP. In contrast, hay and total intake by lambs was not affected ($P > 0.25$) by CP supplementation. Interestingly, a linear effect of CP amount ×supplementation frequency interaction for both hay and total intake was noted for steers ($P = 0.02$) and a tendency was noted for lambs ($P < 0.09$), with intake decreasing a greater amount from daily to once every10 days with Full CP supplementation compared with little to no reduction with Half CP.

Diet digestibility by steers tended ($P = 0.10$) to be greater with CP supplementation and was increased ($P < 0.01$) by lambs. This, with the intake data, resulted in a greater quantity of nutrients available for utilization by the animal with CP supplementation.

Efficiency of CP utilization by lambs was greater with CP supplementation but was not altered by amount of supplement (P = 0.94) or supplementation frequency (P > 0.92). In addition, plasma urea was greater with CP supplementation (P < 0.01) and for Full CP compared

with Half CP ($P \leq 0.02$) in both steers and lambs.

Cow pre- and post-calving weight and BCS change was improved with CP supplementation ($P \leq 0.03$). Likewise, pre- and post-calving weight change and pre-calving BCS change were improved ($P \leq 0.01$) with Full CP compared with Half CP. However, the change in pre-calving weight and BCS was less as supplementation frequency decreased for Half CP compared with Full CP ($P = 0.01$).

These data suggest that reducing the amount of supplemental CP, when supplementation intervals are greater than 5 or 6 days, can be a management tool to maintain acceptable levels of intake, digestibility, and cow performance while reducing supplement cost.

Introduction

Production of beef cattle is consistently the number two agriculture commodity in Oregon. Consequently, raising cattle is the largest generator of livestock value in Oregon and is dominated by commercial cow/calf production with over 500,000 producing females located in the state. Most cattle spend their entire lives, except for the final 4 to 6 months in the feedlot, grazing standing forage or consuming hay. Forage quality is usually sufficient to support normal levels of production early in the growing season; however, as forages mature they increase in fiber content, decrease in CP, and decrease in digestibility. As a result, many cattle in Oregon and the western United States consume low-quality forage (< 6% CP) from late summer through winter and require some form of supplementation to maintain desired levels of performance.

Protein supplementation of low-quality forage has been shown to increase cow weight gain and BCS, forage intake and digestibility, and can improve reproductive performance. However, winter supplementation can be very expensive. Winter feed costs in the intermountain west often total $150 to 250 per cow per year. In addition to actual supplement costs, winter supplementation includes other expenses such as the labor, time, and equipment associated with supplement delivery. In contrast to other areas of North America, winter feed costs represent an economic disadvantage and could substantially threaten the economic future of the beef industry in this region.

Decreasing the frequency of protein supplementation is one management practice that can decrease labor and time costs by greater than 80% compared with daily supplementation. Ruminants have the ability to recycle excess absorbed nitrogen back to the rumen; therefore, recycling of absorbed nitrogen may support ruminal fermentation between times of supplementation. Consequently, research has shown that protein supplements can be fed at infrequent intervals and still maintain acceptable levels of performance (Hunt et al., 1989; Huston et al., 1999; Bohnert et al., 2002); however, data is limited comparing the effects of altering the amount of protein provided at infrequent intervals on forage intake and digestibility, animal performance, and efficiency of protein use.

It is possible that ruminants consuming low-quality forage may be able to adapt to infrequent supplementation of CP by increasing their ability to recycle nitrogen, thereby improving efficiency of CP use. We hypothesize that as the supplementation interval increases ruminants will become more efficient in their use of supplemental CP. As a result, we should be able to provide LESS total CP and maintain performance comparable to more frequent supplementation of MORE total CP. This will not only save time and labor, but will decrease the amount and cost of supplement provided to beef cows consuming low-quality forage, and therefore increase economic returns of Oregon's beef producers (Table 1).

Materials and Methods

Experiment 1. Seven ruminally cannulated Angus x Hereford steers (661 ± 22 lb) were used in a 4 × 7 incomplete Latin square design and housed in individual pens within an enclosed barn with continuous lighting. Steers were provided continuous access to fresh water and a low-quality cool season hay (Chewings fescue grass seed straw; 2.9% CP). A trace mineralized salt mix was provided daily. Treatments were arranged in a 2 × 3factorial design with 2 levels of CP provided daily, once every 5 days, or once every 10 days with an unsupplemented control (daily, 5-day, and 10-day treatments, within CP level, received the same total amount of CP over a 10-day period). The greater level of CP was estimated to meet ruminal requirements for degradable intake protein and the lower level was 50% of the greater level. Soybean meal (SBM; 51.4% CP) was placed directly into the rumen via the ruminal cannula for supplemented treatments.

Experimental periods were 30 d, with intake measured beginning d 19 and concluding d 28. On day 11 (day of supplementation for all treatments except for control) and day 20 (day before supplementation for all treatments except for control), treatment effects on ruminal indigestible fiber fill were determined by manually removing the contents from each steer's reticulo-rumen 4 h after feeding. Feces were collected on days 21 to 30.

On days 21 and 30, ruminal fluid was collected by suction strainer immediately prior to feeding and at 3, 6, 9, 12, 18, and 24 hours postfeeding. Ruminal fluid pH was measured immediately after collection.

Data were analyzed as an incomplete 7 × 4 Latin square. The model for intake and digestibility data included period and treatment. The model for samples collected at fixed times included period, treatment, time, and treatment × time. Contrast statements were: 1) Control vs CP supplementation, 2) Full vs Half CP, 3) linear effect of supplementation frequency, 4) quadratic effect of supplementation frequency, 5) Interaction of linear effect of supplementation frequency and level of CP, and 6) Interaction of quadratic effect of supplementation frequency and level of CP.

Experiment 2. Seven wethers (68 ± 1 lb) were used in a 4 × 7 incomplete Latin square design. Lambs were provided continuous access to fresh water and a low-quality cool season hay (Chewings fescue grass seed straw; 4.9% CP). A trace mineralized salt mix was provided daily. Treatments were arranged in a 2 × 3 factorial design (two levels of CP provided daily, once every 5 days, or once every 10 days) with an unsupplemented control. The greater level of CP was estimated to meet the CP requirement of a 66 lb lamb gaining 0.44 lb/day; the lower level was 50% of the greater level. Soybean meal (SBM; 49.9% CP) was used as the CP supplement and was offered to lambs immediately prior to hay feeding.

