North Dakota State University

Hettinger Research Extension Center

NDSU | HETTINGER RESEARCH EXTENSION CENTER

2015 Annual Report

Table of Contents

NORTH DAKOTA **AGRICULTURE EXPERIMENT STATION**

Hettinger Research Extension Center

Hettinger REC Research in Brief

- Integrated crops, livestock, and range 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

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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 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 in 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 weed science. 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 calf backgrounding.

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

- Lead a multi-agency and multi-discipline research project evaluating the reclamation of grazing lands inhabited by prairie dogs on the Standing Rock Sioux Reservation.
- Evaluation of 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, Weeds, Livestock, and Range

- 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, and telemetry of upland chicks.
- 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.

OUTREACH

- Conduct annually the HREC Beef Day, Sheep School, Shearing School, Wool Classing School, Carcass Ultrasound School, Crops Tours, Crops Day, and Soil Health Workshops.
- Published “Importance of Range Monitoring” video.
- Published NDSU Sheep Research Report and Hettinger Crops Day Report and contributed to NDSU Beef and Range Report.

HREC Research Faculty

Dr. Christopher Schauer, Director & Animal Scientist
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Weather Summary - Hettinger

Frost Free Days

	28ºF	32ºF	Normal 32ºF
Date of Last Frost	May 20	May 30	May 18
Date of First Frost	October 15	October 6	September 20
Frost Free Days	**148**	**129**	**125**

Precipitation (inches)

Month	2010 -11	2011-12	2012-13	2013-14	2014-15	60 Year Average
October	0.4	0.8	0.7	4.4	0.1	1.1
November	0.6	0.0	0.1	0.2	1.0	0.5
December	0.6	0.2	0.5	0.5	0.0	0.3
January	1.1	0.4	0.2	0.1	0.1	0.4
February	1.0	0.5	0.2	0.3	0.0	0.4
March	0.7	0.2	0.2	0.6	0.2	0.7
April	2.3	3.0	0.2	1.6	1.0	1.6
May	4.6	2.2	7.9	1.6	4.0	2.6
June	3.4	2.4	3.7	5.1	5.2	3.3
July	1.9	3.9	2.0	0.9	1.0	2.0
August	2.3	2.2	1.8	5.2	1.9	1.7
September	0.4	0.0	3.4	1.3	0.9	1.4
April-Sept.	**14.5**	**13.7**	**15.6**	**14.3**	**14.1**	**11.3**
Total	**19.2**	**15.7**	**20.7**	**21.7**	**15.2**	**16.2**

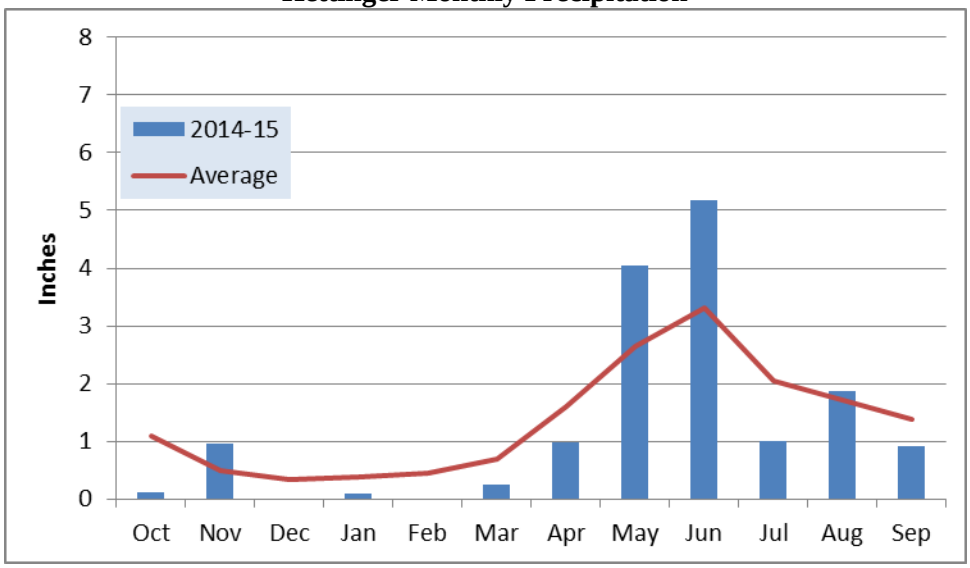
Air Temperature (^{o}F)

Month	2010 -11	2011-12	2012-13	2013-14	2014-15	60 Year Average
October	48.5	48.2	42.1	39.7	46.6	45.6
November	28.0	30.9	32.4	28.8	21.3	30.0
December	13.4	23.9	18.5	12.9	23.4	19.7
January	12.7	24.2	18.3	16.6	21.6	15.2
February	14.7	21.8	26.7	10.1	19.1	20.0
March	22.8	44.4	27.4	26.5	38.0	28.8
April	39.4	46.9	35.5	39.1	43.2	42.6
May	50.2	53.6	53.5	52.8	50.2	53.7
June	62.0	66.5	61.7	59.5	64.6	63.1
July	71.3	75.2	68.1	66.4	70.4	70.1
August	65.3	67.8	69.5	66.0	69.3	68.7
September	56.9	59.4	62.5	56.4	64.1	57.8
Average	**40.4**	**46.9**	**43.0**	**39.6**	**44.3**	**42.9**

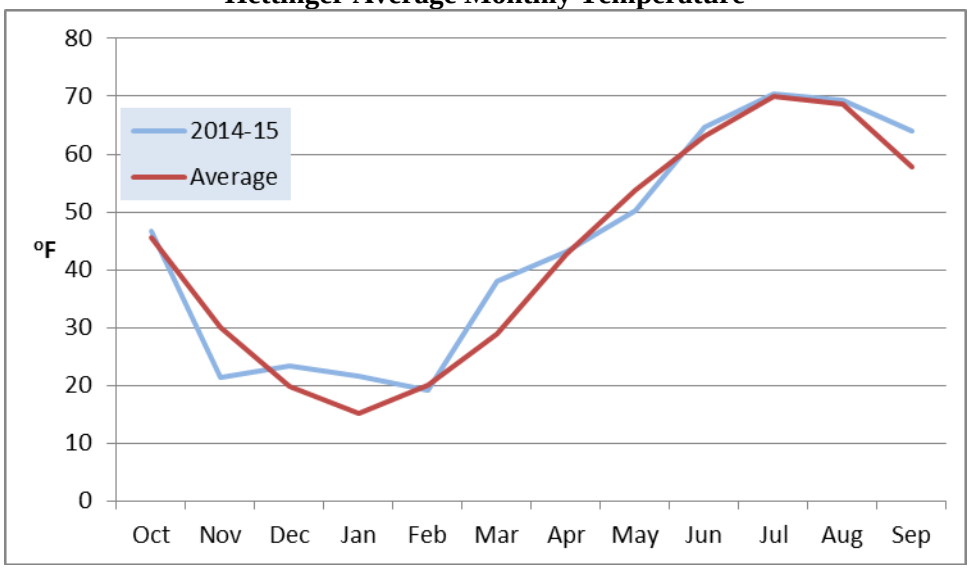
Corn Growing Degree Days (GDD)

Month	2011	2012	2013	2014	2015	43 Year Average
May	161	266	266	245	185	258
June	358	498	381	330	444	417
July	631	688	543	526	595	584
August	555	504	553	504	578	537
September	347	411	403	313	462	324
Total	**2052**	**2367**	**2146**	**1918**	**2264**	**2120**

Hettinger Monthly Precipitation



Hettinger Average Monthly Temperature



Hard Red Spring Wheat - 2015 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	*	inches	0-9**	lbs/bu	%	---------- Bushels per acre ----------				
LCS Albany	78	35	1	61.1	13.0	75.7	95.4	82.3	88.9	84.5
MS Stingray	80	38	0	60.0	10.9	70.9	95.9	73.8	84.9	80.2
Advance	78	36	2	62.5	13.3	67.8	89.0	79.1	84.1	78.6
SY Soren	77	33	0	62.3	15.1	72.2	86.2	71.9	79.1	76.8
LCS Iguacu	77	35	0	61.8	12.2	69.1	88.2	72.9	80.6	76.7
Elgin-ND	77	39	1	61.8	14.6	66.7	88.5	74.5	81.5	76.6
Prevail	75	38	2	61.1	14.0	66.4	87.2	75.2	81.2	76.3
SY Rowyn	76	35	0	61.3	14.0	69.5	85.0	74.3	79.7	76.3
Faller	79	38	1	61.6	12.4	54.4	94.1	79.5	86.8	76.0
SY 605CL	75	40	1	62.2	14.5	71.8	83.1	71.5	77.3	75.5
LCS Powerplay	77	34	1	61.9	13.4	69.8	82.9	68.6	75.8	73.8
LCS Breakaway	75	35	0	62.3	14.7	69.6	86.4	64.1	75.3	73.4
Rollag	76	33	0	62.3	14.7	63.9	84.2	71.8	78.0	73.3
Prosper	79	38	1	61.2	12.8	63.0	86.3	70.4	78.4	73.2
Norden	78	35	0	62.6	14.4	65.8	83.5	70.0	76.8	73.1
SY Tyra	78	31	0	60.8	13.3	66.0	85.7	66.5	76.1	72.7
ND 821	77	40	1	62.1	14.5	66.5	83.8	67.2	75.5	72.5
RB07	75	34	1	60.4	14.6	62.7	84.1	70.2	77.2	72.3
Bolles	79	36	0	60.8	15.3	65.0	79.8	70.5	75.2	71.8
Velva	78	38	0	60.0	13.6	68.0	85.7	61.5	73.6	71.7
Forefront	73	44	2	61.6	14.5	64.9	85.2	64.8	75.0	71.6
Barlow	77	39	1	63.1	15.2	68.2	80.1	65.2	72.7	71.2
Mott	80	41	0	61.5	14.3	65.0	78.9	66.4	72.7	70.1
Linkert	77	31	0	61.5	15.6	61.0	80.5	63.7	72.1	68.4
WB Mayville	76	32	0	60.7	14.7	62.6	79.7	60.1	69.9	67.5
Glenn	76	40	2	63.5	15.6	60.2	77.1	63.1	70.1	66.8
ND 901CL Plus	78	41	1	60.8	15.3	55.7	73.5	59.2	66.4	62.8

Table continued on next page

Hard Red Spring Wheat - 2015 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	*	inches	0-9**	lbs/bu	%	---------- Bushels per acre ----------				
Table continues from previous page										
LCS Nitro	77	34	1	60.8	12.6	--	94.4	82.6	88.5	--
MS Chevelle	76	35	2	61.4	12.8	--	91.3	76.1	83.7	--
Croplan HRS 3378	78	36	0	63.1	13.3	--	89.6	73.1	81.4	--
WB9507	76	37	3	59.1	12.4	--	92.8	65.6	79.2	--
Croplan HRS 3361	77	36	0	60.7	14.0	--	88.2	65.5	76.9	--
Focus	73	43	1	62.3	14.9	--	83.6	66.3	75.0	--
SY Ingmar	78	36	0	62.5	15.3	--	82.1	67.0	74.6	--
WB9879CLP	78	35	0	60.6	14.1	--	83.4	65.5	74.5	--
SD4299	79	38	1	61.1	14.2	--	77.1	70.5	73.8	--
LCS Pro	77	40	1	62.6	15.3	--	83.6	60.4	72.0	--
Croplan HRS 3419	79	35	0	60.9	13.3	--	97.9	86.8	--	--
LNR12-0311	76	38	2	62.5	12.7	--	--	80.4	--	--
Redstone	79	36	0	61.0	13.9	--	--	80.2	--	--
Croplan HRS 3530	79	40	2	61.8	14.3	--	--	79.6	--	--
WB9653	78	33	0	61.9	13.1	--	--	77.9	--	--
Prestige	74	34	2	60.1	14.1	--	--	72.6	--	--
SY Valdo	77	35	1	62.3	13.5	--	--	71.5	--	--
Duclair	75	36	1	59.6	14.0	--	--	64.5	--	--
Trial Mean	77	37	1	61.4	14.1	75.9	84.8	70.1	--	--
C.V. %	0.8	3.8	58.9	0.7	3.9	4.6	5.2	4.8	--	--
LSD 5%	0.8	2.0	0.7	0.6	0.8	4.8	6.2	4.7	--	--
LSD 10%	0.7	1.6	0.6	0.5	0.6	4.1	5.2	4.0	--	--

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

** 0 = no lodging, 9 = 100% lodged.

Planting Date: April 10

Harvest Date: August 12

Previous Crop: Spring Wheat Green Fallow

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2015 **Scranton, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Advance	33	0	59.9	11.7	54.3	58.1	57.9	58.0	56.8
Barlow	39	0	60.6	12.7	61.9	61.9	59.5	60.7	61.1
Bolles	33	0	58.6	13.1	--	--	53.5	--	--
Croplan HRS 3361	36	0	58.8	11.6	--	--	59.2	--	--
Croplan HRS 3419	34	0	58.4	10.4	--	--	68.5	--	--
Elgin-ND	39	0	59.5	12.1	61.6	60.2	59.5	59.9	60.4
Glenn	39	0	61.3	13.0	55.2	54.6	55.2	54.9	55.0
LCS Albany	34	0	58.8	10.7	--	63.2	66.1	64.7	--
LCS Iguacu	35	0	59.6	11.3	--	--	66.2	--	--
LCS Nitro	34	0	58.6	11.2	--	--	63.8	--	--
LCS Powerplay	36	0	59.8	11.5	--	57.7	59.5	58.6	--
Mott	40	0	59.1	12.9	63.7	62.2	56.2	59.2	60.7
MS Stingray	37	0	58.4	9.9	--	--	66.5	--	--
Prevail	36	0	59.8	12.0	--	66.4	59.5	63.0	--
RB07	32	0	59.7	12.4	57.1	55.8	60.1	58.0	57.7
SY Rowyn	31	0	59.2	11.6	--	56.8	59.5	58.2	--
SY Soren	31	0	60.6	12.2	55.7	62.6	62.6	62.6	60.3
Velva	36	0	57.0	12.3	66.4	59.7	55.5	57.6	60.5
WB9507	36	0	57.9	11.0	--	--	62.9	--	--
SY 605CL	38	0	61.6	12.6	--	65.7	61.1	63.4	--
Trial Mean	35	0	59.4	11.8	57.8	60.5	60.6	--	--
C.V. %	3.3	0.0	1.0	5.2	8.0	7.6	5.8	--	--
LSD 5%	2	0	0.8	0.9	5.5	6.3	5.0	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 13

Harvest Date: August 20

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2015 **Regent, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Advance	38	0	57.6	13.4	65.1	61.8	81.4	71.6	69.4
Barlow	40	1	57.9	14.6	67.4	60.2	82.4	71.3	70.0
Bolles	36	2	56.6	15.9	--	--	75.4	--	--
Croplan HRS 3361	37	0	56.8	13.7	--	--	84.1	--	--
Croplan HRS 3419	36	1	56.9	13.5	--	--	98.8	--	--
Elgin-ND	40	2	56.5	14.9	73.8	64.4	82.4	73.4	73.5
Glenn	41	1	60.2	15.1	62.5	56.0	74.0	65.0	64.2
LCS Albany	36	1	57.4	13.5	--	63.3	105.1	84.2	--
LCS Iguacu	38	1	57.2	12.6	--	--	93.2	--	--
LCS Nitro	36	3	57.1	12.8	--	--	103.4	--	--
LCS Powerplay	36	3	58.3	13.7	--	57.5	83.6	70.6	--
Mott	43	0	57.0	15.1	69.9	57.8	84.3	71.1	70.7
MS Stingray	40	4	55.5	12.2	--	--	97.4	--	--
Prevail	38	0	57.8	13.7	--	62.6	83.8	73.2	--
RB07	35	0	56.6	14.2	69.0	55.2	83.1	69.2	69.1
SY Rowyn	35	0	57.6	13.7	--	54.5	92.0	73.3	--
SY Soren	35	0	57.7	14.6	72.6	60.8	82.5	71.7	72.0
Velva	38	0	54.3	14.3	73.3	61.1	80.6	70.9	71.7
WB9507	39	3	56.3	14.2	--	--	95.1	--	--
SY 605CL	39	0	59.5	15.2	--	65.9	82.3	74.1	--
Trial Mean	38	1	57.2	14.0	69.8	60.7	87.2	--	--
C.V. %	3.8	88.7	1.0	2.2	5.7	8.0	4.7	--	--
LSD 5%	2	1	0.7	0.4	4.8	5.7	4.9	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 13

Harvest Date: August 20

Previous Crop: Prevent Plant

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2015 **New Leipzig, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Advance	35	5	57.4	13.5	55.5	62.0	48.4	55.2	55.3
Barlow	38	5	58.6	14.4	57.7	64.0	51.4	57.7	57.7
Bolles	36	6	55.3	16.3	--	--	42.9	--	--
Croplan HRS 3361	34	3	55.6	13.8	--	--	50.9	--	--
Croplan HRS 3419	35	3	55.2	13.5	--	--	49.4	--	--
Elgin-ND	38	5	55.6	14.5	59.2	65.6	47.8	56.7	57.5
Glenn	39	3	60.6	14.8	57.6	53.3	45.4	49.4	52.1
LCS Albany	35	3	56.0	13.3	--	64.4	55.4	59.9	--
LCS Iguacu	34	6	57.6	12.6	--	--	52.5	--	--
LCS Nitro	35	5	54.9	13.3	--	--	47.3	--	--
LCS Powerplay	34	7	56.7	13.8	--	62.6	46.4	54.5	--
Mott	38	1	56.2	14.7	64.4	55.7	44.5	50.1	54.9
MS Stingray	36	5	54.7	12.4	--	--	49.3	--	--
Prevail	37	3	57.8	13.2	--	66.4	50.1	58.3	--
RB07	33	3	57.0	14.1	56.2	60.4	51.3	55.9	56.0
SY Rowyn	34	4	56.9	13.8	--	58.3	52.4	55.4	--
SY Soren	32	6	57.3	14.3	59.4	65.2	51.8	58.5	58.8
Velva	35	4	54.8	14.1	65.9	67.9	41.7	54.8	58.5
WB9507	37	6	54.2	14.1	--	--	45.9	--	--
SY 605CL	37	2	60.6	14.3	--	65.6	57.5	61.6	--
Trial Mean	36	4	56.7	13.9	58.8	62.7	49.1	--	--
C.V. %	3.7	27.5	0.8	2.3	7.9	7.4	6.7	--	--
LSD 5%	2	2	0.7	0.4	5.5	5.5	4.6	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 14