Experimental periods were 30 d, with intake measured beginning d 19 and concluding d 28. Feces and urine were collected on days 21 to 30. In addition, blood samples were collected on days 21 to 30 for analysis of plasma urea.

Data were analyzed as an incomplete 7 × 4 Latin square. The model for intake and digestibility data included period and treatment. The model for plasma urea included period, treatment, day, and treatment × day. The same contrasts described in Experiment 1 were used to evaluate treatment effects.

Experiment 3. Eighty-four cows (1231 ± 9 lb; 4.8 ± 0.04 BCS) in the last third of gestation were stratified by age, body condition score, and weight and assigned randomly within stratification to the treatments described in Experiment 1 using a Randomized Complete Block design. Soybean meal was used as the source of supplemental CP (51.7% CP). The cows were then sorted by treatment and allotted randomly to 1 of 21 pens. The greater level of CP was, on a daily basis, 0.525 lb CP/hd and the lower level was 50% of the greater level. Supplements were provided through calving. Cows had continuous access to water, salt, and a vitamin/mineral mix. They were offered ad libitum access to low-quality grass seed straw (2.4% CP) at 0800 daily.

Cow weight and BCS were measured every 14 days until calving and within 24 hours after calving. In addition, calf weights were obtained within 24 hours of birth.

Data were analyzed as a Randomized Complete Block. The model included block, treatment, and Block × treatment. The same contrasts described in Experiment 1 were used to evaluate treatment effects.

Results

Experiment 1. Hay (P = 0.03) and total (P < 0.01) intake increased with CP supplementation; however, we noted a linear effect of CP amount × supplementation frequency interaction (P = 0.02) for both hay and total intake, with intake decreasing almost 17% from daily to once every10 days with Full CP supplementation compared with essentially no reduction with Half CP (Table 2). Digestibility was not altered by CP supplementation (P = 0.10) but it increased quadratically (P < 0.01) as the supplementation interval increased. Fiber digestibility (neutral detergent fiber) was not affected by treatments (P > 0.12).

Ruminal particulate fill was not affected by treatments on the day all supplements were provided (P > 0.31; Table 3); however, when only daily supplements were provided, ruminal particulate fill was greater (P = 0.03) with CP supplementation. Also, ruminal particulate passage rate was increased with CP supplementation (P > 0.03).

A day × treatment interaction (P < 0.01) was noted for plasma urea (Figure 1); however, after evaluating the nature of the responses we decided to provide the day × treatment figure and discuss overall treatment means. Plasma urea increased with CP supplementation (P < 0.01; Table 2) and was greater with Full CP compared with Half CP (P < 0.01).

Ruminal pH decreased linearly as supplementation frequency decreased (P < 0.01) when all supplements were provided; however no affect was noted when only daily supplements were provided (P > 0.22).

A time × treatment interaction (P < 0.01) was noted for ruminal ammonia when all supplements were provided (Figure 2); however, after evaluating the nature of the responses we decided to provide the time × treatment figure and discuss overall treatment means. Ruminal ammonia increased with CP supplementation when all supplements were provided and was greater with Full CP compared with Half CP (P < 0.01). However, a linear effect of CP amount × supplementation frequency interaction (P = 0.02) was observed with ruminal ammonia increasing 400% from daily to once every10 days with Full CP supplementation compared with approximately 300% with Half CP (Table 3; Figure 2). When only daily supplements were provided, we noted no CP supplementation effect (P = .44) or difference between Full CP and Half CP (P = .64); nevertheless, ruminal ammonia decreased as supplementation frequency decreased (P < 0.01).

Experiment 2. Hay and total intake were not affected (P > 0.25) by CP supplementation. However, similar to Experiment 1, a tendency for a linear effect of CP amount × supplementation frequency interaction ($P \leq 0.09$) was noted for both hay and total intake, with intake decreasing over 30% from daily to once every10 days with Full CP supplementation compared with less than 10% with Half CP (Table 4).

Digestibility was increased 19% with CP supplementation (P < 0.01) and also increased (P = 0.04) as the supplementation interval increased. No difference in digestibility was noted between Full CP and Half CP (P = 0.28). As with intake, fiber digestibility (neutral detergent fiber) was increased (P = 0.02) almost 10% with CP supplementation. Also, fiber digestibility increased 11% as supplementation frequency decreased from daily to once every 10 days with Full CP compared with a 3% decrease with Half CP (P = 0.04).

Crude protein intake increased with CP supplementation (P < 0.01), for Full CP compared with Half CP (P < 0.01), and decreased as supplementation interval increased (P =

0.04). Digestibility of CP was increased greater than 300% with CP supplementation (*P* < 0.01), 21% greater for Full CP compared with Half CP (*P* < 0.01), and decreased as supplementation interval increased (*P* = 0.01).

The efficiency of CP use, measured as the quantity of digested CP retained in the body, was increased with CP supplementation (*P* < 0.01) but was not affected by amount of supplemental CP (*P* = 0.94) or supplementation frequency (*P* > 0.92) (Table 4).

As with Experiment 1, a day × treatment interaction (*P* < 0.01) was noted for plasma urea (Figure 3); however, after evaluating the nature of the responses we decided to provide the day × treatment figure and discuss overall treatment means. Plasma urea increased with CP supplementation (*P* < 0.01; Table 4) and was greater with Full CP compared with Half CP (*P* = 0.03).

Experiment 3. Pre- and Post-calving weight change by cows was improved with CP supplementation (*P* < 0.03) and for Full CP compared with Half CP (*P* < 0.02; Table 5). However, both pre- and post-calving weight change were negatively affected as supplementation frequency decreased (*P* < 0.01). It is of interest to note that there was less pre-calving weight change as supplementation frequency decreased from daily to once every 10 days for Half CP compared with Full CP (*P* = 0.01). Calf birth weight was not affected by treatment (*P* > 0.19).

Similar to our observations with cow body weight, pre- and post-calving change in BCS was improved with CP supplementation (*P* < 0.03). Also, pre-calving BCS change was improved with Full CP compared with Half CP (*P* < 0.01; Table 5) but negatively affected as supplementation frequency decreased (*P* = 0.02). Also, as with cow weight change, there was less pre-calving BCS change as supplementation frequency decreased for Half CP compared with Full CP (*P* = 0.05).

Conclusions

Reducing the amount of supplemental CP provided to ruminants consuming low-quality forages, when supplementation intervals are greater than 5 or 6 days, can be a management tool to maintain acceptable levels of intake, digestibility, and cow performance while reducing supplement cost.