Harvest Date: August 19

Previous Crop: Sunflower

NDSU Hettinger Research Extension Center

Hard Red Spring Wheat - 2015 **Mandan, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Advance	34	0	57.9	11.1	70.3	76.8	35.5	56.2	60.9
Barlow	36	0	57.8	11.9	72.4	73.4	31.9	52.7	59.2
Bolles	34	0	55.6	12.2	--	--	27.0	--	--
Croplan HRS 3361	34	0	55.9	11.3	--	--	35.1	--	--
Croplan HRS 3419	34	0	55.6	10.1	--	--	39.4	--	--
Elgin-ND	38	0	56.7	11.0	78.1	76.9	30.1	53.5	61.7
Glenn	39	2	60.9	11.5	70.8	69.7	26.1	47.9	55.5
LCS Albany	34	0	56.2	10.4	--	80.9	38.5	59.7	--
LCS Iguacu	34	0	57.8	10.6	--	--	38.6	--	--
LCS Nitro	32	0	54.9	10.4	--	--	33.2	--	--
LCS Powerplay	34	0	57.8	10.5	--	71.1	29.9	50.5	--
Mott	38	0	57.0	11.4	75.0	76.0	31.0	53.5	60.7
MS Stingray	36	0	56.0	9.7	--	--	36.7	--	--
Prevail	35	2	58.1	10.8	--	73.9	35.3	54.6	--
RB07	33	1	54.7	12.0	72.3	72.2	24.3	48.3	56.3
SY Rowyn	33	1	56.5	11.2	--	74.7	34.7	54.7	--
SY Soren	29	0	57.8	11.8	76.9	72.5	32.6	52.6	60.7
Velva	34	0	55.3	11.9	71.9	72.9	24.4	48.7	56.4
WB9507	36	1	55.8	10.4	--	--	34.7	--	--
SY 605CL	38	1	60.4	10.9	--	72.8	37.1	55.0	--
Trial Mean	35	1	56.9	11.1	70.0	74.3	32.8	--	--
C.V. %	3.4	98.7	0.8	3.0	3.1	7.3	8.9	--	--
LSD 5%	2	1	0.7	0.5	2.6	6.5	4.2	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 14

Harvest Date: August 19

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Hard Red Winter Wheat - 2015 **Hettinger, ND**

Variety	Spring Stand	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2012	2014	2015	Average Yield 2 yr	3 yr
	%	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
SY Wolf	90	34	0.0	61.6	12.4	62.2	95.7	96.8	96.3	84.9
Decade	90	36	2.0	59.9	11.7	68.4	102.9	81.1	92.0	84.1
Overland	90	38	1.3	62.0	11.6	73.8	91.6	86.3	89.0	83.9
Lyman	90	36	2.8	62.6	12.7	73.7	91.0	80.4	85.7	81.7
Ideal	90	38	2.5	60.5	11.1	66.3	95.8	80.8	88.3	81.0
WB Matlock	90	39	1.8	61.1	12.0	67.2	86.6	75.2	80.9	76.3
Peregrine	90	44	1.5	62.1	10.9	46.9	96.2	80.6	88.4	74.6
Jerry	90	45	1.8	60.4	11.9	66.3	85.2	72.2	78.7	74.6
Accipiter	90	39	2.0	60.0	11.1	58.3	81.2	77.5	79.4	72.3
AC Emerson	90	40	0.0	62.9	12.5	--	94.9	86.9	90.9	--
AC Gateway	90	36	0.8	61.4	12.2	--	87.9	79.3	83.6	--
Redfield	90	35	5.0	60.7	12.0	--	88.0	78.4	83.2	--
Flourish	85	36	1.5	58.3	11.8	--	88.8	75.9	82.4	--
CDC Falcon	90	36	3.8	59.2	11.9	--	85.2	73.3	79.3	--
AC Broadview	90	36	5.5	59.4	11.8	--	84.9	71.7	78.3	--
Moats	90	42	1.5	61.6	12.2	--	85.6	70.6	78.1	--
Northern	90	37	1.0	59.7	11.9			84.0	--	--
CDC Chase	90	43	2.0	62.7	12.0	--	--	83.7	--	--
Colter	90	39	0.8	54.8	12.1	--	--	80.4	--	--
WB4614	90	35	0.0	57.9	12.3	--	--	78.1	--	--
Trial Mean	90	38	1.9	60.2	11.9	63.7	88.1	79.5	84.6	79.3
C.V. %	1.0	4.7	37.7	1.0	2.9	7.7	4.9	4.3	--	--
LSD 5%	1.2	3	1.0	0.9	0.5	5.8	5.9	4.8	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: September 22

Harvest Date: August 3

Fertilizer: 50 lbs/ac 11-52-0, 100 lbs/ac 46-0-0

Herbicide: Widematch + 2,4-D

Previous Crop: Spring Wheat Green Fallow

NDSU Hettinger Research Extension Center

Winter Rye - 2015 **Hettinger, ND**

Variety	Spring Stand	Heading Date	Plant Height	Plant Lodge	Test Weight	----- Grain Yield ----- 2010	2012	2015	Average Yield 2 yr	3 yr
	%		inches	0-9*	lbs/bu	---------- Bushels per acre ----------				
Aroostok	90	5/30	55	5.8	55.3	66.3	46.0	54.3	50.2	55.5
Dacold	90	6/4	51	6.5	54.6	105.1	71.1	87.8	79.5	88.0
Hancock	91	5/31	55	6.3	56.4	92.9	63.5	73.7	68.6	76.7
Hazlet	91	6/1	53	5.5	56.8			92.6	--	--
Musketeer	90	6/1	53	7.0	55.8			77.2	--	--
Rymin	90	6/1	55	6.0	55.6			69.8	--	--
Spooner	90	5/31	53	4.0	56.7	73.8	48.9	64.4	56.7	62.4
Wheeler	90	6/4	61	3.5	50.9	53.2	33.1	49.8	41.5	45.4
ND Dylan	90	6/2	53	7.0	55.6	110.6	74.2	84.9	79.6	89.9
Trial Mean	90	6/1	54	5.7	55.3	79.1	55.4	72.7	62.6	69.6
C.V. %	1.2	0.4	6.9	19.8	0.9	4.1	15.5	6.9	--	--
LSD 5%	1.6	0.9	5.4	1.7	0.7	4.7	10.5	7.2	--	--
LSD 10%	1.3	0.8	4.5	1.4	0.6	3.9	8.8	6.0	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: September 22

Harvest Date: August 3

NDSU Hettinger Research Extension Center

Durum Wheat - 2015 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	*	inches	0-9**	lbs/bu	%	---------- Bushels per acre ----------				
AC Commander	80	30	0	56.3	13.7	43.7	69.7	59.7	64.7	57.7
AC Navigator	80	33	0	57.3	14.0	42.3	65.1	56.2	60.7	54.5
Alkabo	79	39	0	59.2	13.0	50.5	82.6	70.0	76.3	67.7
Alzada	79	31	2	53.9	14.1	35.0	56.8	41.7	49.3	44.5
Ben	80	42	0	58.0	13.6	53.2	73.0	60.5	66.8	62.2
Carpio	81	41	1	59.3	13.8	50.3	80.5	71.6	76.1	67.5
CDC Verona	80	41	0	57.2	14.5	55.6	79.1	66.5	72.8	67.1
Divide	79	41	1	59.5	13.2	55.1	81.6	82.6	82.1	73.1
Grenora	79	38	0	57.7	13.8	52.6	68.1	76.3	72.2	65.7
Joppa	79	40	1	58.1	12.7	51.1	85.7	78.8	82.3	71.9
Lebsock	80	38	0	58.7	14.0	49.5	71.8	60.6	66.2	60.6
Maier	82	38	0	57.6	14.7	42.3	66.3	59.3	62.8	56.0
Mountrail	80	41	0	57.4	13.1	55.3	83.3	76.6	80.0	71.7
MS Dart	79	40	4	58.9	12.4	--	--	73.5	--	--
Pierce	82	40	0	57.8	13.5	47.2	64.3	55.3	59.8	55.6
Rugby	79	43	0	57.6	13.6	51.3	74.9	59.3	67.1	61.8
Strongfield	80	40	0	59.1	14.7	52.4	75.7	70.7	73.2	66.3
Tioga	79	42	1	59.0	13.6	59.9	79.8	81.5	80.7	73.7
VT Peak	78	38	2	60.5	13.1	63.3	80.4	79.2	79.8	74.3
Trial Mean	79	40	1	58.9	13.4	64.5	56.0	73.5	--	--
C.V. %	6	11.9	65.8	0.9	3.2	4.9	7.0	6.2	--	--
LSD 5%	1.0	1.7	1.2	0.7	0.6	4.4	5.5	6.4	--	--
LSD 10%	0.8	1	1	0.6	0.5	3.7	4.6	5.3	--	--

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

** 0 = no lodging, 9 = 100% lodged.

Planting Date: April 10

Harvest Date: August 17

Previous Crop: Lentils

Durum Wheat - 2015 **Scranton, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Alkabo	40	0	58.2	11.9	57.5	64.9	58.4	61.7	60.3
Carpio	40	0	58.3	11.3	55.3	57.8	56.5	57.2	56.5
Divide	42	0	58.4	11.1	54.6	61.5	62.0	61.8	59.4
Joppa	40	0	57.0	11.3	60.7	63.5	60.1	61.8	61.4
Mountrail	41	0	57.8	11.2	52.9	67.6	63.1	65.4	61.2
Tioga	43	0	57.8	11.1	61.2	61.1	62.1	61.6	61.5
Trial Mean	41	0	57.9	11.3	56.5	62.7	60.4	--	--
C.V. %	4.6	0.0	1.1	6.5	5.8	6.3	6.0	--	--
LSD 5%	3	0	1.0	1.1	4.0	4.8	5.5	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 13

Harvest Date: August 20

Previous Crop: Spring Wheat

Durum Wheat - 2015 **Regent, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Alkabo	42	1	57.6	13.1	65.5	46.9	83.0	65.0	65.1
Carpio	44	2	58.2	12.8	64.9	46.9	88.0	67.5	66.6
Divide	44	2	57.9	13.8	64.5	46.9	89.0	68.0	66.8
Joppa	43	1	57.1	13.0	67.1	49.9	88.0	69.0	68.3
Mountrail	43	1	56.2	13.5	61.9	47.2	80.5	63.9	63.2
Tioga	45	3	58.2	13.4	69.7	46.3	89.2	67.8	68.4
Trial Mean	43	2	57.5	13.3	65.8	47.4	86.3	--	--
C.V. %	3.7	18.0	1.1	2.1	5.9	9.3	2.6	--	--
LSD 5%	2	0.4	1.0	0.4	4.8	5.5	3.4	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 13

Harvest Date: August 20

Previous Crop: Prevent Plant

Durum Wheat - 2015 **Mandan, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
Alkabo	39	0	56.2	11.4	77.1	74.2	25.3	49.8	58.9
Carpio	40	1	58.2	10.9	84.6	67.6	26.7	47.2	59.6
Divide	41	1	56.7	10.8	79.8	69.3	28.9	49.1	59.3
Joppa	40	1	56.5	10.6	85.3	74.9	26.2	50.6	62.1
Mountrail	40	1	55.9	11.0	80.4	76.0	24.8	50.4	60.4
Tioga	43	2	57.4	10.7	86.4	68.7	26.9	47.8	60.7
Trial Mean	41	1	56.8	10.9	82.1	71.8	26.5	--	--
C.V. %	3.0	75.0	0.8	1.9	4.1	7.4	9.1	--	--
LSD 5%	2	2	0.7	0.7	4.1	6.6	3.6	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 14

Harvest Date: August 19

Previous Crop: Spring Wheat

NDSU Hettinger Research Extension Center

Barley - 2015 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Plump	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	*	inches	0-9**	%	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW											
ND Genesis	75	40	1	95	50.0	11.3	122.8	114.4	103.2	108.8	113.5
Pinnacle	75	38	1	95	50.4	11.0	110.5	115.1	103.5	109.3	109.7
CDC Copeland	82	43	1	95	50.8	12.4	103.5	110.0	101.0	105.5	104.8
Rawson	73	38	1	95	49.0	11.9	116.1	102.1	93.2	97.7	103.8
Conrad	82	36	2	95	50.9	12.4	102.7	109.3	93.1	101.2	101.7
Conlon	73	36	2	98	51.1	12.8	102.1	118.2	82.6	100.4	101.0
AC Metcalfe	76	38	3	89	49.8	13.1	87.4	86.9	81.6	84.3	85.3
CDC Meredith	82	38	3	93	49.8	11.7	--	--	110.0	--	--
SIX ROW											
Tradition	74	39	1	97	49.2	12.6	124.1	120.2	83.9	102.1	93.0
Lacey	76	40	1	96	49.2	13.3	116.5	114.2	84.3	99.3	91.8
Stellar-ND	74	38	1	97	48.1	13.1	107.9	122.2	86.6	104.4	95.5
Innovation	74	40	0	97	49.0	13.2	122.4	122.3	87.2	104.8	96.0
Celebration	75	38	2	95	48.7	14.3	110.7	115.3	76.4	95.9	86.1
Quest	76	41	2	91	48.3	13.2	114.0	110.4	66.2	88.3	77.3
Trial Mean	76	39	1	95	49.5	12.4	115.5	115.5	90.7	--	--
C.V. %	1.0	3.3	42.6	1.1	0.9	3.4	5.6	3.0	5.4	--	--
LSD 5%	1.1	1.8	0.8	1.5	0.6	0.6	9.0	4.9	6.9	--	--
LSD 10%	0.9	1.5	0.6	1.3	0.5	0.5	7.6	4.1	5.8	--	--

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

** 0 = no lodging, 9 = 100% lodged.

Planting Date: April 10

Harvest Date: August 7

Previous Crop: Spring Wheat Green Fallow

Barley - 2015 **Scranton, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW									
Conlon	33	4	48.9	11.9	81.0	74.0	67.6	70.8	74.2
Pinnacle	36	1	48.8	10.4	93.5	81.3	79.7	80.5	84.8
ND Genesis	36	0	47.9	10.6	--	--	85.2	--	--
SIX ROW									
Celebration	34	4	47.6	12.2	82.6	75.3	76.4	75.9	78.1
Quest	37	2	47.3	11.6	94.6	80.6	78.1	79.4	84.4
Innovation	35	2	48.3	11.3	80.3	83.0	78.6	80.8	80.6
Trial Mean	35	2	48.1	11.3	87.4	80.7	77.6	--	--
C.V. %	3.2	17.5	0.8	4.2	9.6	7.3	8.2	--	--
LSD 5%	2	2	0.6	0.7	10.4	7.3	9.6	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 13

Harvest Date: August 20

Previous Crop: Spring Wheat

Barley - 2015 **Regent, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW									
Conlon	37	6	49.9	13.3	88.4	71.0	93.8	82.4	84.4
Pinnacle	41	2	48.6	12.1	106.3	73.2	106.1	89.7	95.2
ND Genesis	41	3	48.4	12.1	--	--	112.1	--	--
SIX ROW									
Celebration	39	4	47.7	16.0	98.9	87.9	78.8	83.4	88.5
Quest	41	1	47.2	14.1	95.9	84.1	83.3	83.7	87.8
Innovation	38	2	48.5	14.3	104.8	77.1	84.8	81.0	88.9
Trial Mean	39	3	48.4	13.6	100.3	79.0	93.2	--	--
C.V. %	3.6	27.9	1.3	3.5	4.5	12.5	8.0	--	--
LSD 5%	2	1	0.9	0.7	5.5	12.3	11.3	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 13

Harvest Date: August 20

Previous Crop: Prevent Plant

Barley - 2015 **New Leipzig, ND**

Variety	Plant Height	Plant Lodge	Test Weight	Grain Protein	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	inches	0-9*	lbs/bu	%	---------- Bushels per acre ----------				
TWO ROW									
Conlon	38	6	50.5	13.5	76.0	69.3	53.5	61.4	66.3
Pinnacle	38	4	50.1	11.8	81.9	81.8	51.5	66.7	71.7
ND Genesis	38	4	49.1	11.9	--	--	51.3	--	--
SIX ROW									
Celebration	37	8	47.8	14.5	90.1	81.6	55.6	68.6	75.8
Quest	38	7	48.3	14.0	92.4	83.8	49.5	66.7	75.2
Innovation	37	8	49.4	13.5	93.0	78.5	51.2	64.9	74.2
Trial Mean	37	6	49.2	13.1	87.3	79.8	52.1	--	--
C.V. %	3.6	15.0	1.1	3.1	7.9	7.6	6.1	--	--
LSD 5%	2	1	0.8	0.6	8.5	7.5	5.7	--	--

* 0 = no lodging, 9 = 100% lodged.

Planting Date: April 14

Harvest Date: August 19

Previous Crop: Spring Wheat

Oat - 2015 **Hettinger, ND**

Variety	Days to Head	Plant Height	Plant Lodge	Test Weight	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	*	inches	0-9**	lbs/bu	---------- Bushels per acre ----------				
Beach	84	52	1	37.7	152.2	171.0	164.8	167.9	162.7
CDC Dancer	83	52	4	33.7	151.5	165.2	177.4	171.3	164.7
Deon	84	49	3	36.8	--	200.9	173.0	187.0	--
Furlong	84	48	1	31.8	162.2	192.8	194.6	193.7	183.2
Goliath	83	58	6	36.8	161.0	195.8	177.5	186.7	178.1
HiFi	82	53	5	37.1	135.6	130.1	180.7	155.4	148.8
Horsepower	79	42	1	36.8	159.5	192.0	171.5	181.8	174.3
Hytest	80	50	4	38.0	130.2	109.0	144.7	126.9	128.0
Jury	81	53	5	35.9	163.1	196.0	175.8	185.9	178.3
Killdeer	81	44	1	36.2	164.0	185.5	186.8	186.2	178.8
Leggett	85	50	2	35.8	162.4	193.2	174.5	183.9	176.7
CDC Minstrel	84	48	2	33.7	167.9	191.5	186.3	188.9	181.9
Newburg	81	53	4	34.4	172.5	192.7	181.6	187.2	182.3
Otana	83	51	4	34.8	167.6	181.3	156.2	168.8	168.4
AC Pinnacle	85	51	8	33.4	148.8	173.5	180.4	177.0	167.6
Rockford	82	53	2	37.8	156.1	199.8	186.3	193.1	180.7
Souris	81	47	2	34.5	136.7	128.9	169.5	149.2	145.0
Stallion	81	51	7	37.2	150.8	157.1	160.5	158.8	156.1
Paul (hull-less)	85	56	3	41.0	--	131.7	149.4	140.6	--
Trial Mean	82	50	3	35.7	157.0	175.8	176.5	--	--
C.V. %	0.9	3.2	46.0	3.3	5.0	6.3	5.6	--	--
LSD 5%	0.8	2.3	2.2	1.6	11.1	15.6	13.8	--	--
LSD 10%	0.6	1.9	1.8	1.4	9.3	13.0	11.6	--	--

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

** 0 = no lodging, 9 = 100% lodged.

Planting Date: April 10

Harvest Date: August 7

Previous Crop: Spring Wheat Green Fallow

Safflower - 2015 **Hettinger, ND**

Variety	Oil Type	Days to Flower	Plant Height	Test Weight	Oil Content	-------Grain Yield------- 2013	2014	2015	Average Yield 2-Yr	3-Yr
		DAP*	inches	lbs/bu	%	---------- lbs per acre ----------				
Cardinal	Linoleic	98	39	41.1	32.3	2394	1043	2497	1770	1978
Finch	Linoleic	96	35	43.3	33.6	2272	897	2672	1785	1947
MonDak	Oleic	97	35	41.0	34.8	2303	1070	3050	2060	2141
Montola 2003	Oleic	98	32	39.9	36.7	2186	991	3346	2169	2174
Nutrasaff	Linoleic	98	36	34.0	41.8	2124	867	2162	1515	1718
Hybrid 9049	Oleic	96	36	40.7	29.9	2978	1063	3082	2073	2374
Hybrid 1601	Oleic	98	36	38.7	34.7	2182	1195	3750	2473	2376
Hybrid 200	Oleic	97	34	41.4	31.1	--	--	3412	--	--
Hybrid 446	Oleic	97	32	41.1	31.3	--	--	3302	--	--
Hybrid 621	Oleic	98	36	34.7	37.6	--	--	2860	--	--
Trial Mean		97	35	39.6	34.4	2277	983	3011	1978	2101
C.V. %		0.8	3.6	1.9	2.5	8.8	21.7	7.7	--	--
LSD 5%		0.9	1.9	1.1	0.8	290	NS	337	--	--
LSD 10%		0.7	1.5	0.9	0.6	244	NS	279	--	--

* Days after planting.
Planting Date: April 22
Harvest Date: September 24
Previous Crop: Spring Wheat Green Fallow

NDSU Hettinger Research Extension Center

Oil Type Sunflower - 2015 **Hettinger, ND**

Company/Brand	Hybrid	Oil Type & Traits	Days to Bloom	Plant Height	Lodging	Test Weight	Oil Content	Grain Yield 2015	Grain Yield 2-Year	Grain Yield 3-Year
		*	**	inches	%	lbs/bu	%	--------lbs/ac--------		
AgVenture - Scherr Seed	AF3H681ES	HO, EX, DM	105	62	10	25.7	34.5	2280	1567	--
AgVenture - Scherr Seed	AF3N692ES	NS, EX, DM	106	61	8	26.0	35.9	3329	1962	--
Prosun - Scherr Seed	3N94DM	NS, CL, DM	104	62	14	28.4	37.6	3195	--	--
Prosun - Scherr Seed	4H95DM	HO, CL, DM	106	65	3	27.4	39.4	3757	--	--
Croplan	432 E	NS, EX, DM	102	57	13	23.5	32.8	1916	1453	1628
Croplan	458 E HO	HO, EX, DM	104	60	2	23.8	35.6	2517	--	--
Croplan	545 CL	NS, CL, DM	106	59	3	25.6	36.4	3082	2309	--
Croplan	549 CL HO	HO, CL, DM	101	67	3	26.5	36.5	2896	--	--
Croplan	553 CL HO	HO, CL, DM	107	62	1	26.0	36.4	3413	--	--
Genosys	12G04	HO	106	54	5	24.4	36.6	2648	--	--
Genosys	12G20	HO, CL	104	59	8	27.3	37.1	3247	2479	2370
Genosys	12G25	HO, CL	104	58	1	27.0	38.5	3757	2629	--
Genosys	12G28	HO	106	60	0	27.3	36.3	3394	--	--
Mycogen Seeds	8D310CL	TR, CL	104	65	1	22.5	32.2	2885	2157	1983
Mycogen Seeds	8H456CL	HO, CL, DM	106	62	0	26.3	42.0	4134	--	--
Myocgen Seeds	8H449CLDM	HO, CL, DM	105	58	2	28.7	41.3	3407	2470	2289
Nuseed	Badger DMR	NS, CL, DM	102	59	6	22.5	30.4	2352	1727	--
Nuseed	Camaro II	NS, CL, DM	104	62	5	26.9	36.9	3103	2204	2152
Nuseed	Cobalt II	HO, CL, DM	101	60	0	26.7	36.5	2577	1735	1694
Nuseed	Daytona	HO, CL	105	55	0	24.7	34.9	2996	--	--
Nuseed	Falcon	NS, EX	104	49	1	28.0	37.1	2995	2109	2203
Nuseed	Hornet	HO, CL, DM	106	61	2	26.8	37.5	3687	2699	--
Nuseed	NHK12M054	HO, CL, DM	102	57	5	26.3	36.7	2392	--	--
Nuseed	NHK12M055	HO, CL, DM	102	55	2	25.7	36.1	2117	--	--
Nuseed	NSK12M507	NS, CL, DM	101	56	5	21.5	34.1	1508	--	--
Nuseed	Talon	NS, EX	102	56	4	24.7	36.6	2893	1966	--
NuTech	68H7	HO, EX	106	65	11	26.0	34.6	2666	--	--
NuTech	69M2	NS, EX	106	61	6	25.7	35.4	3219	--	--
Proseed	E-85 CL	HO, CL	103	65	4	25.2	35.7	2939	2025	1899
Proseed	E-31 CL	HO, CL	106	65	15	24.4	32.5	2111	1568	1681
Proseed	E-21 CL	HO, CL	104	67	0	24.6	33.5	2040	1347	1446
Proseed	E-362436	HO	104	67	1	27.3	36.5	2578	1847	1880
Proseed	E-31051 CL	HO, CL	104	67	4	24.8	33.4	1765	--	--
Proseed	E-1041 CL	HO, CL	104	63	23	25.4	34.0	2039	--	--

Table continues on next page.

NDSU Hettinger Research Extension Center

Oil Type Sunflower - 2015 **Hettinger, ND**

Company/Brand	Hybrid	Oil Type & Traits	Days to Bloom	Plant Height	Lodging	Test Weight	Oil Content	Grain Yield 2015	Grain Yield 2-Year	Grain Yield 3-Year
Table continues from previous page.										
Proseed	E-53051 CL	HO, CL	102	66	2	24.1	32.8	2076	--	--
Proseed	E-79051 CL	HO, CL	106	66	18	23.5	32.5	2211	--	--
Syngenta	3495 NS/CL/DM	NS, CL, DM	105	60	2	28.4	37.3	2635	2015	--
Syngenta	3845 HO	HO	105	57	5	28.3	41.2	3165	--	--
Syngenta	7111 HO/CL/DM	HO, CL, DM	99	54	1	24.9	31.7	1739	1351	1380
Syngenta	SY7717	HO, CL	101	57	0	27.3	36.1	2797	2327	2187
Thunder Seed	11N94	NS, CL, DM	105	62	9	28.3	36.0	2883	--	--
Thunder Seed	35H92	HO, CL, DM	102	54	0	26.7	36.5	2613	--	--
Thunder Seed	42H94	HO, CL, DM	106	61	5	27.1	37.2	3778	--	--
AAFC/USDA (Check)	Honeycomb NS	NS	97	52	4	24.0	34.2	1432	--	--
USDA (Check)	894	TR	103	59	5	26.3	36.7	2829	1961	--
Mycogen Seeds (Check)	8N270CLDM	NS, CL, DM	101	53	3	25.5	36.5	2246	--	--
Trial Mean			104	60	5	25.8	35.9	2744	--	--
C.V. %			1.0	6.6	92.0	4.3	3.4	11.4	--	--
LSD 5%			1.6	5.6	7.0	1.6	1.7	510	--	--
LSD 10%			1.3	4.7	5.9	1.3	1.4	427	--	--

* Type: TR-Traditonal, NS-NuSun, HO-High Oleic, CL=Clearfield, EX=ExpressSun, DM=Downy Mildew Resistant

** Days after planting.

Planting Date: May 19

Harvest Date: October 20

Previous Crop: Wheat

Canola - Liberty Link, SU and Clearfield - 2015 **Hettinger, ND**

Brand	Variety	Type	Days to Bloom	Bloom Duration	Days to Mature	Plant Height	Lodging	Test Weight	Oil Content	Seed Yield 2015	Seed Yield 2-Yr. Avg.
		*	**	days	**	inches	0 - 9***	lbs/bu	%	-------lbs/a-------	
Bayer CropScience	InVigor L140P	LL, TR	51	21	91	52	6	51.8	48.5	1779	--
Bayer CropScience	InVigor L130	LL, TR	51	22	91	53	5	52.1	47.8	1856	--
Bayer CropScience	InVigor L120	LL, TR	52	21	91	48	5	50.9	47.2	1961	--
Bayer CropScience	InVigor 5440	LL, TR	51	22	91	54	2	52.5	48.1	2146	--
Cibus	C1511	SU, TR	53	22	93	51	4	51.1	44.4	1941	--
Cibus	C1516	SU, TR	55	24	95	52	4	51.3	45.4	1729	--
Mycogen	Nexera 2020 CL	CL, HO	54	23	95	52	3	52.1	48.9	2282	1895
Mycogen	CL2562966H	CL, HO	53	22	92	53	3	52.3	49.4	2232	--
Trial Mean			52	22	92	52	4	51.8	47.5	1991	--
C.V. %			1.0	2.1	0.5	5.5	14.7	0.9	1.3	8.4	--
LSD 5%			0.8	0.7	0.7	4.2	0.9	0.7	0.9	246	--
LSD 10%			0.7	0.6	0.6	3.5	0.7	0.6	0.8	203	--

* Type: LL-Liberty Link, SU-SU Tolerant, CL-Clearfield, TR-Traditional Oil Type, HO-High Oleic Oil Type.

** Days after planting.

*** Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 30

Harvest Date: August 13

NDSU Hettinger Reserch Extension Center

Canola - Roundup Ready - 2015 **Hettinger, ND**

Brand	Variety	Oil Type	Days to Bloom	Bloom Duration	Days to Mature	Plant Height	Lodging	Test Weight	Oil Content	Seed Yield 2015	Seed Yield 2-Yr. Avg.
		*	**	days	**	inches	0 - 9***	lbs/bu	%	-------lbs/a-------	
BrettYoung	6074 RR	TR	52	23	92	54	7	49.3	48.9	2209	--
BrettYoung	BY15-975	TR	51	21	90	52	7	50.1	49.7	2107	--
BrettYoung	6064 RR	TR	51	23	92	57	3	47.9	49.4	2178	--
Cargill	V12-1	HO	52	21	91	52	4	49.8	47.8	2266	2132
Cargill	V22-1	HO	53	21	92	54	3	48.4	48.1	2232	--
Mycogen Seeds	Nexera 1012 RR	HO	54	23	95	57	3	47.7	47.0	2048	--
Mycogen Seeds	Nexera 1020 RR	HO	53	23	94	56	3	47.2	47.2	2374	--
Mycogen Seeds	Nexera 1022 RR	HO	54	22	94	54	1	48.4	47.3	1992	--
Proseed	44 Mag	TR	51	22	91	50	8	49.6	49.6	1947	1826
Proseed	300 Mag	TR	50	22	90	52	6	50.4	48.9	1971	1818
Proseed	PS 5000	TR	52	21	91	48	6	50.0	47.6	2085	--
Star Seed	Star 402	TR	50	23	91	51	6	50.5	51.7	1975	1931
P3 Hybrids	P3H13005	TR	50	23	91	52	6	51.5	46.7	2074	--
Trial Mean			52	22	92	53	5	49.3	48.5	2105	--
C.V. %			0.9	3.3	0.7	4.2	23.0	1.4	1.2	8.7	--
LSD 5%			0.7	1.0	1.0	3.2	1.6	1.0	0.8	261	--
LSD 10%			0.6	0.9	0.8	2.7	1.3	0.8	0.7	218	--

* Type: TR-Traditional Oil Type, HO-High Oleic Oil Type.

** Days after planting.

*** Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: May 1

Harvest Date: August 11

NDSU Hettinger Research Extension Center

Flax - 2015 **Hettinger, ND**

Variety	Days to Bloom	Plant Height	Test Weight	Oil Content	Grain Yield 2012	Grain Yield 2014	Grain Yield 2015	Average Yield 2-Yr	Average Yield 3-Yr
	**	inches	lbs/bu	%	bu per acre	bu per acre	bu per acre	bu per acre	bu per acre
Carter*	57	32	56.4	45.5	14.4	29.5	35.5	32.5	26.5
CDC Arras	56	34	56.0	44.7	16.4	30.3	31.4	30.9	26.0
CDC Bethume	56	34	56.2	44.9	20.4	30.4	32.5	31.5	27.8
CDC Glas	57	32	54.9	46.5	--	35.2	35.4	35.3	--
CDC Sanctuary	57	32	54.9	45.9	--	35.6	35.1	35.4	--
CDC Sorel	56	34	55.5	45.3	--	32.8	32.8	32.8	--
Gold ND*	58	33	56.2	46.7		32.8	33.1	33.0	--
Hanley	55	34	55.7	44.9	14.3	32.0	32.1	32.1	26.1
Lighting	56	33	56.0	45.1	12.8	31.8	33.0	32.4	25.9
Neche	56	35	55.9	45.1	--	30.3	29.7	30.0	--
Neela	55	32	55.5	46.3	--	37.6	36.2	36.9	--
Nekoma	56	33	55.7	45.6	16.8	32.8	32.8	32.8	27.5
Omega*	59	30	56.7	46.1	--	31.2	27.2	29.2	--
Pembina	56	33	55.5	45.9	18.4	31.5	30.5	31.0	26.8
Prairie Blue	57	33	55.6	46.4	17.8	34.4	33.8	34.1	28.7
Prairie Grande	55	33	55.4	46.5	16.9	32.8	33.2	33.0	27.6
Prairie Sapphire	58	33	54.5	46.7	--	33.7	30.5	32.1	--
Prairie Thunder	58	35	56.2	43.8	18.4	33.1	28.2	30.7	26.6
Rahab 94	56	34	55.1	46.0	--	34.4	33.1	33.8	--
Shape	56	33	55.2	46.7	--	33.2	31.4	32.3	--
Webster	57	34	55.9	45.5	15.4	31.7	30.8	31.3	26.0
York	55	33	55.5	45.5	22.0	31.7	33.8	32.8	29.2
Trial Mean	56	33	55.6	45.7	17.0	32.2	32.4	32.9	26.6
C.V. %	0.8	3.8	0.6	1.3	11.8	10.0	6.9	--	--
LSD 5%	0.7	1.8	0.4	0.8	2.9	4.5	3.2	--	--
LSD 10%	0.6	1.5	0.4	0.7	2.4	3.8	2.6	--	--

* Yellow seed type.

** Days after planting.

Lodging notes were taken at harvest, however no lodging was observed.