Acknowledgements

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Figure 1. Effect of protein amount and supplementation frequency on plasma urea nitrogen in steers. Columns from left to right for each treatment represent day 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 of a 10-day supplementation period, respectively. Treatments were: Control; D = 0.133% of body weight/day of soybean meal (SBM); 5D = 0.665% of body weight of SBM once every 5 days; 10D = 1.33% of body weight of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment. Each column with an S below it represents a supplementation day.

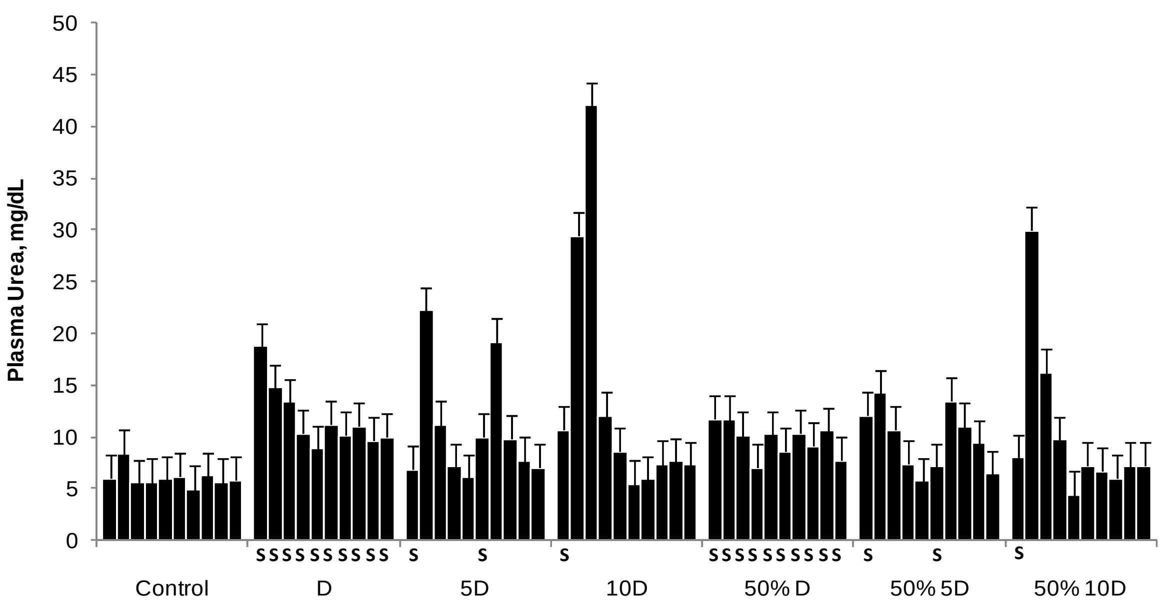

Figure 2. Effect of protein amount and supplementation frequency on steer ruminal ammonia N the day all supplements were provided. Columns from left to right for each treatment represent 0, 3, 6, 9, 12, 18, and 24 hours post-feeding, respectively. Treatments were: Control; D = 0.133% of body weight/day of soybean meal (SBM); 5D = 0.665% of body weight of SBM once every 5 days; 10D = 1.33% of body weight of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment.

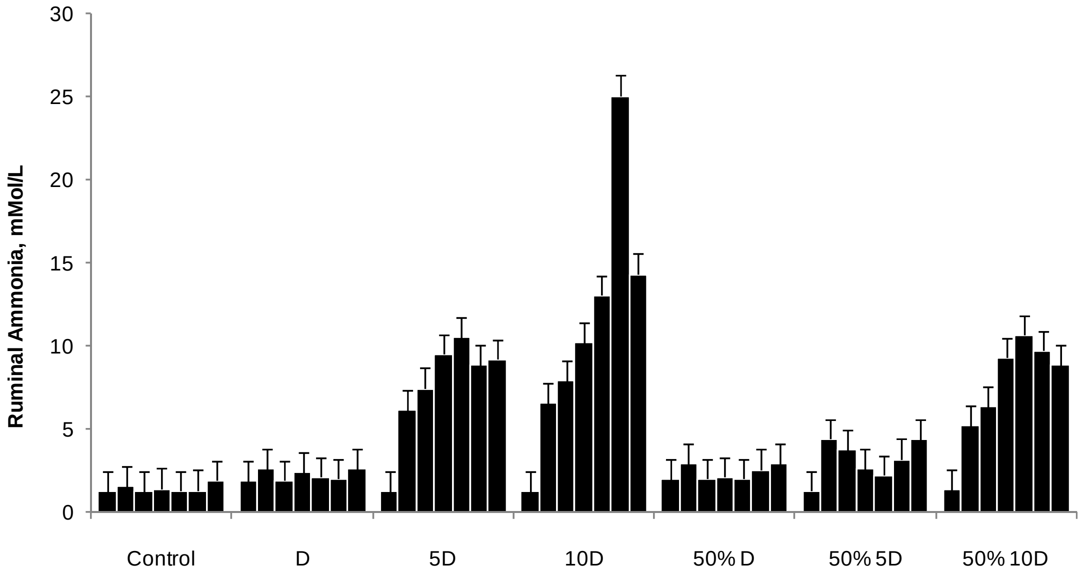

Figure 3. Effect of protein amount and supplementation frequency on plasma urea nitrogen in lambs. Columns from left to right for each treatment represent day 1, 2, 3, 4, 5, 6, 7, 8, 9, and 10 of a 10-day supplementation period, respectively. Treatments were: Control; D = 0.133% of body weight/day of soybean meal (SBM); 5D = 0.665% of body weight of SBM once every 5 days; 10D = 1.33% of body weight of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment. Each column with an S below it represents a supplementation day.