Planting Date: April 30

Harvest Date: August 12

Previous Crop: Barley

Dry Bean - 2015 **Hettinger, ND**

Variety	Type	Plant Height	Plant Lodge	Test Weight	-------- Grain Yield --------			Average Yield	
					2013	2014	2015	2 yr	3 yr
		inches	0-9*	lbs/bu	---------- lbs per acre ----------				
LaPaz	Pinto	22	0	57.2	2779	2140	2024	2082	2314
Lariat	Pinto	21	3	54.9	2571	2081	2021	2051	2224
Maverick	Pinto	27	5	54.8	2152	1824	1714	1769	1897
ND-307	Pinto	24	2	52.9	2813	1892	1735	1814	2147
SF103-8	Pinto	25	2	53.9	--	1727	1809	1768	--
Stampede	Pinto	24	2	54.3	2552	1922	2028	1975	2167
Windbreaker	Pinto	26	3	53.1	2216	1833	1699	1766	1916
23ST27	Pinto	24	5	56.7	--	2003	1923	1963	--
Avalanche	Navy	24	0	56.3	2571	1583	1614	1599	1923
Ensign	Navy	24	3	56.9	2780	1682	1710	1696	2057
HMS Medalist	Navy	23	0	57.3	2562	1658	1597	1628	1939
Vista	Navy	23	0	57.0	1994	1809	1619	1714	1807
T9905	Navy	22	1	55.9	3082	1913	1744	1829	2246
Merlot	Sm Red	25	2	56.9	1961	1752	1802	1777	1838
Rio Rojo	Sm Red	26	1	59.3	2548	2075	1823	1949	2149
Zorro	Black	22	0	59.9	--	--	1986	--	--
Eclipse	Black	24	0	60.0	2246	2098	1791	1945	2045
Loreto	Black	23	0	57.5	2190	1855	1618	1737	1888
Montcalm	Dk Red Kidney	21	3	51.4	--	--	1404	--	--
Talon	Dk Red Kidney	23	3	51.1	--	--	1505	--	--
Pink Panther	Lt Red Kidney	23	1	51.2	--	--	1705	--	--
Rosie	Lt Red Kidney	22	2	52.8	--	--	1586	--	--
Trial Mean		23	2	55.4	2402	1867	1746	--	--
C.V. %		8.9	48.0	1.7	7.7	8.2	7.3	--	--
LSD 5%		2.9	1.1	1.3	260	216	181	--	--
LSD 10%		2.5	0.9	1.1	217	180	151	--	--

* 0 = no lodging, 9 = lying flat on ground.

Planting Date: May 19

Harvest Date: August 31

Previous Crop: Oat

Chickpea - 2015 **Hettinger, ND**

Variety	Days to Flower	Height	Lodging	-----Seed Size (mm)------				Test Weight	----- Grain Yield -----			Average Yield	
				<8	8-9	9-10	>10		2013	2014	2015	2 yr	3 yr
	DAP*	inches	0 - 9**	----------%----------				lb/bu	----------lb/a----------				
Kabuli Type													
CDC Alma	70	23	1	11	62	25	2	51.4	2131	3386	4646	4016	3388
CDC Frontier	71	28	3	8	67	23	1	53.7	2380	4719	4952	4836	4017
CDC Luna	70	25	1	9	59	29	3	53.0	1976	3844	4787	4316	3536
CDC Orion	69	26	2	4	30	48	17	53.2	2202	3998	5091	4545	3764
CDC Xena	71	0	1	5	16	34	45	0.0	--	--	982	--	--
Sawyer	70	28	5	5	38	37	20	55.7	1781	3223	3954	3589	2986
Sierra	70	27	2	3	12	35	50	52.2	610	1936	3845	2891	2130
Small Kabuli Type													
B-90	71	25	4	85	14	1	0	50.9	1914	4204	4345	4275	3488
Desi Type													
CDC Anna	70	24	0	94	6	0	0	49.4	2281	4718	4299	4509	3766
Mean	70	25	2	12	22	31	35	49.5	1924	3369	3858	--	--
C.V. %	0.6	7.1	43.5	19.3	20.4	16.6	15.6	3.0	11.4	11.1	8.2	--	--
LSD 5%	1	3	2	3	6	7	8	2.1	315	531	448	--	--
LSD 10%	1	2	1	3	5	6	7	1.8	262	443	374	--	--

* Days after planting.

** Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 15

Harvest Date: August 26

Previous Crop: Winter Wheat

Field Pea - 2015 **Hettinger, ND**

Variety	Days to Flower	Flower Duration	Days to Mature	Vine Length[1]	Canopy Height[2]	Height Index[3]	Lodging	Seed Protein	1,000 Seed Wt.	Seeds Lb	Test Weight	Seed Yield	
												2015	3-Yr. Avg.
	DAP[4]	days	DAP[4]	inches	inches	%	0 - 9[5]	%	gm	seeds	lb/bu	---------bu/a---------	
Yellow Cotyledon Type													
AAC Carver	70	17	100	41	21	52	6	23.9	236	1922	62.5	61.6	--
Agassiz	70	22	106	36	20	55	6	25.7	219	2068	60.5	50.9	52.1
Bridger	68	18	100	38	22	59	7	25.9	217	2097	61.6	49.2	54.0
CDC Amarillo	71	20	105	40	22	56	6	25.5	237	1917	62.1	57.7	--
CDC Meadow	69	20	104	39	16	41	7	25.1	213	2139	62.3	51.5	52.1
CDC Saffron	70	16	100	37	17	47	7	25.9	254	1785	61.7	58.1	--
CM3404	71	17	102	40	20	50	6	26.0	286	1588	63.1	53.7	--
DS Admiral	68	19	100	41	19	48	7	25.6	229	1985	60.1	57.9	55.8
Earlystar	68	21	102	40	18	45	7	24.0	210	2159	60.2	57.0	--
Gunner	70	19	103	41	20	48	7	25.8	215	2116	60.8	45.5	50.0
Hyline	69	20	103	38	15	39	7	24.7	243	1871	62.6	49.3	--
Jetset	70	21	105	37	18	49	7	25.7	224	2025	59.8	52.8	--
LGPN4243	67	19	100	38	21	54	7	25.8	267	1698	61.9	57.0	--
LGPN4244	69	17	100	38	17	46	7	26.6	244	1866	60.1	57.4	--
LGPN4901	70	20	104	44	18	41	7	25.8	221	2064	61.7	48.2	
LGPN4902	70	20	104	39	20	51	7	27.0	227	2002	61.5	48.5	--
LGPN4903	71	19	104	45	19	42	7	24.8	216	2099	61.8	54.4	--
LN4228	68	19	100	37	19	51	7	25.0	271	1673	62.2	57.9	--
LN4236	71	17	102	38	20	52	7	25.9	257	1768	61.0	53.6	--
Nette	68	18	100	37	22	60	6	24.9	241	1886	61.8	57.9	54.4
Salamanca	69	18	101	42	20	46	6	26.8	241	1884	62.5	49.0	--
Spider	68	22	104	40	16	39	8	26.2	251	1808	60.0	53.9	--
SW Midas	70	18	102	34	16	46	7	25.3	199	2282	60.1	55.0	52.3
Vegas	70	17	100	39	20	52	7	27.4	224	2027	61.7	50.6	--

Table continues on next page.

Field Pea - 2015 **Hettinger, ND**

Variety	Days to Flower	Flower Duration	Days to Mature	Vine Length[1]	Canopy Height[2]	Height Index[3]	Lodging	Seed Protein	1,000 Seed Wt.	Seeds Lb	Test Weight	Seed Yield 2015	Seed Yield 3-Yr. Avg.
	DAP[4]	days	DAP[4]	inches	inches	%	0 - 9[5]	%	gm	seeds	lb/bu	---bu/a---	
Green Cotyledon Type													
Bluemoon	67	19	99	40	17	43	7	26.3	230	1971	59.7	56.4	--
CDC Striker	68	18	100	30	14	47	8	25.2	209	2175	60.9	51.4	52.5
Cruiser	70	20	104	37	17	45	7	25.7	202	2242	60.5	47.9	46.4
Daytona	69	16	100	37	17	45	7	25.3	247	1837	59.8	49.3	--
LGPN1902	68	18	100	35	15	42	7	26.9	242	1879	61.7	48.3	--
Majoret	69	17	100	37	17	44	8	26.7	221	2052	61.5	49.2	49.3
Mean	69	19	102	38	18	48	7	25.7	233	1963	61.2	52.9	--
C.V. %	0.7	5.2	0.8	4.5	15.2	15.7	9.4	1.7	3.3	3.3	1.6	8.2	--
LSD 5%	1	1	1	2	4	11	1	0.6	11	92	1.4	6.1	--
LSD 10%	1	1	1	2	3	9	1	0.5	9	77	1.1	5.1	--

[1] Plant height at end of flowering.

[2] Height to the top of the canopy at harvest.

[3] Harvest Index: Calculated as the ratio of canopy height/plant height.

[4] Days after planting.

[5] Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 15

Harvest Date: August 3

Previous Crop: Durum Wheat

NDSU Hettinger Reserach Extension Center

Lentil - 2015 **Hettinger, ND**

Variety	Days to Flower	Height	Lodging	Seed Protein	1,000 Seed Wt.	Seeds Lb	Test Weight	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	DAP*	inches	0 - 9**	%	gm	seeds	lb/bu	----------lbs/acre----------				
Large Green Type												
CDC Greenland	69	10	7	24.9	50	9003	60.2	1789	2182	2823	2503	2265
Pennell	69	12	7	25.7	51	8965	59.7	1457	2269	2527	2398	2084
Riveland	68	12	7	24.9	57	8019	58.1	1580	2075	2374	2225	2010
Medium Green Type												
Avondale	68	12	7	23.4	44	10318	60.9	2171	2700	2844	2772	2572
CDC Richlea	69	11	7	24.8	44	10452	59.9	1890	2084	2804	2444	2259
Merrit	68	10	7	26.7	58	7797	58.5	--	2244	2407	2326	--
Small Green Type												
CDC Viceroy	69	11	7	27.0	31	14553	62.4	3046	2388	2951	2670	2795
Essex	68	14	7	24.6	41	11128	59.2	2171	2031	2388	2210	2197
Eston	69	11	7	26.3	32	14366	62.8	2273	2601	2823	2712	2566
French Green Type												
CDC Lemay	69	12	7	24.6	32	14035	62.7	2393	2603	3005	2804	2667
Small Red Type											--	--
CDC Red Rider	69	12	7	24.5	42	10817	61.0	3133	2475	2974	2725	2861
CDC Redberry	68	11	6	26.6	39	11641	62.0	2919	2731	3295	3013	2982
CDC Redcoat	69	12	7	24.5	38	11938	62.1	--	2846	3057	2952	--
CDC Rosetown	69	12	7	25.5	27	16936	62.8	2942	2319	2768	2544	2676
CDC Rouleau	69	12	7	23.7	35	12988	61.3	1926	2842	3154	2998	2641
Crimson	68	10	8	25.2	34	13358	63.0	--	2465	2534	2500	--
Spanish Brown Type												
Morena	69	10	7	25.2	38	11898	61.6	2478	1929	2786	2358	2398
Pardina	69	11	8	23.6	36	12714	61.3	--	2602	3266	2934	--
Mean	68	11	7	25	43	11081	60.5	2283	2394	2687	--	--
C.V. %	0.5	10.7	7.0	1.8	4.7	4.4	4.4	12.3	10.2	7.0	--	--
LSD 5%	0.5	1.7	0.7	0.6	2.9	686	1.1	395	344	264	--	--
LSD 10%	0.4	1.4	0.6	0.5	2.4	574	0.9	332	289	221	--	--

* Days after planting.

** Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 15

Harvest Date: August 5

Previous Crop: Peas

NDSU Hettinger Resarch Extension Center

Clearfield Lentil - 2015 **Hettinger, ND**

Variety	Days to Flower	Plant Height	Plant Lodging	Seed Protein	1,000 Seed Wt.	Seeds Lb	Test Weight	----- Grain Yield ----- 2013	2014	2015	Average Yield 2 yr	3 yr
	DAP*	inches	0 - 9**	%	gm	seeds	lb/bu	----------lbs/acre----------				
Medium Green Type												
CDC Imigreen CL	63	14	3	25.8	50	9029	62.4	2640	2311	3012	2662	2654
Small Green Type												
CDC Imvincible CL	63	13	3	26.6	31	14573	63.2	--	--	3624	--	--
Small Red Type												
CDC Maxim CL	62	13	3	24.9	36	12714	63.4	3132	3566	4007	3787	3568
CDC Impala CL	65	14	3	26.2	29	15572	63.9	3086	2754	3428	3091	3089
Mean	63	13	3	25.9	37	12972	63.2	3029	2817	3518	--	--
C.V. %	0.7	12.1	0.0	2.1	5.5	5.6	0.7	8.2	6.6	7.6	--	--
LSD 5%	0.7	2.6	0.0	0.9	3.2	1172	0.7	383	286	428	--	--
LSD 10%	0.5	2.1	0.0	0.7	2.6	950	0.6	322	240	347	--	--

* Days after planting.

** Lodging: 0 = none, 9 = lying flat on ground.

Planting Date: April 22

Harvest Date: August 10

Previous Crop: Field Pea

Soybean - Planting Date - 2015 **Hettinger, ND**

Treatment	Flower Date	Mature Date	Harvest Date	Plant Height	Test Weight	Seed Oil	Seed Protein	Grain Yield
				inches	lbs/bu	%	%	bu/ac
Planting Date								
5/5	7/10	9/4	9/12	31	54.7	16.8	33.2	29.7
5/13	7/10	9/8	9/12	27	55.5	16.6	33.2	27.7
5/19	7/11	9/10	9/16	26	55.6	16.7	33.3	35.0
5/27	7/12	9/14	9/24	26	55.4	16.6	33.4	31.4
LSD 5%	0.5	2.0	2.0	1.1	0.4	NS	NS	1.2
Variety								
Proseed 10-20 (.2)	7/11	9/6	9/15	28	55.3	16.0	33.2	30.0
Ashtabula (.4)	7/11	9/8	9/15	29	55.2	17.5	32.8	26.6
Proseed 30-60 (.6)	7/11	9/12	9/18	26	55.5	16.5	33.7	36.2
LSD 5%	0.4	0.0	2.0	0.9	NS	0.1	0.2	1.0
Date X Variety								
5/5 - Proseed 10-20	7/10	9/1	9/10	32	54.0	16.3	33.1	29.8
5/5 - Ashtabula	7/10	9/3	9/10	32	55.0	17.5	32.7	22.6
5/5 - Proseed 30-60	7/10	9/8	9/16	28	55.2	16.6	33.7	36.7
5/13 - Proseed 10-20	7/10	9/5	9/10	28	55.6	15.8	33.1	25.9
5/13 - Ashtabula	7/11	9/7	9/10	29	55.4	17.4	32.9	21.4
5/13 - Proseed 30-60	7/11	9/11	9/16	24	55.7	16.5	33.5	35.7
5/19 - Proseed 10-20	7/11	9/7	9/16	26	55.4	16.0	33.3	35.1
5/19 - Ashtabula	7/11	9/9	9/16	27	55.3	17.6	32.8	33.4
5/19 - Proseed 30-60	7/12	9/13	9/16	25	56.0	16.6	33.8	36.4
5/27 - Proseed 10-20	7/12	9/11	9/24	26	56.3	16.0	33.4	29.3
5/27 - Ashtabula	7/12	9/13	9/24	28	55.0	17.4	32.9	29.0
5/27 - Proseed 30-60	7/13	9/17	9/24	26	54.9	16.3	33.8	36.0
	NS	--	--	NS	***	NS	NS	***
Trial Mean	7/11	9/9	9/16	27	55.3	16.7	33.3	30.9
C.V. %	0.0	0.0	0.0	4.8	0.9	1.3	1.0	4.1

Previous Crop: Oat

NDSU Hettinger Reaserch Extension Center

Soybean - Conventional - 2015 **Hettinger, ND**

Company /Brand	Variety	Maturity	Mature Date	Plant Height	Test Weight	Seed Oil	Seed Protein	Grain Yield	Average 3-Yr
				inches	lbs/bu	%	%	Bushels per acre	
NDSU	Traill	00.0	8/31	31	56.3	16.2	34.5	25.6	37.5
NDSU	ND-Henson	0.0	9/3	28	56.2	16.8	34.0	26.4	--
NDSU	Ashtbula	0.4	9/5	31	54.4	17.9	31.9	25.7	39.9
NDSU	Sheyenne	0.7	9/7	32	52.3	17.6	31.1	27.9	41.9
Trial Mean		--	9/4	31	54.8	17.1	32.9	26.4	39.8
C.V. %		--	0.1	2.4	1.1	1.2	0.9	4.1	--
LSD 5%		--	0.4	1.2	1.0	0.3	0.5	1.7	--
LSD 10%		--	0.3	1.0	0.8	0.3	0.4	1.4	--

Planting Date: May 5
Harvest Date: September 10
Previous Crop: Oat

Soybean - Roundup Ready - 2015 **Hettinger, ND**

Company/Brand	Variety	Maturity	Mature Date	Plant Height	Test Weight	Seed Oil	Seed Protein	Grain Yield	Average 2-Yr
				inches	lbs/bu	%	%	Bushels per acre	
Integra	20215	0.1	9/9	35	55.0	15.7	35.1	53.7	--
Rea Hybrids	61G24	0.1	9/9	35	56.1	16.2	35.1	51.2	--
Proseed	30-20	0.2	9/10	34	54.2	17.0	35.0	52.1	52.8
AgVenture	03E3RR	0.3	9/12	36	55.2	17.3	34.9	48.2	--
Integra	20300	0.3	9/11	34	55.1	16.5	34.7	50.6	48.5
Integra	20327	0.3	9/10	36	55.6	15.9	36.0	52.4	--
Legacy Seed	LS0334	0.3	9/11	36	54.7	16.5	35.3	53.4	51.5
Thunder Seeds	3503	0.3	9/9	36	55.5	16.0	35.9	49.9	--
AgVenture	04E4RR	0.4	9/9	36	55.3	16.9	34.6	47.0	47.0
Peterson Farms Seed	15R04	0.4	9/10	35	55.1	16.6	34.9	52.2	50.3
Rea Hybrids	64G94	0.4	9/5	38	54.4	17.8	33.2	45.9	--
AgVenture	05B2RR	0.5	9/7	35	54.6	17.2	33.1	50.1	50.1
Proseed	11-50	0.5	9/11	36	55.3	16.4	34.2	52.2	51.7
Thunder Seeds	3205	0.5	9/12	35	55.4	16.2	34.2	51.2	--
Thunder Seeds	3505N	0.5	9/11	35	54.5	16.2	35.2	51.6	--
AgVenture	06K1RR	0.6	9/13	36	56.4	16.8	35.0	43.0	--
Integra	20600	0.6	9/12	35	55.2	16.4	34.0	54.4	52.4
Legacy Seed	LS0615	0.6	9/15	34	55.2	16.6	35.0	49.7	--
Legacy Seed	LS0635N	0.6	9/14	35	54.9	16.6	35.1	55.0	--
Rea Hybrids	66G14	0.6	9/11	35	54.9	16.2	34.7	51.9	--
Peterson Farms Seed	15R07	0.7	9/13	33	54.5	16.3	34.3	50.1	--
AgVenture	08E5RR	0.8	9/13	35	56.2	16.8	34.0	49.5	45.6
Rea Hybrids	R0815	0.8	9/14	32	55.0	16.4	34.3	49.0	--
Thunder Seeds	3408N	0.8	9/14	33	55.5	16.4	34.5	49.9	--
AgVenture	09E1RR	0.9	9/18	37	55.1	17.1	34.8	43.0	40.6
Rea Hybrids	69G14	0.9	9/15	35	55.5	16.4	34.0	48.6	--
Trial Mean		--	9/11	35	55.2	16.6	34.7	50.2	49.0
C.V. %		--	0.1	6.6	0.6	1.9	1.3	6.8	--
LSD 5%		--	2.0	3.2	0.5	0.5	0.6	4.8	--
LSD 10%		--	1.6	3	0.4	0.4	0.5	4.0	--