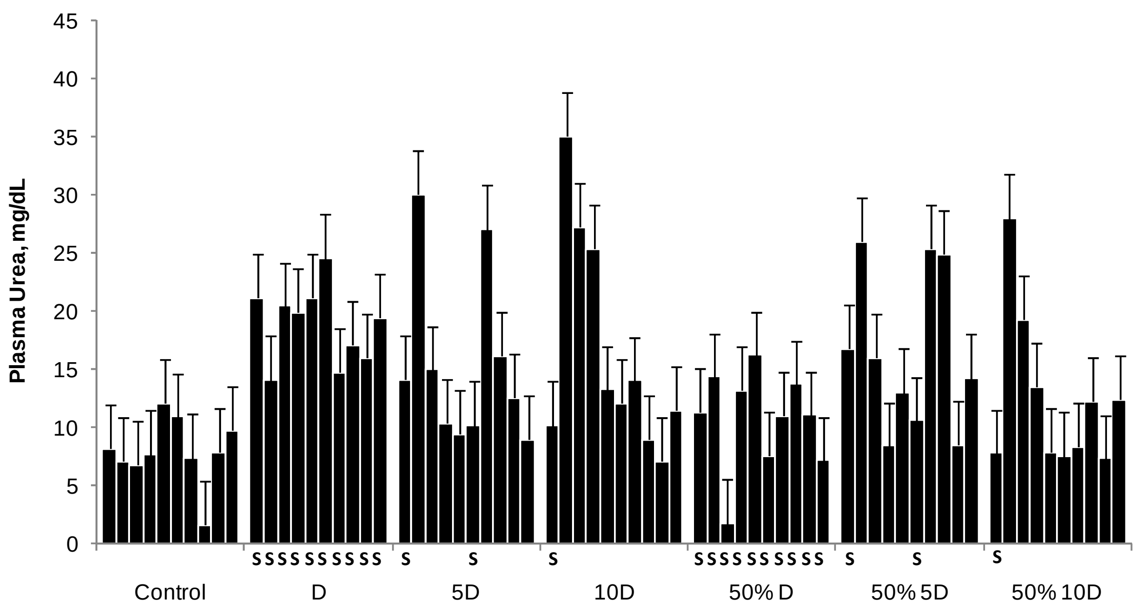

Table 1. Estimated cost of treatments over a 30-day Period. One pound of soybean meal (SBM), daily, was used as the basis to compare all other treatments.

	1 pound of Soybean Meal/head			1/2 pound of Soybean Meal/head		
	Daily	5 Days	10 Days	Daily	5 Days	10 Days
Fuel Cost ($)[a]	360.00	72.00	36.00	360.00	72.00	36.00
Labor Cost($)[b]	630.00	126.00	63.00	630.00	126.00	63.00
Supplement Cost ($)[c]	1,485.00	1,485.00	1,485.00	742.50	742.50	742.50
Total Cost ($)	2,475.00	1,683.00	1,584.00	1732.50	940.50	841.50
Labor/Fuel Cost Reduction	0	80%	90%	0	80%	90%
Supplement Cost Reduction	0	0	0	50%	50%	50%
Total Cost Reduction	0	32%	36%	30%	62%	66%
Total Benefit ($)	0	792.00	891.00	742.50	1,534.50	1633.50

[a] Fuel costs calculated as 3 gallons/supplementation day at $4.00/gallon
[b] Labor calculated as 2.5 hours/supplementation day at $8.40/hour
[c] Assuming 300 cow herd; cost of $330/ton

Table 2. Effect of CP amount (soybean meal; SBM) and supplementation frequency on intake, diet digestibility, and plasma urea in steers.

	Treatment[a]								P-Value[c]					
	Con	D	5D	10D	50% D	50% 5D	50% 10D	SEM[b]	Con vs Supp	Full vs Half	L Freq	Q Freq	L Freq vs Amt	Q Freq vs Amt
Hay intake, % body weight	1.61	1.96	1.92	1.62	1.76	1.70	1.75	0.075	0.03	0.08	0.02	0.52	0.02	0.14
SBM intake, % body weight	0.000	0.133	0.133	0.133	0.067	0.067	0.067							
Total Intake, % body weight	1.61	2.10	2.05	1.76	1.83	1.77	1.81	0.075	< 0.01	< 0.01	0.02	0.52	0.02	0.14
Diet Digestibility, %	45.0	45.8	44.7	48.6	45.7	45.1	47.3	0.86	0.10	0.57	< 0.01	< 0.01	0.39	0.34
NDF Digestibility, %	48.2	47.5	46.2	49.0	47.8	47.4	48.5	1.03	0.64	0.68	0.26	0.12	0.69	0.48
Plasma Urea, mg/dL	6.0	11.8	10.7	13.6	9.7	9.7	10.2	0.72	<0.01	<0.01	0.10	0.07	0.38	0.16

[a] CON = control; D = 0.133 % body weight/day of SBM; 5D = 0.665% body weight of SBM once every 5 days; 10D = 1.33% body weight of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment.
[b] n = 4.
[c] Con vs Supp = control vs supplemented treatments; Full vs Half = full vs half amount of CP; L Freq = linear effect of supplementation frequency; Q SF = quadratic effect of supplementation frequency; L Freq vs Amt = interaction of the linear effect of supplementation frequency and amount of CP; Q Freq vs Amt = interaction of the quadratic effect of supplementation frequency and amount of CP.

Table 3. Ruminal particulate fill and ammonia concentration on the day of supplementation for all supplemented treatments and, other than daily treatments, the day before supplementation in steers.

	Treatment[a]								P-value[c]					
	Con	D	5D	10D	50% D	50% 5D	50% 10D	SEM[b]	Con vs Supp	Full vs Half	L Freq	Q Freq	L Freq vs Amt	Q Freq vs Amt
Day of Supplementation	1.61	1.96	1.92	1.62	1.76	1.70	1.75	0.075	0.03	0.08	0.02	0.52	0.02	0.14
Particulate Fill, % BW	0.90	1.02	1.07	0.99	0.95	0.89	0.89	0.04	0.20	< 0.01	0.30	0.63	0.77	0.25
Particulate Passage rate, %/h	1.92	2.03	1.97	1.87	2.02	2.18	1.99	0.126	0.50	0.31	0.44	0.38	0.58	0.48
pH	6.7	6.7	6.6	6.4	6.9	6.6	6.6	0.09	0.33	0.07	0.01	0.66	0.90	0.22
Ammonia, mMol/L	1.4	2.2	7.6	11.2	2.4	3.1	7.4	0.78	<0.01	<0.01	<0.01	0.52	0.02	0.07
Day Before Supplementation														
Particulate Fill, % BW	0.97	1.09	1.01	1.02	0.95	0.91	0.90	0.06	0.85	0.02	0.34	0.55	0.88	0.75
Particulate Passage rate, %/h	1.54	1.92	2.01	1.77	1.86	1.91	1.97	0.144	0.03	0.90	0.92	0.52	0.38	0.52
pH	6.7	6.7	6.9	6.8	6.8	6.8	6.9	0.06	0.25	0.54	0.23	0.51	0.79	0.25
Ammonia, mMol/L	1.1	2.0	1.2	0.8	1.5	1.2	1.1	0.24	0.44	0.64	<0.01	0.38	0.10	0.81

[a] CON = control; D = 0.133 % body weight/day of soybean meal (SBM); 5D = 0.665% of body weight of SBM once every 5 days; 10D = 1.33% of body weight of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment.

[b] n = 4.

[c] Con vs Supp = control vs supplemented treatments; Full vs Half = full vs half amount of CP; L Freq = linear effect of supplementation frequency; Q SF = quadratic effect of supplementation frequency; L Freq vs Amt = interaction of the linear effect of supplementation frequency and amount of CP; Q Freq vs Amt = interaction of the quadratic effect of supplementation frequency and amount of CP.

Table 4. Effect of CP amount (soybean meal; SBM) and supplementation frequency on intake and diet digestibility by lambs.

	Treatment[a]								P-Value[c]					
	Con	D	5D	10D	50% D	50% 5D	50% 10D	SEM[b]	Con vs Supp	Full vs Half	L Freq	Q Freq	L Freq vs Amt	Q Freq vs Amt
Hay intake, % body weight	1.88	2.16	1.95	1.40	2.02	1.93	1.87	0.173	0.97	0.45	0.02	0.60	0.08	0.52
SBM intake, % body weight	0.000	0.280	0.280	0.280	0.140	0.140	0.140							
Total Intake, % body weight	1.88	2.44	2.23	1.68	2.16	2.07	2.01	0.173	0.26	0.80	0.02	0.60	0.09	0.54
Diet Digestibility, %	37.4	40.6	45.7	49.6	43.5	43.5	43.5	1.98	<0.01	0.28	0.04	0.86	0.04	0.87
NDF Digestibility, %	42.2	43.6	46.9	48.6	46.0	45.7	44.7	1.39	0.02	0.43	0.19	0.64	0.04	0.86
CP Intake, % body weight	0.092	0.240	0.230	0.205	0.165	0.165	0.160	0.0092	<0.01	<0.01	0.04	0.54	0.12	0.75
CP Digestibility, %	12.2	49.5	58.4	65.8	45.5	48.9	48.4	3.40	<0.01	<0.01	0.01	0.67	0.07	0.85
Efficiency of CP Use, %[d]	-461	22	18	4	12	2	7	120	<0.01	0.94	0.92	0.99	0.96	0.95
Plasma Urea, mg/dL	9.0	18.9	15.4	16.5	11.7	16.4	12.4	1.73	<0.01	0.03	0.63	0.51	0.39	0.04

[a] CON = control; D = 0.280% of body weight/day of SBM; 5D = 1.4% of body weight of SBM once every 5 days; 10D = 2.8% of body weight of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment.
[b] n = 4.
[c] Con vs Supp = control vs supplemented treatments; Full vs Half = full vs half amount of CP; L Freq = linear effect of supplementation frequency; Q SF = quadratic effect of supplementation frequency; L Freq vs Amt = interaction of the linear effect of supplementation frequency and amount of CP; Q Freq vs Amt = interaction of the quadratic effect of supplementation frequency and amount of CP.
[d] Measured as the quantity of digested CP retained in the body.

Table 5. Effect of CP amount (soybean meal; SBM) and supplementation frequency on performance of cows in the last third of gestation.

	Treatment[a]								P-Value[c]					
	Con	D	5D	10D	50% D	50% 5D	50% 10D	SEM[b]	Con vs Supp	Full vs Half	L Freq	Q Freq	L Freq vs Amt	Q Freq vs Amt
Body Weight														
Initial, lb	1240	1241	1217	1231	1175	1260	1250	24.5	0.66	0.93	0.17	0.47	0.08	0.10
Pre-Calving[d], lb	1216	1311	1270	1227	1199	1265	1264	28.3	0.16	0.22	0.73	0.45	< 0.01	0.47
Post-Calving[e], lb	1085	1179	1113	1115	1080	1123	1106	23.9	0.17	0.09	0.44	0.91	0.07	0.12
Pre-Calving Change, lb	-23	70	53	-4	24	6	15	12.7	<.001	0.01	< 0.01	0.76	0.01	0.11
Post-Calving Change, lb	-155	-62	-104	-116	-95	-137	-143	15.1	< 0.01	< 0.01	<.001	0.18	0.87	0.90
BCS														
Initial	4.8	4.8	4.8	4.8	4.8	4.8	4.9	0.07	0.49	0.66	0.73	0.51	0.76	0.47
Pre-Calving	4.4	4.9	4.8	4.6	4.6	4.6	4.6	0.10	0.02	0.05	0.08	0.97	0.06	0.51
Post-Calving BCS	4.1	4.6	4.6	4.4	4.5	4.4	4.4	0.09	<.001	0.34	0.14	0.61	0.21	0.51
Pre-Calving BCS	-0.4	0.1	0.0	-0.3	-0.2	-0.2	-0.3	0.09	0.027	< 0.01	0.02	0.53	0.05	0.90
Post-Calving BCS	-0.6	-0.2	-0.3	-0.5	-0.4	-0.4	-0.5	0.11	0.009	0.26	0.13	0.38	0.40	0.96

[a] CON = control; D = 1.02 lb/head of SBM daily; 5D = 5.1 lb/head of SBM once every 5 days; 10D = 10.2 lb/head of SBM once every 10 days; 50% D = 50% of the D treatment; 50% 5D = 50% of the 5D treatment; 50% 10D = 50% of the 10D treatment.
[b] n = 4.
[c] Con vs Supp = control vs supplemented treatments; Full vs Half = full vs half amount of CP; L Freq = linear effect of supplementation frequency; Q SF = quadratic effect of supplementation frequency; L Freq vs Amt = interaction of the linear effect of supplementation frequency and amount of CP; Q Freq vs Amt = interaction of the quadratic effect of supplementation frequency and amount of CP.
[d] Measured within 14 days prior to calving.
[e] Measured within 24 hours after calving.