Planting Date: May 13
Harvest Date: September 27
Previous Crop: Oat

Corn - 2015 **Hettinger, ND**

Company	Hybrid	Relavtive Maturity*	Days to Silk	Plant Height	Ear Height	Stalk Lodge	Root Lodge	Moisture Content	Test Weight	Grain Yield
		days	DAP**	inches	inches	%	%	%	lbs/bu	bu/ac
Legacy Seeds	L2314 VT2PRO RIB	83	72	84	29	0	0	17.8	53.8	108.3
Legacy Seeds	L2415 VT2PRO	84	73	86	28	0	0	20.0	53.7	111.8
Legacy Seeds	L2813 VT2PRO RIB	87	75	93	33	0	1	23.3	53.6	137.3
Legacy Seeds	L2924 VT2PRO	89	73	84	35	0	0	25.3	50.4	125.6
Legacy Seeds	L3011 VT3PRO RIB	90	75	93	35	1	0	29.1	51.1	126.4
Integra	9301	80	70	86	35	0	0	23.1	54.5	116.1
Integra	3314	83	73	82	34	1	0	25.1	53.2	124.5
Integra	3537	85	74	91	30	0	0	21.6	52.5	129.5
Integra	9352	85	74	88	29	0	0	23.5	53.6	124.8
Rea Hybrids	1B820-RIB	82	73	89	35	0	0	21.4	53.1	107.3
Rea Hybrids	2B840-RIB	84	73	89	36	0	0	18.6	52.7	126.6
Rea Hybrids	2B850-RIB	85	74	80	32	0	0	23.8	53.2	122.3
Rea Hybrids	2A871-RIB	87	73	87	27	1	0	22.8	53.1	114.0
Rea Hybrids	3B890-RIB	89	74	90	34	0	1	27.9	52.1	121.3
Peterson Farms Seed	PFS 75K85	85	73	91	40	1	0	21.9	52.8	121.3
Thunder Seed	6385VT2PRIB	85	72	91	31	1	0	22.4	54.1	129.1
Thunder Seed	4585RR	85	74	95	36	1	0	21.9	52.6	133.4
Thunder Seed	7188VT2PRIB	88	75	96	39	0	0	28.0	52.8	112.8
Thunder Seed	7993VT2PRIB	93	77	90	36	0	0	40.5	48.7	105.9
Proseed	1283 VT2P	83	70	82	29	0	0	20.9	53.6	103.5
Proseed	1384 VT2P	84	73	89	32	1	2	21.4	54.1	116.2
Proseed	PX85R VT2RIB	85	74	93	33	0	0	22.4	52.4	119.4
Proseed	1185 RR	85	75	90	28	0	0	18.2	52.7	132.1
Proseed	1286 VT2P	86	74	92	33	0	0	24.8	52.4	122.5
AgVenture	RL1742HB	78	70	88	35	0	5	16.4	53.5	115.8
AgVenture	RL2106AM	81	72	84	36	0	2	17.8	54.1	118.1
AgVenture	RL2289AM	82	73	92	35	0	11	17.2	54.1	121.9
AgVenture	R2774	82	72	84	33	0	0	22.7	50.7	80.0
AgVenture	GL2949AB	86	75	89	29	0	0	20.3	53.0	116.7
AgVenture	RL3645AM	89	76	91	35	0	2	21.0	51.1	119.8
AgVenture	RL4492AMX	92	76	89	39	1	3	37.1	50.6	99.7
AgVenture	RL4616HB	93	75	86	30	0	5	30.1	50.4	98.8
Trial Mean			74	88	33	0	1	23.4	52.6	117.6
C.V. %			1.3	5.3	12.6	287.1	232.8	10.6	2.2	18.2
LSD 5%			1.6	6.7	5.9	1.2	3.7	4.0	1.9	34.9
LSD 10%			1.3	5.5	4.9	1.0	3.1	3.4	1.6	29.2

* Relavtive maturity provided by the company.

** Days after planting

Planting Date: May 19

Harvest Date: October 20

Previous Crop: Wheat

Preemergence weed control in field pea

Caleb Dalley, HREC, Hettinger, ND, 2015

A field trial was conducted to compare herbicide burndown treatments combined with soil active preemergence herbicides. “Blue Moon” field pea were seeded at a rate of 200 lbs/A on May4, 2015 using a John Deere 1590 no-till drill. Herbicide treatments were applied on May 8, 2015 from 2:40 to 3:15 PM using a backpack CO_2 spray system at a volume of 10 gal/A. Glyphosate (Roundup PowerMAX) was tank-mixes with all treatments to act as a burndown. At time of application, wild buckwheat was at the 2-3 leaf stage. No other weeds were present at significant densities at time of application. Rainfall (0.31 inches) occurred on May 9 which allowed for activation of soil active herbicides. Weed control and crop injury were rated on June 9 (5 weeks after herbicide application). Injury was noted following application of Broadaxe (sulfentrazone plus metolochlor) and Sharpen plus Dual II Magnum. All treatments effectively controlled green foxtail. Treatments including Sharpen controlled wild buckwheat 85 to 100%. Other treatments failed to adequately control wild buckwheat. Pea yield following herbicide treatments was equal to or better than the hand-weeded control and in most cases greater than the untreated control. The highest yield occurred with combination of Prowl H2O plus Sharpen (1 oz/A) plus Spartan Charge.

	Treatment	Product rate	Pea	Green foxtail	Wild buckwheat	Test wt	Yield
			Jun 9			Aug-8	
			Injury (%)	control %		lbs/A	bu/A
1	Untreated Control		0 d	0 b	0 f	1755 d	29.2 d
2	Roundup PowerMax	22 oz/a	0 d	91 a	88 abc	2518 abc	42.0 abc
	AMS	7 lb/100 gal					
	Sharpen	2 oz/a					
	Prowl H2O	3 pt/a					
	MSO	1 % v/v					
3	Roundup PowerMax	22 oz/a	9 b	99 a	91 ab	2569 abc	42.8 abc
	AMS	7 lb/100 gal					
	Sharpen	2 oz/a					
	Dual II Magnum	2 pt/a					
	MSO	1 % v/v					
4	Roundup PowerMax	22 oz/a	16 a	94 a	70 d	2470 abc	41.2 abc
	AMS	7 lb/100 gal					
	BroadAxe	32 oz/a					
5	Roundup PowerMax	24 oz/a	1 d	96 a	75 cd	2136 cd	35.6 cd
	AMS	7 lb/100 gal					
	Metribuzin	0.5 lb/a					
	Dual II Magnum	2 pt/a					
6	Roundup PowerMax	22 oz/a	1 d	100 a	93 ab	2745 a	45.8 a
	AMS	7 lb/100 gal					
	Prowl H2O	3 pt/a					
	Sharpen	1 oz/a					
	Spartan Charge	7.5 oz/a					
	MSO	1 % v/v					
7	Roundup PowerMax	22 oz/a	6 bc	99 a	100 a	2455 abc	40.9 abc
	AMS	7 lb/100 gal					
	Prowl H2O	3 pt/a					
	Sharpen	2 oz/a					
	Spartan Charge	7.5 oz/a					
	MSO	1 % v/v					
8	Roundup PowerMax	22 oz/a	0 d	96 a	54 e	2659 ab	44.3 ab
	AMS	7 lb/100 gal					
	Pyroxasulfone	1.5 oz/a					
9	Roundup PowerMax	24 oz/a	1 d	96 a	46 e	2122 cd	35.4 cd
	AMS	7 lb/100 gal					
	Pyroxasulfone	3 oz/a					
10	Roundup PowerMax	22 oz/a	3 cd	93 a	85 bcd	2404 abc	40.1 abc
	AMS	7 lb/100 gal					
	Pyroxasulfone	1.5 oz/a					
	Sharpen	2 oz/a					
	MSO	1 % v/v					
11	Hand weeded		0 d	100 a	100 a	2215 bcd	36.9 bcd
	Roundup PowerMax	22 oz/a					
	AMS	7 lb/100 gal					
	Prowl H2O	3 pt/a					

LSD P=.10	3.2	9.0	15.1	489	8.2
Standard Deviation	2.7	6.3	10.5	407.47	6.79
CV	79.97	7.13	14.38	17.2	17.2
Treatment F	13.774	87.393	32.688	1.983	1.983
Treatment Prob(F)	0.0001	0.0001	0.0001	0.0720	0.0720

Preemergence options for weed control in Clearfield Lentils

Caleb Dalley, HREC, Hettinger, ND, 2015

A field trial was conducted to compare preemergence herbicide applications for weed control and crop tolerance in Clearfield Lentils. Lentils were seeded using a John Deere 1590 no-till drill on May 4, 2015. Herbicides treatments were applied on May 8 with lentil emergence occurring on May 15. Weeds present during application were primarily wild buckwheat, prickly lettuce, and annual mustards. Beyond (imazamox) was applied to all plots on June 8th, prior to flowering, which occurred on June 30th. At 14 days after treatment (DAT), two treatments resulted in visual injury to lentils, both of which contained Spartan. At 35 DAT injury, in the form of chlorosis/necrosis, became apparent in treatments containing Sencor, which may be attributed to the high rainfall that occurred in May. Slight stunting occurred with the higher rate of pyroxasulfone. All treatments, except Spartan, were effective in controlling green foxtail. Wild buckwheat was controlled with Sharpen plus Pursuit with and without Sencor. All other treatments suppressed wild buckwheat. Prickly lettuce was controlled by all treatments except Spartan and the experimental treatment BAS96110H. Lentil yield was lowest in the untreated control due to weed interference, whereas the highest yield occurred when Sharpen plus Pursuit, BAS 820ABH (0.081 lb ai.A), Pyroxasulfone (0.081 lb ai/A), and Prowl H2O (0.95 lb ai/A). The higher rate of Pyroxasulfone (0.16 lb ai/A) and the Sharpen plus Pursuit plus Sencor treatments had lower yields than Sharpen plus Pursuit but yields were greater than the untreated control. Treaments with yields similar to the untreated control included Shapen plus Sencor, Spartan alone, and BAS96110H.

	Treatment	Rate	Lentil			Green foxtail	Wild buckwheat	Prickly lettuce	Lentil yield	
			May 22	May 29	Jun 9		Jun 9		Aug 7	
			Injury (%)			Control (%)			Test wt	Test wt
1	Roundup PowerMax	22 oz/a	0 b	0 c	2 de	96 a	84 bcd	100 a	64 a	37.3 ab
	AMS	7 lb/100 gal								
	BAS 820ABH	2.5 oz/a								
2	Roundup PowerMax	22 oz/a	0 b	0 c	0 e	95 a	78 cd	98 ab	64 a	37.3 ab
	AMS	7 lb/100 gal								
	Pyroxasulfone	1.5 oz/a								
3	Roundup PowerMax	22 oz/a	0 b	0 c	7 c	98 a	83 bcd	100 a	64 a	35.7 bc
	AMS	7 lb/100 gal								
	Pyroxasulfone	3 oz/a								
4	Roundup PowerMax	22 oz/a	0 b	0 c	0 e	93 a	92 ab	100 a	64 a	38.4 a
	AMS	7 lb/100 gal								
	Sharpen	0.75 oz/a								
	Pursuit	2 oz/a								
	MSO	16 oz/a								
5	Roundup PowerMax	22 oz/a	0 b	0 c	45 a	95 a	85 bcd	100 a	64 a	33.8 cde
	AMS	7 lb/100 gal								
	Sharpen	0.75 oz/a								
	Sencor	7.54 oz/a								
	MSO	16 oz/a								
6	Roundup PowerMax	22 oz/a	0 b	0 c	36 a	93 a	95 a	100 a	64 a	35.2 bcd
	AMS	7 lb/100 gal								
	Sharpen	0.75 oz/a								
	Pursuit	1 oz/a								
	Sencor	7.54 oz/a								
	MSO	16 oz/a								
7	Roundup PowerMax	22 oz/a	0 b	0 c	0 e	93 a	85 bcd	93 ab	64 a	36.2 abc
	AMS	7 lb/100 gal								
	Prowl H2O	32 oz/a								
8	Roundup PowerMax	22 oz/a	39 a	27 a	19 b	50 b	77 d	83 bc	64 a	32.6 de
	AMS	7 lb/100 gal								
	Spartan	2.54 oz/a								
	MSO	16 oz/a								
9	Roundup PowerMax	22 oz/a	34 a	15 b	6 cd	95 a	87 abc	69 c	64 a	34.3 cde
	AMS	7 lb/100 gal								
	BAS96110H	29 oz/a								
	MSO	16 oz/a								
10	Untreated Check		0 b	0 c	0 e	0 c	0 e	0 d	63 a	32.0 e
LSD P=.05			5.0	7.3	9.2	26.8	9.5	16.4	NS	2.67
Standard Deviation			3.5	5.0	6.3	18.4	6.5	11.3	0.5	1.84
CV			47.85	109.1	53.63	22.87	8.54	13.4	0.84	5.22
Treatment F			78.1	16.6	27.1	11.8	70.6	30.9	1.074	5.258
Treatment Prob(F)			0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.4125	0.0004

Comparison of POST and PRE/POST Combinations for Weed Control in Spring Wheat

Caleb Dalley, HREC, Hettinger, ND, 2015

A trial was conducted to evaluate preemergence (PRE) and postemergence (POST) options for weed control in spring wheat. 'Elgin' spring wheat was drilled using a John Deere 1590 no-till drill on April 24, 2015. Starter fertilizer (18-46-0) was applied at planting at 40 lbs/acre. Olympus PRE treatments were applied on April 27. Wheat emerged on approximately May 5. Granular urea fertilizer was broadcast at 100 lbs/acre on May 16 using a drop spreader. Wheat and weeds were allowed to grow together until time of treatment application. POST herbicide treatments were applied at a volume of 10 gal/A using a hand-held backpack spray system on May 28 when wheat was in the 3-4 leaf stage. Wild buckwheat and field bindweed were just beginning to vine at time of application. Wheat was evaluated for injury at 2, 9, 16, and 30 days after treatment (DAT). Mild injury, in the form of slight yellowing, was observed in nearly all herbicide treatments and diminished by the 30 DAT evaluation. Field bindweed was suppressed by all treatments at 9 DAT. Wild buckwheat was controlled by all treatments. Wheat was harvested on August 7. No differences in yield, seed moisture, or test weight were observed at harvest. Weed populations were light in this test and did not lead to significant yield losses. Further research should be conducted on different weed populations in order to determine efficacy. It appears that Varro, when applied at the 3 to 4 leaf stage in spring wheat is safe and does not lead to yield losses. Further evaluations at different growth stages of spring wheat is needed to determine safety.