Presentations, outreach and publications

Christopher Schauer, Hettinger REC Director and Animal Scientist

Presentations and Outreach

Multiple Lambing Season Spreadsheets
Making "Cents" of Shepherding, Carrington, ND
January 7, 2012

Alternative Feeding Strategies for Cows During Late Pregnancy
Hettinger Research Extension Center Beef Day, Hettinger, ND
January 19, 2012

Carcass Ultrasound in Sheep: Forum
American Sheep Industry Association, Phoenix, AZ
January 26, 2012

Grazing Nutrition for Livestock
Sustainable Agriculture Conference, Fort Yates, ND
March 13, 2012

Rambouillet Ram Test Results.
Ram Test Field Day, Hettinger, ND
March 17, 2012

Low Cost Winter Feeding Strategies for the Western Dakotas: An Animal Scientist's Perspective
The Web of Life: Land Livestock & People; Morton County SCD, Mandan, ND
March 22, 2012

Sheep Nutrition for Beginners
Starter Flock Sheep School, Hettinger, ND
September 22, 2012

Winter Feeding Supplementation for Ewes
2012 Northern Plains Sheep Symposium; Lead, SD
September 28, 2012

NDSU Shearing School
Hettinger, ND
November 17-19, 2012

NDSU and ASI Wool Classing School
Hettinger, ND
November 17-19, 2012

Hettinger REC Research and Outreach Update
North Dakota Lamb and Wool Producers Association, Mandan, ND
December 8, 2012

Publications

Kronberg, S.L., E.J. Scholljegerdes, E.J. Murphy, R.E. Ward, T.D. Maddock, and **C.S. Schauer**. 2012. Treatment of flaxseed to reduce biohydrogenation of α-linolenic acid by ruminal microbes in sheep and cattle and increase n-3 fatty acid levels in red meat. J. Anim. Sci. 90:4618-4624.

Neville, B.W., G.P. Lardy, K.K. Karges, S.R. Eckerman, P.T. Berg, and **C.S. Schauer*.**

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Benjamin Geaumont, Hettinger REC Research Assistant Professor, Wildlife and Range Sciences

<u>Presentations and Outreach</u>

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Geaumont, B. D. Houchen, and K. Sedivec. 2012. Sharp-tailed Grouse ecology in northwest South Dakota. Plains and Mountain Section of the Wildlife Society. Bismarck, ND.

Geaumont, B. 2012. Annual forages and cover crops in southwest North Dakota: what is being done? NRCS and Adams County SCD Soil Health Meeting. Hettinger, ND.

Geaumont, B. 2012. Carving a niche in southwest North Dakota: wildlife/range research at the Hettinger Research Extension Center. Rural Leadership Conference. Hettinger, ND.

Mazza, M.E., B.A. Geaumont, K.K. Sedivec, K. Larson, J. Norland, and C.S. Schauer. 2012. Selection of brood rearing habitat by Chinese ring-necked pheasant in southwest North Dakota. ND Chapter of the Wildlife Society, Fargo, ND.

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Advisory Board Minutes

Advisory Board Meeting

Hettinger Research Extension Center

February 10, 2012

Board members present included Kat Weinert, Lyle Warner, Terry West, Denise Andress, Julie Kramlich, Cole Ehlers, Nathan Swindler, Ted Sailer, Chuck Christman, Joe Rohr and Dean Wehri. Special guests include Tim Faller, Gerald Sturn and Duaine Marxer. Staff present included Christopher Schauer, Eric Eriksmoen, Clint Clark, Ben Geaumont and Cassie Dick.

After a noon lunch the meeting was called to order by Chairman Ted Sailer at 12:40 p.m.

Ted Sailer called for a nomination to approve the minutes from the previous meeting. Joe Rohr motioned to approve the minutes, Cole Ehlers seconded, the motion passed to approve the minutes from the previous meeting.

Ted Sailer called for any additions or changes for the agenda. There were no changed to be made and the agenda was approved with no opposed.

Director's Report- Chris Schauer (handout provided)

1. Legislative Update
    a. Last Session
        i. Two positions were funded in the Soil Health and Multiple Land Use Initiative
        ii. Dr. Ben Geaumont was hired July 11, 2011 and a M.S. level technician will be hired this spring
        iii. Plant Protection/ Weed Scientist was not funded
        iv. Agronomy and Range lab was not funded
    b. Next Session
        i. SBARE is in the process of ranking requests for positions and facilities
        ii. Weed Scientist and Livestock Extension Specialist are on the list
        iii. Agronomy and Range Lab and a Livestock Facility are on the capital improvements list
        iv. We will know by the next Advisory Board meeting in July how the request list is shaping up
2. Infrastructure review
3. Graduate Student and Technician update

4. The Research Center is sitting good

Animal Science Report- Chris Schauer (handout provided)

1. Being active, but still looking for new projects, prairie dog project will demand attention

Rangeland & Wildlife Report- Ben Geaumont (handout provided)

1. Looking for ideas and feedback
2. Prairie dog project
3. Where are grouse moving to during winter

Agronomy Report- Eric Eriksmoen

1. Good year for crops last year
2. Completed a number of projects
    a. Sawfly project coming to an end- student finishing up work
3. Winter wheat survival through this winter?
    a. Doing good so far even without snow, this is a more typical winter for our region
    b. Soil temperatures should not be an issue
    c. Lack of moisture is the biggest issue
4. Hot topics- putting together research for upcoming summer, looking for ideas
    a. Corn
5. Current needs
    a. Weed scientist
    b. Agronomy/range lab
6. ND Crop Improvement pasted a “Resolution of SW District Crop Improvement & Seed Association”

    Whereas Certified Seed is the backbone of producing a healthy, vibrant and profitable crop, and it’s use has become a standard farming practice and

    Whereas the use of Certified Seed continues to grow, especially in Western North Dakota and

    Whereas Foundation Seed is an essential component in the production of Certified Seed and will also need to increase in future capacity and

    Whereas North Dakota State University does not have a Foundation Seed program in southwestern North Dakota

    Therefore be is resolved, that NDCISA encourage and support NDSU in the development of a Foundation Seed production program in southwestern North Dakota.

Chairman Ted Sailer called to entertain a motion to issue directive "Evaluate the Feasibility of Foundation Seeds Program at Hettinger REC". Terry West moved to pass the motion and Denise Andress seconded the motion. Chairman Ted Sailer asked for any discussion:

a. "What is the Dickinson REC's position and would Hettinger be infringing on their program or competing?"
    1. Dickinson is at the same point, just receiving the information, no discussion from Dickinson is known of them being interested
    2. The first step is to show interest in the program
b. "What about employment?"
    1. It could create two new position in Hettinger, 1 seeds man and 1 technician
c. This project would be land and equipment heavy (bins, tractor, land, seed cleaner etc.) The Hettinger REC does not have the land or resources at this time

Chairman Ted Sailer called for any question, there were none. Ted Sailer called for an all in favor for the directive: all in favor and none opposing. The directive passed and the Advisory Board will entertain the motion to "Evaluate the Feasibility of a Foundation Seed Program at the Hettinger REC". At the next Advisory Board meeting the board will discuss if this item should be added to the request list that SBARE will present to the legislator in the next session.

7. Eric Eriksmoen asked for input on outreach programs and suggestions on research
    a. Drought tolerant corn
        a. No grain corn insurance available in Adams and Hettinger Counties
    b. Sunflowers
    c. Weed control tours
    d. Edible and soy beans
    e. Biodiesel
        a. Minot REC and the main station in Fargo do some
    f. Social Media for outreach

Economic Report- Dan Nudell (handouts)

1. Upcoming program "Outlook for Ag Producers" February 27th at 12 noon

2. New Publication "Potential Economic Effects of Post-CRP Land Management in Southwest North Dakota" December 2011

2010-2014 Strategic Plan- no updates at present time

1. Enhance the efficiency and profitability of crop production systems and promote science based environmental stewardship.
2. Provide information and services to grow the economy of the region.
3. Conduct applied research that evaluates the compatibility of agriculture and wildlife.

4. Explore alternative livestock production systems that increase profitability while maintaining environmental stability.
5. Ensure stakeholders receive information.

Open Discussion and questions

1. Night programming works better for producers
2. What is happening with the Southwest Feeders lot?
    a. SW feeders is fully functional and in use for lambs and calves
    b. Do not have the staff right now for backgrounding producer calves

Election of Board Members

Chairman Ted Sailer called for nominations to replace and re-elect members of the Advisory Board. Members serve a three year term and can serve two terms. Larry Leistritz, David Merwin and Chairman Ted Sailer have completed their terms. Cole Ehlers, Dennis Sabin and Dean Wehri are eligible to serve another term. All members are willing to serve another term. Chuck Christman moved that all members eligible to serve another term remain on the board. Joe Rhor seconded. Motion passes no opposing for Dean Wehri, Cole Ehlers and Dennis Sabin to serve another three year term. Two positions remain open. Discussion on replacements,

1. Tom DeSutter to fill the open spot for an NDSU representative. He is in soil science and is willing to participate on the board.
2. The board and staff came up with two names who would be a good fit for a multi-land use
    a. Randy Bensen, South Dakota rancher
    b. Bob Blahha, out-of-state land owner who is active in land multi-use

After discussion, Dean Wehri moved to appoint Tom DeSutter and Randy Bensen to the board if they are willing to accept the invitation, Kat Weinert seconded. Motion passed, no opposing.

Chairman Ted Sailer called for nominations to replace himself as Chair. Dean Wehri as vice chair would accept being the new Chairman, no other nominations were made. LyleWarner moved for Dean Wehri to become the new Chairman of the Advisory Board. Nathan Swindler seconded. Motion passes, no opposing for Dean Wehri to become the new Chairman of the Advisory Board. Dean becoming Chairman left the vice-chair open. Ted Sailer nominated Cole Ehlers for Vice Chair, Cole accepted the nomination. Chuck Christman moved and Julie Kramlich seconded. The motion passed, no opposing for Cole Ehlers to be the new vice-chair.

The next meeting will be held ______________________.

The meeting concluded at 2:20 p.m. and employees were asked to leave for so the Advisory Board Executive session.

Advisory Board Meeting

Hettinger Research Extension Center

July 10, 2012

Board members present included Kat Weinert, Julie Kramlich, Dennis Sabin, Justin Freitag, Cole Ehlers, Tom DeSutter, Joe Rohr and Terry West. Special guests Tim Faller and Eric Eriksmoen were present. Staff present included Christopher Schauer, Benjamin Geaumont and Cassie Dick.

After a noon lunch the meeting was called to order by Vice-Chair Cole Ehlers at 12:40 p.m.

Cole Ehlers called for a motion to approve the minutes from the previous meeting. Tom DeSutter motioned to approve the minutes from the previous meeting, Joe Rohr seconded, the motion to approve the minutes from the previous meeting passed.

Cole Ehlers called for any additions or changes to the agenda. Only one Eric Eriksmoen, would do his Agronomy report early so that he could continue working to prepare for the field tours. Cole Ehlers called for a motion to approve the changes to the meeting agenda, Tom DeSutter motioned and Joe Rohr seconded. The motion passed with no opposing.

Agronomy Report- Eric Eriksmoen

1. Before leaving the Hettinger station, crops were planted and trials are being finish
    a. Oil seed trials
    b. Sawfly varieties that environment interacts with solidity of stems
    c. Finishing herbicide trials
2. 2012 off station plots tours are being conducted by Roger Ashley, Dickinson REC
3. Rick and summer help doing a lot of work and doing a great job
4. A new agronomy lab in Hettinger is necessary for conducting research

Director's Report- Chris Schauer (handout provided)

1. Legislative Update
    a. Last Session- two positions funded in Soil Health and Multiple Land Use Initiative
        i. PhD level- Dr. Ben Geaumont
        ii. MS level technician- Jeff Stackhouse
    b. Next Session- SBARE ranked both positions and facilities, the list will then go to the Governer, then to the session
        i. Positions:
            1. Weed Research Scientist tied for #1 ranking
            2. Livestock support staff #2 ranking
            3. Livestock Extension Specialist tied for #2 ranking
        ii. Facilities

1. Agronomy and Range Lab #1 ranking with CREC, LREC, CGREC
2. Livestock Processing and Education Facility #3 with CREC

2. Infrastructure
   a. 1200 ewes, 90 cows
   b. Expansion of 200 cows in next five years on the collaborative project with Sitting Bull College, NDSU, SDSU, and USDA-ARS
      i. Clint Clark hired for a herdsman for this collaboration
   c. CASE IH rental agreement
   d. Financially we are stable
   e. Positions
      i. Agronomist- search committee members selected and job has been posted
      ii. Ag Economist- Chris Schauer asked for suggestions as to what to do with this position
         1. Discussion: Chris Schauer stated he would like to see the money in the position used to fund an animal science technician, Tom DeSutter suggested it could be used to fund grad students. Tim Faller suggested using it to fund a permanent SW Feeders Coordinator. Chris Scahuer said that would be difficult to find a scientist without having funding for a technician for them. Chris also pointed out that there should be a plan in place soon, so that legislature will not attack an open position.
         2. Dennis Sabin made the motion to replace the Ag Economist position with a technician for supporting a scientist. Terry West seconded the motion. All members were in favor and no opposed. The motion passed.
   f. Housing graduate students is becoming an issue, FEMA trailers is the direction REC's are going
   g. Graduate Students on Hettinger staff