	Treatment	Rate	Spring wheat injury			Field bindweed	Wild buckwheat		Test wt	Yield
			May 29	Jun 5	Jun 12	Jun 5	Jun 5	Jun 26	Aug 7	Aug 7
			——————%——————			——— Control (%) ———			lbs/bu	bu/A
1	UNTREATED		0b	0c	0c	0d	0b	0b	59a	70.3a
2	VARRO Carnivore Herbicide AMS	6.85oz/a 1.0pt/a 0.5lb/a	5a	4ab	0c	59abc	94a	99a	57a	70.3a
3	VARRO Carnivore Herbicide OLYMPUS AMS	6.85oz/a 1.0pt/a 0.2oz/a 0.5lb/a	7a	4ab	1abc	53bc	95a	98a	58a	72.2a
4	OLYMPUS VARRO Carnivore Herbicide AMS	0.2oz/a 6.85oz/a 1.0pt/a 0.5lb/a	6a	5ab	3a	56abc	95a	98a	56a	70.8a
5	OLYMPUS VARRO Carnivore Herbicide OLYMPUS AMS	0.2oz/a 6.85oz/a 1.0pt/a 0.2oz/a 0.5lb/a	8a	7ab	3ab	56abc	95a	100a	57a	72.5a
6	HUSKIE COMPLETE AMS	13.7oz/a 0.5lb/a	6a	3b	1bc	58abc	95a	98a	58a	69.7a
7	HUSKIE COMPLETE OLYMPUS AMS	13.7oz/a 0.2oz/a 0.5lb/a	6a	3ab	1abc	67a	95a	100a	58a	69.5a
8	OLYMPUS HUSKIE COMPLETE AMS	0.2oz/a 13.7oz/a 0.5lb/a	5a	8a	4a	62ab	94a	100a	58a	68.7a
9	OLYMPUS HUSKIE COMPLETE OLYMPUS AMS	0.2oz/a 13.7oz/a 0.2oz/a 0.5lb/a	6a	4ab	4a	47c	94a	96a	58a	71.7a
LSD P=.05			3.7	0.3	0.4	13.5	1.8	4.4	NS	NS
Standard Deviation			2.5	0.2	0.3	9.0	1.3	3.0	1.2	4.86
CV			47.07	34.85	75.89	17.65	1.49	3.41	2.08	6.87
Treatment F			2.944	5.699	2.990	19.564	2542.778	484.074	1.883	0.286
Treatment Prob(F)			0.0192	0.0004	0.0179	0.0001	0.0001	0.0001	0.1101	0.9642

Postemergence Weed Control Options in Durum

Caleb Dalley, HREC, Hettinger, ND, 2015

A field trial was conducted to evaluate weed control and crop tolerance to POST herbicides. 'Carpio' durum wheat was seeded using a 1590 no-till drill on April 24, 2015. Starter fertilizer (18-46-0) was applied at planting at 40 lbs/acre. Durum emerged on May 7. Granular urea fertilizer was spread at 100 lbs/acre on May 16. Wheat and weeds were allowed to grow together until treatment application. Herbicide treatments were applied using a hand-held backpack spray system on May 28 when durum was in the 3-4 leaf stage. Wild buckwheat and field bindweed were just beginning to vine and Japanese brome was tillering at time of application. Durum was evaluated for injury at 4, 8, 15, and 28 days after treatment (DAT). Mild injury (yellowing), was observed in all herbicide treatments and diminished by 28 DAT. Field bindweed was suppressed by all treatments. Wild buckwheat was controlled by all treatments containing Varro, and was suppressed with Huskie Complete and Wolverine treatments. Japanese brome was controlled by all Varro tank-mixes. Durum was harvested on August 12. No differences in yield, seed moisture, or test weight were observed at harvest. Weed populations were light in this test and did not lead to significant yield losses, although yield in the untreated control was numerically less (4.5 to 16 bushels per acre less) than all other treatments. Further research should be conducted on different weed populations in order to determine efficacy. It appears that Varro, when applied at the 3 to 4 leaf stage in durum is safe and does not lead to yield losses. Further evaluations at different growth stages of durum is needed to ensure safety.

Treatment		Rate	Durum			Field bindweed		Wild buckwheat		Japanese Brome	Durum yield	
			Jun 1	Jun 12	Jun 26	Jun 12	Jun 26	Jun 12	Jun 26	Jun 26	Aug 12	
			Injury (%)			Control (%)					Test wt	bu/A
1	Untreated		0 d	0 c	0 a	0 e	0 d	0 f	0 d	0 c	60 a	58.6 a
2	Varro	6.85 oz/a	4 bc	3 ab	1 a	63 abc	78 ab	96 a	96 a	95 ab	60 a	65.5 a
	Bronate	1.0 pt/a										
	Ams	0.5 lb/a										
3	Varro	6.85 oz/a	6 ab	4 a	2 a	57 c	78 ab	88 bcd	96 a	90 ab	61 a	69.5 a
	Weld Herbicide	1.3 pt/a										
	Ams	0.5 lb/a										
4	Varro	6.85 oz/a	6 ab	2 ab	1 a	73 a	90 a	91 abc	97 a	95 ab	60 a	63.1 a
	Carnivore Herbicide	1.0 pt/a										
	Ams	0.5 lb/a										
5	Varro	6.85 oz/a	4 bc	2 ab	1 a	65 abc	80 ab	85 d	99 a	83 b	60 a	65.8 a
	Widematch	1.0 pt/a										
	2,4-D Ester	0.5 pt/a										
	Ams	0.5 lb/a										
6	Varro	6.85 oz/a	5 abc	4 a	1 a	75 a	87 ab	86 bcd	100 a	90 ab	60 a	66.2 a
	Widematch	1.0 pt/a										
	Mcpa Ester	0.5 pt/a										
	Ams	0.5 lb/a										
7	Varro	6.85 oz/a	6 ab	1 bc	1 a	70 ab	80 ab	86 cd	99 a	100 a	61 a	74.6 a
	Widematch	1.0 pt/a										
	Affinity Tankmix	0.6 oz/a										
	Ams	0.5 lb/a										
8	Varro	6.85 oz/a	6 abc	3 a	0 a	68 abc	75 b	92 ab	89 b	94 ab	60 a	66.1 a
	Olympus	0.2 oz/a										
	Carnivore Herbicide	1.0 pt/a										
	Ams	0.5 lb/a										
9	Huskie Complete	13.7 oz/a	7 a	4 a	2 a	60 bc	77 b	84 d	82 b	88 ab	60 a	70.2 a
	Ams	0.5 lb/a										
10	Wolverine Advanced	27.4 oz/a	4 c	2 bc	0 a	33 d	57 c	65 e	68 c	2 c	61 a	70.9 a
LSD P=.05			2.2	1.7	2.1	11.9	13.2	6.2	6.8	15.1	NS	NS
Standard Deviation			1.5	1.1	1.4	6.9	7.7	4.3	4.7	10.4	1.0	8.41
CV			32.8	48.93	173.12	12.26	11.0	5.54	5.66	14.11	1.69	12.54
Treatment F			6.478	4.210	0.927	33.415	34.480	175.721	173.193	55.355	0.803	1.132
Treatment Prob(F)			0.0001	0.0017	0.5175	0.0001	0.0001	0.0001	0.0001	0.0001	0.6175	0.3751

Wheat Tolerance to Zidua at Different Rates and Application Timings

Caleb Dalley, HREC, Hettinger, ND, 2015

A field trial was conducted to evaluate the tolerance of spring wheat to the herbicide Zidua and experimental herbicide BAS 820ABH when applied preemergence (PRE), delayed PRE (DPRE), and early postemergence (EPOST). Spring wheat was planted on Friday April 24, 2015 at a rate of approximately 80 lbs/A at a depth of 1.5 inches using a John Deere 1590 no-till planter. Starter fertilizer (18-46-0) was applied at planting at a rate of 40 lbs/acre and granular urea fertilizer was broadcast at 100 lbs/acre on May 16 using a drop spreader. After planting, the entire trial was treated with glyphosate (26 oz/A Roundup PowerMAX) plus AMS to control emerged weeds (primarily wild buckwheat and wild mustards). PRE treatments were applied on April 30. At time of application wheat seed was imbibed and the root radicle had emerged from some of the seed. DPRE treatments were applied on May 5th. At time of application, the coleoptile had emerged from the seed, but had not yet emerged from the soil. The EPOST treatments were applied on May 13th when wheat was at the 1-leaf stage. Unfortunately, no rainfall occurred until May 6th, the day after the DPRE application was made, therefore the treatments applied at the PRE timing were not incorporated into the soil until this rainfall had occurred. Rainfall also occurred on the day of, and on the day after the EPOST timing. Weed infestation levels were low in this trial and no ratings were possible. Injury to wheat (minor stunting) was not observed until the June 8th rating when wheat had begun to elongate. Wheat was harvested on August 7th. Wheat yield, regardless of treatment rate or timing was similar to that in the weed free check. There was also no differences in test weight or seed moisture due to herbicide treatment. Currently, only DPRE and EPOST treatments of Zidua are labelled for use in wheat production. Further research needs to be conducted to verify wheat tolerance to Zidua and to determine appropriate tank-mix partners for weed control.

Treatment		Rate	Timing	Wheat		Test wt	Yield
				May 15	Jun 8	Aug 7	
				injury(%)		lbs/bu	bu/A
1	Zidua	1oz/a	PRE	0a	1bc	58.2a	72.5a
2	BAS 820ABH	1.68fl oz/a	PRE	0a	2abc	58.6a	72.6a
3	Zidua	2oz/a	PRE	0a	3ab	58.8a	66.4a
4	BAS 820ABH	3.13fl oz/a	PRE	0a	4a	58.1a	76.6a
5	Zidua	1oz/a	DPRE	0a	0c	58.4a	72.2a
6	BAS 820ABH	1.68fl oz/a	DPRE	0a	1bc	58.9a	73.8a
7	Zidua	2oz/a	DPRE	0a	1bc	59.0a	74.3a
8	BAS 820ABH	3.13fl oz/a	DPRE	0a	4a	58.0a	71.1a
9	Zidua	1oz/a	EPOST	0a	0c	58.8a	73.9a
10	BAS 820ABH	1.68fl oz/a	EPOST	0a	0c	58.7a	74.1a
11	Zidua	2oz/a	EPOST	0a	1bc	58.4a	72.6a
12	BAS 820ABH	3.13fl oz/a	EPOST	0a	1bc	59.2a	72.7a
13	Check- Weed Free			0a	0c	59.4a	73.0a
LSD P=.05				NS	2.3	NS	NS
Standard Deviation				0.0	1.6	1.047	4.20
CV				0.0	124.09	1.79	5.77
Treatment F				0.000	3.568	0.662	1.220
Treatment Prob(F)				1.0000	0.0015	0.7747	0.3073

Postemergence options for weed control in Spring Wheat

Caleb Dalley, HREC, Hettinger, ND, 2015

A field trial was conducted to evaluate different postemergence options for weed control in spring wheat. 'Elgin' spring wheat (HRSW) was drilled at 80 lbs/a using a John Deere 1590 no-till drill on April 24, 2015. Starter fertilizer (18-46-0) was applied at planting at a rate of 40 lbs/acre. Wheat emerged on approximately May 5. Granular urea fertilizer was broadcast at 100 lbs/acre on May 16 using a drop spreader. Wheat and weeds were allowed to grow together until time of treatment application. Herbicide treatments were applied using a hand-held backpack spray system at a volume of 10 gal/A on May 28 when wheat was in the 3-4 leaf stage. Wild buckwheat and field bindweed were just beginning to vine at time of application. Wheat was evaluated for injury at 4, 8, 15, and 29 days after treatment (DAT). Mild injury, in the form of slight yellowing, was observed in nearly all herbicide treatments and diminished by the 29 DAT evaluation. Field bindweed was suppressed by all treatments at 8 and 15 DAT and was controlled 88% or more by all treatments except Wolverine at the 29 DAT evaluation. Wild buckwheat was controlled by all treatments containing Varro as well as Huskie Complete, and was suppressed by the Wolverine treatment at 29 DAT. Wheat was harvested on August 7. No differences in yield or test weight were observed at harvest. Weed populations were light in this test and did not lead to significant yield losses

	Treatment	Product rate	—Wheat–		— Field Bindweed —			—Wild Buckwheat—			Test wt	Yield
			Jun 1	Jun 12	Jun 5	Jun 12	Jun 26	Jun 5	Jun 12	Jun 26	Aug 7	Aug 7
			— Injury % —		——————— Control % ———————						–lbs/bu–	–bu/A–
1	UNTREATED		0 d	0 e	0 c	0 c	0 d	0 d	0 d	0 c	60 a	58.6 a
2	VARRO Bronate AMS	6.85 oz/a 1.0 pt/a 0.5 lb/a	7 a	3 ab	70 ab	65 b	94 ab	94 a	96 a	100 a	59 a	58.2 a
3	VARRO Weld Herbicide AMS	6.85 oz/a 1.3 pt/a 0.5 lb/a	6 ab	2 bc	68 b	66 b	88 b	70 c	92 ab	100 a	59 a	58.2 a
4	VARRO Carnivore Herbicide AMS	6.85 oz/a 1.0 pt/a 0.5 lb/a	6 ab	2 cd	70 ab	70 ab	91 ab	89 ab	96 a	99 a	60 a	58.4 a
5	VARRO WideMatch 2,4-D Ester LV6 AMS	6.85 oz/a 1.0 pt/a 0.35 pt/a 0.5 lb/a	7 a	4 a	70 ab	68 ab	96 a	75 c	96 a	100 a	60 a	59.9 a
6	VARRO WideMatch MCPA Ester AMS	6.85 oz/a 1.0 pt/a 0.5 pt/a 0.5 lb/a	5 ab	1 de	70 ab	70 ab	95 a	70 c	93 ab	100 a	59 a	58.4 a
7	VARRO WideMatch Affinity TankMix AMS	6.85 oz/a 1.0 pt/a 0.6 oz/a 0.5 lb/a	5 bc	2 cd	69 ab	75 a	96 a	70 c	84 c	100 a	60 a	58.5 a
8	VARRO OLYMPUS Carnivore Herbicide AMS	6.85 oz/a 0.2 oz/a 1.0 pt/a 0.5 lb/a	5 ab	2 bcd	71 a	71 ab	95 a	91 ab	97 a	100 a	59 a	56.5 a
9	HUSKIE COMPLETE AMS	13.7 oz/a 0.5 lb/a	5 bc	2 bcd	68 b	73 ab	95 a	92 ab	95 a	100 a	59 a	60.4 a
10	WOLVERINE Advanced	27.4 oz/a	3 c	0 e	70 ab	68 ab	65 c	87 b	90 b	71 b	60 a	58.8 a
LSD P=.10			2.1	1.4	3.2	8.5	5.9	5.2	5.5	2.1	0.8	NS
Standard Deviation			1.7	1.2	2.7	7.0	4.9	4.3	4.6	1.7	0.7	2.82
CV			36.54	77.14	4.29	11.26	6.05	5.81	5.43	2.01	1.11	4.81
Treatment F			5.63	3.76	269.68	39.67	149.09	167.36	170.74	1329.2	0.71	0.55
Treatment Prob(F)			0.0002	0.0036	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.6992	0.8243

Wild Oat Control and Safflower Tolerance to Pyroxasulfone

Caleb Dalley, HREC, Hettinger, ND, 2015

A field trial was conducted to evaluate PRE application of pyroxasulfone alone and in tank-mixes for weed control and safflower tolerance. Safflower was planted on May 4th at 25 lbs/A using a John Deere 1590 no-till drill. A broadcast application of glyphosate (Roundup PowerMAX) plus AMS was applied to the entire study to control weeds emerged at time of planting. Preemergence treatments were applied on May 6th using a hand-held spray boom at a spray volume of 10 gallons per acre. Rainfall (0.36 inches) fell on the same day after PRE treatments were applied. Safflower emerged on May 19th. Visual evaluations at 16 and 23 days after application (3 and 10 days after emergence) showed no injury in the way of stand losses, stunting, or discoloration (chlorosis/necrosis) for any of the treatments applied. At 33 days after emergence, visual injury, in the form of stunted growth was observed for some of the treatments containing pyroxasulfone. However, injury was minor and usually less than a 10% reduction in growth. Stand counts taken at 37 days after application verified visual evaluations in regard to stand losses in that there were no significant differences in safflower stand due to herbicide treatment, although numerically the highest rate of pyroxasulfone (120 g ai/A) had the lowest stand counts. Evaluation of wild oat control showed that the higher rates of pyroxasulfone were needed to achieve satisfactory control of this weed. However, weed populations in this trial were very light and were not competitive with safflower. Yield data from safflower harvested on September 8th showed no differences in yield due to herbicide treatment which were all equivalent to the untreated control. This trial showed that while higher rates of pyroxasulfone may result in minor injury, in the form of stunting, that the injury is short lasting and did not reduce safflower yield. Further research on the safety and efficacy of pyroxasulfone in safflower need to be conducted, especially ones dealing with tank-mixes that would provide adequate control of broadleaf weeds, such as wild buckwheat.

Treatment		Rate	Safflower		Wild oat	Safflower	Test wt	Yield
			May 22	Jun 8	Jul 21	Jun 15	Sep 8	Sep 8
			——injury (%) ——		control (%)	stand (no./m^2)	lbs/bu	bu/A
1	Pyroxasulfone	1.24 oz/a	0 a	0 e	33 d	76 a	44 a	2255 a
2	Pyroxasulfone	2.5 oz/a	0 a	4 bcd	60 c	72 a	44 a	2248 a
3	Pyroxasulfone	3.73 oz/a	0 a	6 bc	97 a	70 a	44 a	2439 a
4	Pyroxasulfone	5 oz/a	0 a	10 a	98 a	58 a	44 a	2336 a
5	Prowl H2O	48 oz/a	0 a	0 e	0 e	74 a	44 a	2108 a
6	Dual	26.7 oz/a	0 a	1 de	0 e	81 a	44 a	2204 a
7	Pyroxasulfone Prowl H2O	1.87 oz/a 48 oz/a	0 a	3 cde	68 c	69 a	45 a	2449 a
8	Pyroxasulfone Prowl H2O	3.73 oz/a 48 oz/a	0 a	8 ab	97 a	72 a	44 a	2384 a
9	Pyroxasulfone Dual	1.87 oz/a 26.7 oz/a	0 a	6 bc	95 a	60 a	44 a	2342 a
10	Pyroxasulfone Dual	3.73 oz/a 26.7 oz/a	0 a	11 a	79 b	67 a	44 a	2258 a
11	Pyroxasulfone Dual	3.73 oz/a 13.4 oz/a	0 a	5 bc	100 a	67 a	44 a	2371 a
12	Pyroxasulfone Prowl H2O	3.73 oz/a 24 oz/a	0 a	5 bc	95 a	59 a	44 a	2427 a
13	Untreated		0 a	0 e	0 e	69 a	45 a	2247 a
LSD P=.05			NS	3.7	9.5	NS	NS	NS
Standard Deviation			0.0	2.6	5.6	10.9	0.5	202.28
CV			0.0	58.95	8.9	15.81	1.05	8.75
Treatment F			0.000	7.939	158.219	1.579	2.026	1.028
Treatment Prob(F)			1.0000	0.0001	0.0001	0.1421	0.0529	0.4466

Effects of whole or rolled corn and 20 or 40 percent forage levels on finishing performance of yearling steers

C.L. Engel[1], A. Taylor[1], C.S. Schauer[2], R. Maddock[3] and K.C. Olson[4]

The objective of this project was to evaluate whole and rolled corn in diets for finishing yearling steers with 20 or 40 percent forage as grass hay. Results indicated that corn processing type does not interact with forage level, and feeding dry-rolled corn provides a slight advantage over whole corn because dry-rolled corn tended to have improved feed efficiency. However, whole- and rolled-corn diets produced carcasses with similar characteristics. Diets with 20 percent forage had higher calculated energy values and, as expected, resulted in improved feed efficiency and overall average daily gain (ADG). We found a tendency for yield grade to be lower for 40 percent forage; however, hot carcass weight, marbling score, rib-eye area and backfat were similar across the two forage levels.