      Jeff Stackhouse, Amanda Lipinski, Magan VanEmon, Alison Crane

Animal Science Report - Christopher Schauer (handout given)

1. 2010-2014 Strategic Plan
   a. Enhance the efficiency and profitability of crop production systems and promote science based environmental stewardship.
   b. Provide information and services to grow the economy of the region.
   c. Conduct applied research that evaluates the compatibility of agriculture and wildlife.
   d. Explore alternative livestock production systems that increase profitability while maintaining environmental stability.
   e. Ensure stakeholders receive our information.
2. Progress toward goals

a. Outreach efforts- Fall Ram Test, Shearing School and Wool Classing School, co-coordinator of carcass ultrasound standards meeting at ASI in 2012, upcoming Beef Day
b. May Lambing Flock- looking at new research options, potentially winter supplemental strategies
c. Fall Laming Flock- Evaluation of Arginine supplementation for decreased fetal death loss: natural sources vs. injectable; by-pass Arginine source (Alison Crane)
d. DDGS Trials- DDGS in growing ram rations(0, 15, and 30%) demonstrated a decrease in semen production
e. NRI grant evaluating metabolizable protein supplementation in late pregnancy and its effect on subsequent ewe lamb prolificacy and feedlot performance of wethers (Megan VanEmon)
f. Tribal Beef Project: AFRI grant, Collaborative project with multiple institutions (Ben Geaumont is leading the prairie dog/range restoration portion). Hettinger REC will be owning and managing approximately 200 head of cattle in Corson County on a cooperator site. 200 yearling cattle are being grazed on the research site, and we will be developing a cow herd.
g. Cattle- grazing studies with Range and Wildlife program

Range and Wildlife- Ben Geaumont (handout provided)

1. Jeff Stackhouse was hired as a full time research technician, as of June 1, 2012
2. Currently have two graduate students and four undergraduate workers aiding with research
3. There are currently eight research trials underway and two cooperator agreements

Research

a. Evaluation of the environmental consequences of agriculture production on post-contract CRP
b. Survival, home range, and habitat use by ring-necked pheasant chicks in southwest ND
c. Sharp-tailed grouse survival, home range, and habitat use on Grand River National Grasslands in northwest SD
d. Establishment of Yellow-flowered Alfalfa Interseeded into Crested Wheatgrass Stands (Collaboration with SDSU)
e. Evaluate winter survival, home range, and habitat use by ring-necked pheasant on a post CRP landscape in southwest ND
f. Evaluation of annual forages associated with cover crops as forage for sheep, benefits to soil health, and as wildlife cover and food.
g. Small scale research project evaluating the use of cover crops on land devoted to oat and barley production in southwest ND
h. New Research- Prairie Dogs, Beef Production and Wildlife- still working out details

Cooperator Agreements

a. Bowman-Slope Soil Conservation District, NDSU Bowman Extension Service and Hettinger Research Extension Center- cover crops/annual forages
b. Hettinger Research Extension Center, US Forest Service, Rocky Mountain Elk Foundation, Boone and Crocket, and numerous other- establish a cover (summer 2010 and 2011) and implement ecological restoration efforts over several years on the Elkhorn Ranch

2010-2014 Strategic Plan

1. Enhance the efficiency and profitability of crop production systems and promote science based environmental stewardship.
2. Provide information and services to grow the economy of the region.
3. Conduct applied research that evaluates the compatibility of agriculture and wildlife.
4. Explore alternative livestock production systems that increase profitability while maintaining environmental stability.
5. Ensure stakeholders receive our information.

Open discussion

1. Alfalfa Weevils- Dennis Sabin stated the need for education, scouts and spraying information, reports of 100% loss in areas
2. Alfalfa seed are not readily available
3. Questions on the possibility of Foundation Seed, which was discussed at the last advisory board meeting- Slow process, SBARE rankings too late for this year legislative session. Many issues need to be address first- labor, land, equipment. The agronomy lab is top priority and will come first.
4. Poor access to seed in area

The next meeting is ___________________________

The advisory Board Meeting concluded at 2:00 pm. Employees were asked to leave so an executive session could be held.

Personnel

Hettinger Research Extension Center

Christopher Schauer	Director/ Animal and Range Science
Dan Nudell	Assistant R/E Center Specialist/ Ag Economics
Eric Eriksmoen	Associate R/E Center Specialist/ Agronomy
Ben Geaumont	Wildlife and Range Research Assistant Professor
Jeff Stackhouse	General Science Professional- Wildlife and Range Research Tech
Terri Lindquist	Finance Paraprofessional
Cassie Dick	Administrative Secretary
Don Stecher	Manager of Ag Operations
Nels Olson	Research Technician/ Agronomy
David Pearson	Research Technician/ Shepherd
Donald Drolc	Research Technician/Livestock
Clint Clark	Research Technician/Beef Herdsman
Stephanie Schmidt	Research Technician

Range and Wildlife Graduate Students
Amanda Lipinski
Jeff Stackhouse
Mark Mazza
Derek Klostermenier

Animal Science Graduate Students
Megan VanEmon
Alison Crane

The Hettinger Research Extension Center hires individuals on a part-time basis to help in the research effort. Many of these are students as well as local residence. We would like to acknowledge the following people who helped at some time during the past year: John White, Caitlin Pearson, Matt Korang, Derrick Stecher, Sulley Merwin, Mariah Miller, Samantha Obrigewitch, Alyssa DeRubeis, Garrett Clark, Daniel Giesen and Chris Vennum.

Advisory Board Members

Dean Wehri, Chair	Mott, ND	Dennis Sabin	Morristown, SD
Cole Ehlers	Hettinger, ND	Lyle Warner	Baldwin, ND
Denise Andress	Hettinger, ND	Nathan Swindler	Mott, ND
Chuck Christman	Lemmon, SD	Joe Rohr	Elgin, ND
Justin Freitag	Scranton, ND	Julie Kramlich	Hettinger, ND
Terry West	Hettinger, ND	Jeremy Fordahl	Hettinger, ND
Kat Weinert	Hettinger, ND	Tom DeSutter	Fargo, ND
Rodney Howe	Hettinger, ND		

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