Summary

One hundred eight black crossbred yearling steers (917 ± 2.5 pounds body weight) were used to evaluate feeding whole or dry-rolled corn in diets with 20 or 40 percent of the diet dry matter included from grass hay. The four treatments were: 1) 55 percent whole corn with 20 percent grass hay, 2) 55 percent dry-rolled corn with 20 percent grass hay, 3) 35 percent whole corn with 40 percent grass hay or 4) 35 percent dry-rolled corn with 40 percent grass hay. Corn type (whole or dry-rolled) did not influence ($P \geq 0.21$) performance across the two forage levels; therefore, the data are presented as main effects of whole vs. rolled corn and 20 percent vs. 40 percent forage. Weights at the start of the trial were similar ($P = 0.96$) among treatments, and steer body weights were similar ($P \geq 0.47$) for whole and rolled-corn treatments across all five weight periods. Overall average daily gain (ADG) was similar ($P \geq 0.25$) across all weight periods, with the exception of days 28 to 56, when the steers on the rolled-corn treatment gained 4.31 pounds/head/day, compared with those on the whole corn, which had an ADG of 3.56 pounds/head/day ($P = 0.03$). Dry-matter intake (DMI) was similar for whole and rolled corn overall and across all weight periods ($P \geq 0.42$). While the overall feed-to-gain ratio tended ($P = 0.09$) to favor dry-rolled corn (6.93 pounds:1 pound), compared with whole corn (7.35 pounds:1 pound), all the interim periods had similar ($P \geq 0.29$) feed-to-gain ratios with the exception of days 28 to 56, when dry-rolled corn was lower than whole corn (7.13 pounds:1 pound, compared with 9.04 pounds:1 pound; $P = 0.003$). Carcass attributes were similar ($P \geq 0.11$) for whole and rolled corn. Body weight was similar ($P \geq 0.69$) in steers fed the two forage levels at the start and through day 56; however, at each subsequent period from day 56 through market, body weights were greater ($P \leq 0.03$) for 20 percent forage. Average daily gains were greater for the 20 percent forage for the first three periods and overall. While DMI was similar ($P \geq 0.20$) for steers fed 20 and 40 percent forage treatments across all periods, and thus for the whole 141-day feeding period, the feed-to-gain ratio followed a similar pattern as with ADG. The 20 percent forage-fed cattle used less feed to gain a pound of body weight for the first three trial periods and overall, compared with 40 percent forage-fed cattle ($P \leq 0.03$). Carcass attributes, including hot carcass weight, rib-eye area, marbling score, back fat and dressing percent, were similar among 20 and 40 percent forage ($P \geq 0.16$). However, yield grade tended ($P = 0.06$) to be greater for 20 percent forage.

Introduction

Corn included in growing and finishing feedlot diets typically is processed by dry rolling, grinding or steam flaking. Corn processing research trials have had mixed results through the years, with some reporting processed corn increasing digestibility and improving the performance of feedlot cattle and others showing no difference between processed and whole corn.

The topic of how much processing and when to process still is debated among producers and nu-

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tritionists. Forage level and moisture content of dietary ingredients, as well as other unknown factors, may interact with the processing level and contribute to the variability in animal response. Our objective was to evaluate effects on animal performance and carcass characteristics from feeding whole or rolled corn in finishing diets with 20 or 40 percent of the diet dry matter inclusion from grass hay.

Experimental Procedures

All procedures were approved by the NDSU Animal Care and Use Committee. One hundred eight black crossbred yearling steers (917 ± 2.5 pounds body weight) were used to evaluate feeding whole or dry-rolled corn in diets with 20 or 40 percent of the diet dry matter included from grass hay.

Steers were assigned randomly to one of 12 pens (nine animals/pen) at the NDSU Carrington Research Extension Center. Each pen was assigned randomly to one of four treatments: 1) 55 percent whole corn with 20 percent grass hay, 2) 55 percent dry-rolled corn with 20 percent grass hay, 3) 35 percent whole corn with 40 percent grass hay or 4) 35 percent dry-rolled corn with 40 percent grass hay (Table 1).

Diets were formulated to be similar in crude protein and meet or exceed the National Research Council (NRC) recommendations. Modified corn distillers grain was included in each treatment diet at a set level of 25 percent. All diets included a supplement containing an ionophore, vitamins and minerals.

Each corn type was analyzed for particle size following the procedures of Behnke (1985) at a commercial laboratory using a Tyler Ro-Tap Shaker Model RX-29 and 14 Sieves [4, 6, 8, 12, 16, 20 (with brush), 30 (with brush), 40 (with brush), 50 (with brush), 70 (with brush), 100 (with brush and ball), 140 (with brush), 200 (with brush and ball) and 270 screens plus bottom pan and cover lid]. Mean particle size for the whole and dry-rolled corn was 5,516 ± 1.15 millimeters (mm) and 2,824 ± 1.45 mm, respectively.

Steers were weighed and implanted with 120 milligrams (mg) trembelone acetate and 24 mg estradiol (Revalor S; Merck Animal Health) at the start of the trial (day 0). Steers were weighed approximately every 28 days for the 141-day feeding period. One steer died in the first 28 days from complications not related to treatment, and one steer on the 55 percent rolled corn/20 percent forage treatment died one month prior to harvest from complications due to bloat.

All cattle were harvested on the same date at Tyson Fresh Meats, Dakota City, Neb. Hot carcass weights were obtained at harvest. The following carcass attributes were evaluated by a trained grader after a 24-hour chill: 12th rib-fat depth; rib- eye area; kidney, pelvic, and heart fat (KPH); marbling score; and U.S. Department of Agriculture yield grade. Performance and carcass characteristics were analyzed using the GLM procedure of SAS (SAS Inst. Inc., Cary, N.C.) and pen was the experimental unit.

Results and Discussion

During the 141-day feeding period, corn type (whole or dry-rolled) did not influence ($P \geq 0.21$) performance across the two forage levels, therefore the data is presented as main effects of whole corn vs. rolled corn and 20 percent forage vs. 40 percent forage (Table 2). This also was observed in a study by Turgeon et al., 1983, in which diets with whole, cracked and fine-ground corn were fed with three levels of alfalfa hay (5, 10 and 15 percent) and by Gorocica-Buenfil and Loerch (2005), in which two levels of corn silage were fed (18.2 and 5.2 percent) with whole or cracked corn.

This study consisted of five 28-day weight periods during the 141-day feeding trial. Weights at the

Table 1. Formulation and nutrient composition of diets for yearling steers fed whole or dry-rolled corn and 20 or 40 percent grass hay.

Ingredients, Dry-matter Basis	40% Forage Whole Corn	40% Forage Rolled Corn	20% Forage Whole Corn	20% Forage Rolled Corn
Corn, %[1]	32.54	33.48	51.47	52.39
MDGS, %[2]	25.67	25.27	25.65	25.07
Hay, %	39.75	39.15	20.73	20.32
Supplement, %[3]	2.04	2.10	2.20	2.21
Nutrient Composition				
CP, %	14.29	14.07	14.51	14.17
NEg, Mcal/lb.	0.47	0.48	0.56	0.56
DM, %	74.10	73.02	72.91	74.59
Diet concentrate, %	60.25	60.85	79.27	79.68
Diet forage, %	39.75	39.15	20.73	20.32

[1]Mean particle size for the whole and dry-rolled corn was 5,516 ± 1.15 mm and 2,824 ± 1.45 mm, respectively.

[2]Modified corn distillers grains, 52 percent dry matter.

[3]Supplement included vitamins, minerals and an ionophore.

start of the trial were similar (P = 0.96) among treatments, and steer body weights were similar ($P \geq 0.47$) for whole and rolled corn treatments across all five weight periods (Table 2). Similarly, overall average daily gain (ADG) was similar ($P \geq 0.25$) across all weight periods, with the exception of days 28 to 56, when the steers on the rolled corn treatment gained 4.31 pounds/head/day, compared with those on the whole corn, which had an ADG of 3.56 pounds/head/day (P = 0.03).

Similarly, Vance et al. (1972) observed similar ADG when whole or crimped corn was fed. Dry-matter intake was similar for whole and rolled corn overall and across all weight periods ($P \geq 0.42$). While the overall feed-to-gain ratio tended (P = 0.09) to favor dry-rolled corn (6.93:1), compared with whole corn (7.35:1), all the interim periods had similar ($P \geq 0.29$) feed-to-gain ratios with the exception of days 28 to 56, when dry-rolled corn was lower than whole corn (7.13:1 compared with 9.04:1; P = 0.003).

In a summary of published research, Owens et al. (1997) reported feeding diets with whole corn resulted in higher feed efficiencies than dry rolled corn. The greater efficiency for whole-corn diets was attributed to lower dietary forage levels (less than 15 percent), which are typical for feedlot finishing diets. In contrast, in a study with high (18.2 percent) or low (5.2 percent) corn silage inclusion, Gorocica-Buenfil and Loerch (2005) observed

Table 2. Performance of yearling steers fed diets with whole or rolled corn and 20 or 40 percent grass hay.

Variable	Rolled Corn	Whole Corn	20% Forage	40% Forage	SEM	Corn Trt *P*-value	Forage Trt *P*-value	Corn x forage level *P*-value
Experimental unit, pen	6	6	6	6				
Weight, lb		.						
Weight, day 0	920.00	916.17	916.83	919.33	2.49	0.31	0.50	0.96
Weight, day 28	1,085.50	1,079.17	1,092.83	1,071.83	7.86	0.58	0.10	0.69
Weight, day 56	1,202.00	1,175.17	1,207.50	1,169.67	10.16	0.10	0.03	0.50
Weight, day 85	1,325.50	1,293.50	1,340.83	1,278.17	12.11	0.10	0.01	0.47
Weight, day 113	1,422.83	1,390.17	1,441.83	1,371.17	14.07	0.14	0.01	0.57
Weight, day 141	1,531.83	1,495.50	1,549.50	1,477.83	18.49	0.20	0.03	0.77
Average daily gain, lb/hd/d								
ADG, days 0-28	5.91	5.82	6.29	5.45	0.30	0.84	0.08	0.69
ADG, days 28-56	4.31	3.56	4.25	3.62	0.21	0.03	0.07	0.51
ADG, days 56-85	4.26	4.08	4.60	3.74	0.13	0.35	0.002	0.60
ADG, days 85-113	3.48	3.45	3.61	3.32	0.29	0.96	0.51	0.91
ADG, days 113-141	3.89	3.76	3.85	3.81	0.22	0.68	0.91	0.68
ADG, days 0-141	4.17	3.94	4.31	3.80	0.13	0.25	0.02	0.76
Dry-matter intake, lb/hd/d								
DMI, days 0-28	26.56	26.86	26.76	26.66	0.58	0.72	0.91	0.68
DMI, days 28-56	30.44	31.68	31.03	31.09	1.04	0.42	0.97	0.21
DMI, days 56-85	28.57	28.96	28.79	28.75	1.29	0.84	0.98	0.22
DMI, days 85-113	28.39	27.82	27.57	28.63	1.07	0.72	0.50	0.48
DMI, days 113-141	30.98	29.89	29.07	31.80	1.36	0.59	0.20	0.40
DMI, days 0-141	28.77	28.82	28.43	29.16	0.96	0.97	0.60	0.56
Feed:Gain, lb:lb								
Feed:Gain, days 0-28	4.54	4.67	4.30	4.92	0.16	0.60	0.03	0.68
Feed:gain, days 28-56	7.13	9.04	7.46	8.70	0.33	0.003	0.03	0.42
Feed:gain, days 56-85	6.77	7.19	6.28	7.68	0.26	0.29	0.01	0.20
Feed:gain, days 85-113	8.19	8.58	7.74	9.03	0.85	0.76	0.31	0.54
Feed:gain, days 113-141	8.01	8.01	7.65	8.38	0.42	1.00	0.25	0.66
Feed:gain, days 0-141	6.93	7.35	6.61	7.67	0.15	0.09	0.001	0.48

similar feed efficiency for cattle fed whole or cracked corn. In both of these reports, the dietary forage levels were less than both of the forage levels fed in the current study.

All carcass attributes were similar between whole- and rolled-corn diets ($P \geq 0.11$; Table 3).

Body weight was similar ($P \geq 0.69$) in steers fed the two forage levels at the start and through day 56; however, at each subsequent period from day 56 through market, body weights were greater ($P \leq 0.03$) for 20 percent forage. Average daily gains were greater for the 20 percent forage for the first three periods and overall (days 0 to 141; Table 2).

While DMI was similar ($P \geq 0.20$) for steers fed 20 and 40 percent forage treatments across all periods and thus for the whole 141-day feeding period, the feed-to-gain ratio followed a similar pattern as with ADG. The 20 percent forage-fed cattle used less feed to gain a pound of body weight for the first three trial periods and overall, compared with 40 percent forage-fed cattle ($P \leq 0.03$).

Improved dry matter conversions also were observed by Turgeon et al. (1983), but in contrast, they observed a linear increase in dry-matter intake when forage levels increased from 5 to 15 percent of the diet dry matter. Carcass attributes, including hot carcass weight, rib-eye area, marbling score, back fat and dressing percent, were similar among 20 and 40 percent forage ($P \geq 0.16$). However, yield grade tended ($P = 0.06$) to be greater for 20 percent forage.

These results indicate that when feeding forage above 20 percent of the diet dry matter, corn type (whole or rolled) does not interact differently with forage level. Feeding diets with 20 percent forage had higher calculated energy values and, as expected, resulted in improved feed efficiency and overall ADG. However, hot carcass weight and carcass quality grade were similar for the two forage levels.

Feeding dry-rolled corn provides a slight advantage over whole corn, as indicated by improved feed efficiency. However, whole-corn and rolled corn diets produced carcasses with similar carcass characteristics at harvest. When the cost to roll corn exceeds the production benefits or rolling is not available, feeding whole corn is a viable option for finishing yearling steers.

Acknowledgments

The authors thank NDSU Carrington Research Extension Center livestock program technicians Dale Burr, Tim Schroeder and Tyler Ingebretson for their contributions and diligence to this project and the program. We also thank the Hettinger Research Extension Center for providing the cattle and funding for this project.

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Turgeon, O.A., D.R. Brink and R.A. Britton. 1983. Corn particle size mixtures, roughage level and starch utilization in finishing steers diets. J. Anim. Sci. 57:739–749.

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Table 3. Carcass performance of yearling steers fed diets with whole or rolled corn and 20 and 40 percent grass hay.

Variable	Rolled Corn	Whole Corn	20% Forage	40% Forage	SEM	Corn *P*-value	Forage *P*-value	Corn by forage level interaction P-value
Hot carcass weight, lb.	906.99	888.01	908.86	886.15	10.41	0.23	0.16	0.07
Yield grade[1]	3.80	3.71	3.87	3.65	0.07	0.39	0.06	0.17
Rib-eye area, sq. in.	12.31	12.16	12.19	12.27	0.18	0.57	0.78	0.58
Marbling score[2]	457.58	439.80	440.90	456.48	6.89	0.11	0.14	0.85
Back fat, in.	0.52	0.51	0.53	0.50	0.02	0.62	0.33	0.22
KPH, %	1.74	1.78	1.74	1.77	0.02	0.26	0.39	0.14

[1]Yield grade is composite calculation of fat to lean yield in a carcass based on a relationship of hot carcass weight, rib-eye area, fat thickness and KPH; low values = lean carcasses.

[2]USDA quality grades based on scores of 300-399 = select, 400-499 = low choice, 500-599 = average choice, 600-699 = high choice, 700+ = prime.

2015 Presentations, Outreach and Publications

Christopher Schauer, Hettinger REC Director and Animal Scientist

Presentations and Outreach

Beef Cattle Management on Prairie Dog Colonies
SRM Invited Symposium: Rangeland Management on Tribal Lands
February 5, 2015

Rambouillet Ram Test Results.
Ram Test Field Day, Hettinger, ND
March 14, 2015

Sheep Research Update from the NDSU Hettinger Research Extension Center
Western Section ASAS Sheep Symposium
June 24, 2015

Managing Cattle on Prairie Dog Towns
Tribal Beef Field Day
August 20, 2015

Animal and Range Science at the Hettinger Research Extension Center: The 3 P's
APHIS Annual meeting
August 25, 2015

NSIP for Sheep Producers
Newell Ram Sale
September 17, 2015

Sheep Nutrition for Beginners
Starter Flock Sheep School, Hettinger, ND
September 19, 2015

Ram Lamb Fertility: Management Techniques and Implications
ND Lamb and Wool Producers Association Sheep Symposium
October 3, 2015

Carcass and Reproductive Ultrasound
BSC Animal Science Lab
November 13, 2015

NDSU Shearing School
Hettinger, ND
November 21-23, 2015

NDSU and ASI Wool Classing School
Hettinger, ND

November 21-23, 2015

Publications

Stackhouse, J.W., **C.S. Schauer**, and B.A. Geaumont. 2015. Use of annual forage crops as a late-season forage for pregnant ewes, insect habitat, and to improve soil health. Sheep & Goat Res J. 30:6-12.

Lekatz, L.A., T.J. Swanson, L.E. Comacho, M.L. Van Emon, **C.S. Schauer**, K.R. Maddock Carlin, C.J. Hammer, and K.A. Vonnahme. 2015. Maternal metabolizable protein restriction during late gestation on uterine and umbilical blood flows and maternal and fetal amino acid concentrations near term in sheep. Anim. Repro. Sci. 158:115-125.

Van Emon, M.L., **C.S. Schauer**, S.R. Eckerman, K.R. Maddock-Carlin, and K.A. Vonnahme. 2015. Supplementing metabolizable protein to ewes during late gestation: II. Effects on ewe lamb performance and reproductive efficiency. J. Anim. Sci. 93:1332-1339.

Crane, A.R., R.R. Redden, M.S. Crouse, J.D. Kirsch, J.E. Held, and **C.S. Schauer.** 2015. Influence of dried distiller's grains with solubles on ram lamb growth and reproductive traits. J. Anim. Sci. Proc. 66:27-31.

C.S. Schauer, C. Clark, and K.C. Olson. 2015. Beef Cattle Management on Prairie Dog Colonies. Soc. Range Manage. Proc. #329.

Engel, C.L., V.L. Anderson, and **C.S. Schauer.** 2015. Effects of corn processing and particle size on beef feedlot cattle performance and carcass traits. J. Anim. Sci. 93(Supp. 2):#352.

Engel, C.L., A. Taylor, and **C.S. Schauer.** 2015. Effects of whole or rolled corn and 20 or 40 percent forage levels on finishing performance of yearling steers. 2015 NDSU Beef Report. AS1775:22-24.

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

Presentations

i. Danzl, M, **B**. **Geaumont**, J. Stackhouse, and E. DeKeyser. 2015. Home Range of Sharp-tailed Grouse on the Grand River National Grasslands in Northwest South Dakota. ND Wildlife Society, Bismarck, ND.

ii. **Geaumont**, **B.A**., A.L. Lipinski, W. Mack, R. Limb, and K.K. Sedivec. 2015. Understanding the Interactions of Prairie Dog and Livestock Herbivory on Passerine Bird Populations. Society For Range Management Annual Conference, Sacramento, CA.

iii. Mack, W., **B. Geaumont**, A. Lipinski, and K. Sedivec. 2015. Cattle, Prairie Dogs, and Birds. Beef Day, Rhame, ND.

iv. Stackhouse, J., K. Sedivec, and **B. Geaumont**. 2015. Use of Home Range estimators to evaluate ring-necked pheasant habitat use at multiple scales. Society for Range Management Annual Conference, Sacramento, CA.

v. **Geaumont, B**. The role of wildlife in land management. 2015. Foreign Contingent Visiting North Dakota. Hettinger, ND.

vi. Mack, W., **B. Geaumont**, T. Hovick, A. Lipinski, R. Limb, and K.K. Sedivec. 2015. Community associations of grassland birds on grazed mixed-grass prairie occupied by black-tailed prairie dogs. Wildlife Society Annual Conference, Winnipeg, Canada.

vii. Graham, D., **B. Geaumont**, J. Stackhouse, and K. Sedivec. 2015. Nest site selection of sharp-tailed grouse: a management indicator species, in northwest South Dakota. Wildlife Society Annual Conference, Winnipeg, Canada.

viii. **Geaumont, B**. 2015. Wildlife of North Dakota. Eco-Ed Days. Bowman, ND.

ix. **Geaumont, B**. 2015. Wetlands of North Dakota. Eco-Ed Days. Hettinger, ND.

x. Geaumont, B. 2015. Prairie dogs as important ecosystem engineers. Field Day: Renewal at Standing Rock. Mahto, SD.

xi. Geaumont, B. 2015. Traps and Trapping. 4H Youth Activity Day. Hettinger School.

Publications

i. Stackhouse, J.W., C.S. Schauer, and **B.A. Geaumont**. 2015. Use of annual forage crops as a late season forage for pregnant ewes, insect habitat and to improve soil health. Sheep and Goat 30:6-12.

ii. **Geaumont, B.A.,** and D. Graham. 2015. Sharp-tailed grouse nest and brood site selection and survival on the Grand River National Grasslands in Northwest South Dakota. Final Report – USDA Forest Service.

John Rickertsen, Hettinger REC Research Agronomist

Presentations and Outreach

Best Management Practices for Winter Wheat Production
Diversity, Dollars & Direction
Dickinson, ND
January 5, 2015

New Varieties Update
West River Breeders, Reeder, ND
January 21, 2015

New Varieties and Research Update
Hettinger County Crop Imp. Asso., Regent, ND
February 4, 2015

New Varieties and Research Update
Taylor Farm Institute, Taylor, ND
February 4, 2015

New Varieties and Research Update
Grant County Ag Day, Elgin, ND
February 12, 2015

Booth & Poster
Area 4 SCD Winter Workshop
March 2, 2015

Diversity in No-till Crop Rotations
Watershed Coordinator Meeting, Bismarck, ND
April 1, 2015

Spring Wheat Varieties
Hettinger REC Crop Tour, Hettinger, ND
July 7, 2015

Small Grain Varieties
Bowman County Crop Tour, Scranton, ND
July 13, 2015

Small Grain Varieties
Hettinger County Crop Tour, Regent, ND
July 28, 2015

Small Grain Varieties
Grant County Crop Tour, Regent, ND
July 30, 2015
New Varieties and Research Updates

32nd Western Dakota Crops Day, Hettinger, ND
December 18, 2014

Publications

Forster, Shana, Joel Ransom and John Rickertsen. Source and Placement of Fertilizer Affects Cadmium Accumulation in Durum Wheat Cultivars. 2015 ASA-CSSA-SSSA Annual Meeting.

North Dakota Alternative Crop Variety Trial Results for 2014. January 2015. NDSU Extension Service circular A1105-15.

2014 Research Results, Area 4 SCD Cooperative Research Farm & USDA-NGPRL. Spring Wheat, Durum Wheat and Barley Variety Performance Results. In Proc. March 2, 2015.

North Dakota Hard Winter Wheat Variety Trial Results for 2015. October 2015. NDSU Extension Service circular A1196-15.

North Dakota Canola Variety Trial Results for 2015 and Selection Guide - A1124-15. October 2015. NDSU Extension Service circular A1124-15.

North Dakota Hard Red Spring Wheat Variety Trial Results for 2015. November 2015. NDSU Extension Service circular A574-15.

North Dakota Durum Wheat Variety Trial Results for 2015. November 2015. NDSU Extension Service circular A1067-15.

North Dakota Barley, Oat and Rye Variety Trial Results for 2015. November 2015. NDSU Extension Service circular A1049-15.

North Dakota Dry Pea Variety Trial Results for 2015. November 2015. NDSU Extension Service circular A1469-15.

North Dakota and South Dakota Sunflower Hybrid Trial Results for 2015. December 2015. NDSU Extension Service circular A652-15.

North Dakota Soybean Variety Trial Results for 2015. December 2015. NDSU Extension Service circular A842-15.

North Dakota Corn Hybrid Trial Results for 2015. December 2015. NDSU Extension Service circular A793-15.

North Dakota Dry Bean Variety Trial Results for 2015. December 2015. NDSU Extension Service circular A654-15.

32nd Annual Western Dakota Crops Day Research Report. December 2015. NDSU Hettinger Research Extension Center Ag. Report No. 32.

Caleb Dalley, Hettinger REC Research Weed Scientist

Presentations and Outreach

Weed Control Program in Southwest North Dakota
Wild World of Weeds Workshop
January 20, 2015

Weed Control Update
Hettinger County Crop Improvement Association, Regent, ND
February 4, 2015

Weed Control Update
Taylor Farm Institute, Taylor, ND
February 4, 2015

Weed Control Updates for Southwest North Dakota
Hettinger REC Crop Tour, Hettinger, ND
July 7, 2015

Weed Control Updates and Herbicide Resistance Management
32nd Western Dakota Crops Day, Hettinger, ND
December 17, 2015

Publications

2015 North Dakota Weed Control Guide. January 2015. Richard Zolliger, ed. NDSU Publication W-253.

32nd Annual Western Dakota Crops Day Research Report. December 2015. NDSU Hettinger Research Extension Center Ag. Report No. 32.

2015 Advisory Board Minutes

Advisory Board Meeting
Hettinger Research Extension Center
February 19, 2015

Board members present included Cloe Ehlers, Dennis Sabin, Terry West, Justin Freitag, Jeremy Huether, Matt Neiderman, Kat Weinert, Chuck Christman, Lyle Warner, Duaine Marxen and Tom DeSutter via videoconference with Special guests Tim Faller and Chris Boerboom. Staff present included Chris Scahuer, Ben Geaumont, John Rickertsen, Caleb Dalley and Alison Crane.

The meeting was called to order by Chairman Cole Ehlers at 12:45.

Cole asked for a motion to approve the minutes from the last meeting that were sent in the mail to members, Terry West motioned, Dennis Sabin seconded. The motion was approved, no opposing.

Cole Ehlers asked for a motion to approve the agenda Terry West motioned, Matt Neiderman seconded. The motion was passed, no opposing.

Director's Report- Chris Schauer, handout given

1. Two open positions at last meeting- Caleb Dalley filled the weed scientist position and the weed research technician still needs to be filled
2. Agronomy and Range lab should be completed for this field season

Legislative Session-

Chris Boerboom

1. Governor's budget- House was only going to approve the Governor's recommendations
2. Appropriations committee did not add in any Extension recommendations from the House
3. Cross-over to the Senate in March
4. Budget Section of Senate- Section 7 language for redirecting budget funding – working on changing the language back to what it previously was to give flexibility in filling grant funded positions.

Tim Faller

1. $400,000 to Central Grasslands REC, House took away funding for lab
2. Funds for animal diagnostic lab ($18 million)

Chris Schauer

1. Revolving funding, Livestock Research Technician still funded
2. Additional operating- Governor approved, House approved
3. State Fleet changes- ($0.67/mile + $200/month); $30,000 more in operating to cover the State Fleet bill for the HREC, annually
4. Still pursuing Livestock Extension Specialist
5. Capital improvement – nothing included in the Governor's budget

Lyle Warner

1. Ag research fund
    a. $1 million/year to increase funding of research
    b. Senate proposed taking out of diesel tax, requisitioned by highway department, taking out of tax on new farm equipment
    c. Currently $80,000 in livestock fund

d. Need new funding sources

Infrastructure

1. Summer housing lost, looking for rentals

Strategic Plan & Animal Science Report- Chris Schauer, handout given

1. Commented on shearing school, OFDA given to the HREC by ASI

Range & Wildlife Report- Ben Geaumont, handout given

1. Highlighted projects and hiring of technicians
2. Workshops

Agronomy Report- John Rickertsen, handout given

1. Record soybean yield
   -soybean creeping west (soybean council)
2. Spring wheat breeding program becoming more important
3. Plant studies

Weed Science Report- Caleb Dalley

1. Introduction and past research
2. Future research for southwest ND
   -Agronomic crops (small grains, oilseeds, pulse crops)
   -More options for weed control
   -Herbicide resistant weeds
   -Drone use

Strategic Plan - Chris Schauer

Accomplishments 2010-2014

1. Crop Production Research ($65,459)
   - Variety testing and herbicide trials ($289,450)
   - 56 extension publications, five Crop Day Reports, two journal articles
   - Outreach Crop Days (1250 individual producer contacts)
2. Ag Economics- Dan Nudell retired
3. Ag and Wildlife Program (> $725,000 in funding)
   - Position funded July 2011 (Ben)
   - Contracts (non-classical, forest service)
4. Livestock (> $1.65 million/five years)
   - Sheep and Cattle
   - Outreach- schools, Ram Test, Beef Day, etc.
5. 2010-2014 Summary
   - Two new research programs added
   - New facilities
   - Specific Cooperative Agreement (Mandan ARS and SDSU)
   - $2.729 million in Grants
   - 22 journal articles

2015-2019 New Strategic Plan- handout given

Discussion

1. Wade Henderson- contingent on Livestock Specialist, gene mapping on feed effects
    - Bleaux Johnson for information
2. Tim Faller- What's the plan on sharing the strategic plan with NDSU
    - Forward to Administration
    - Present somewhere? SBARE
    - Invite SBARE to field days
3. Wade Henderson- What do Research stations do for field day?
    - focus on 1 or 2 commodities
4. Dennis Sabin- Vomitoxin issues, hot topic to have at field days

Wade Henderson motioned to approve 2015-2019 Strategic Plan, Chuck Christman seconded, motion passed no opposing.

Board Member Elections

Dean Wehri and Dennis Sabin have both served two, three year terms, completing their term. Cole Ehlers has one year left as chair, will be stay on the board to finish his chairmanship. Cole Ehlers asked for a motion to elect two new board members to replace the two leaving.

1. Ashley Sabin- Dennis Sabin moved to nominate Ashley as an Advisory Board member, Wade Henderson seconded

2. Cody Jorgensen- Terry West moved to nominate Cody as an Advisory Board member, Matt Neiderman seconded

Motion to elect Ashley Sabin and Cody Jorgensen were both passed, no opposing.

Cole Ehlers asked for a motion to re-elect Tom DeSutter and Wade Henderson to a second three-year term. Lyle Warner motioned and Matt Neiderman seconded. Motion passed, no opposing.

Meeting Dismissed

Hettinger Research Extension Center
Advisory Board Meeting
July 7, 2015

Board members present Terry West, Jeremy Fordahl, Justin Freitag, Matt Neiderman, Kat Weinert, Duaine Marxen, Ashley Sabin, Cody Jorgenson, Tom DeSutter and Chairman Cole Ehlers. Special guests Tim Faller, Ken Grafton, Chris Boreboom, Gerald Sturn and Mike Beltz, and staff members Chris Schauer, Ben Geaumont, John Rickertsen, Caleb Dalley, Daniel Abe, Alison Crane and Cassie Dick.

The meeting was called to order at 12:40 pm by chairman Cole Ehlers.

Cole Ehlers asked for a motion to approve the minutes from the previous meeting, Terry West motioned to approve, Tom DeSutter seconded. The motion passed, no opposing.

Cole Ehlers then asked for a motion to approve the agenda, Matt Neiderman motioned to approve and Kat Weinert seconded. The motion passed, no opposing.

Chris Scahuer welcomed our new Advisory Board members, explained to them how the board works and thanked them for their continued support. Chris also introduced Daniel Abe a new staff member who works as the weed science technician.

Legislative Update

- Ken Grafton, Director ND Ag Experiment Stations- Great legislative session for the Research Extension Centers, six new positions at the REC's, money for capital improvement projects and land purchase.
- Chris Boreboom, Director NDSU Extension Services- Extension covers many areas, from 4-H, to crops and livestock, to community vitality projects. Extension received funding for a Livestock Area Specialist that will be located at the Hettinger REC; all REC's will now have an area Extension Specialist. The 4-H camp by Watford City is nearing its renovation completion and will be a great asset for 4-H.
- Mike Beltz, SBARE Chair- Explained to our board members and staff how SBARE functions, thanked the Advisory Board members and asked for any input to take back to the SBARE board.

Director's Report- Chris Schauer, handout given

- Hettinger REC was fully staffed as of June 2015. Caleb Dalley and Daniel Abe were hired this past year to complete staffing for the newly created weed science program.
- This new fiscal year as of July 2015 we have two new positions to fill
    1. Livestock Extension Specialist, work with Chris Boreboom to fill position this fall
    2. Livestock Research Technician, fill position this fall
- The new agronomy/range lab is done and looks great.

Animal Science Report- Chris Schauer, handout given

- Presentation given by Alison Crane, Ph.D. student

Range and Wildlife Report- Ben Geaumont, handout given

- Field Day for "Evaluation of the interactions among black-tailed prairie dogs, birds and livestock" project on August 13 at Mahto, SD

Agronomy Report- John Rickertsen

- Wet year, crops are looking good.
- Variety trials for 20+ crops, working on trying to figure out what variety's work in our area.
- Wheat research will continue being important, as corn and beans take over eastern part of the state, more wheat will be produced in this area.
- Rotational root rot disease in peas with the NCREC in Minot.
- Cover crops/winter wheat research with Ben Geaumont in uncertainty plots.
- Mustard and carinata, couple of crops for alternative fuel research.
- Crops Day scheduled for December 17, 2015, asking for suggestions on topics and speakers.

Weed Science Report- Caleb Dalley

- Good first year, working on establishing a new program, and becoming familiar with crops/weeds in our area.
- Pasture and rangeland weeds not just crop weeds.
- Program will also work to establish crop herbicide tolerance.
- Work on developing consistent weed populations for research.
- Caleb asked for suggestions on program establishment.

Strategic Plan

1. Evaluate alternative livestock production systems that increase profitability while maintaining environmental stability.
2. Conduct applied research that investigates the compatibility of agriculture and wildlife.
3. Evaluate weed control methods to increase crop and forage productivity in southwest ND.
4. Enhance dryland crop production while maintaining natural resources.
5. Integration of Livestock, Wildlife, Agronomy and Weeds research programs into a farm-scale interdisciplinary research project.

Open Discussion

- Alfalfa weevils, anything new? Early detection and scouting is key to keeping on top of the weevils.
- There is an interest for an entomologist in the western part of the state, something to bring forward as a need to SBARE for further consideration.
- Wheat issues this year with all the rain.
- Tim Faller noted that the Central Grassland REC also has a similar goal in strategic planning with #5 on the Hettinger REC's list, this could create some unique opportunities for the stations.

The next meeting will be scheduled for winter 2016.
Meeting adjourned.

2015 Personnel

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Christopher Schauer	Director and Animal Scientist
Benjamin Geaumont	Research Assistant Professor/Wildlife and Range Science
John Rickertsen	Associate R/E Center Specialist/Agronomy
Caleb Dalley	Research Weed Scientist
Daniel Graham	Wildlife and Range Technician
Daniel Guimaraes Abe	Weed Science Technician
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/Livestock

Range and Wildlife Graduate Students
Wyatt Mack
Animal Science Graduate Students
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, Derrick Stecher, Devin Faller, Katie Graham, Alix Pearson, Ben Pearson, Skylar Keller, Kelsey DeZalia, Dustin Clark, Jessalyn Bachler and Jacob Lardy.

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