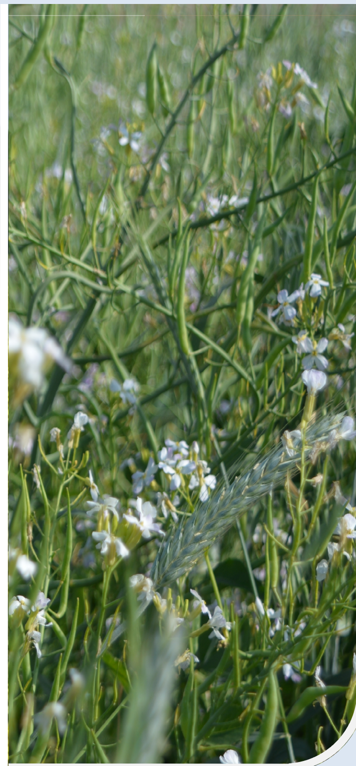
CHINOOK APPLIED RESEARCH ASSOCIATION






2017 Annual Report

CHINOOK APPLIED RESEARCH ASSOCIATION
CARA

Member of ARECA

Chinook Applied Research Association

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Visit our Home Page: www.chinookappliedresearch.ca

Twitter: @CARAresearch

Visit us on Facebook

The Chinook Applied Research Association is driven by farmers and ranchers in east central Alberta to bring innovative and profitable practices to the local agricultural industry. Our program of applied research, demonstration and extension projects provides a link in the transfer of technology between research and the producer. Producers, industry, government and others can access reliable data on crop, livestock and soils that is relevant to the area and its soil and climatic conditions.

We are pleased to make available the 38th edition of our Projects Report. It contains a description and summary of results of projects carried out or monitored by CARA in 2017.

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President's Message

Change is always in the air. In the fall of 2016, the year ended with a lot of damp grain on the ground. 2017 posed a different problem, as we were in a drought and ag producers worried if it would be worth the effort to harvest what little grain grew.

Along with the weather uncertainty, ag producers are aware of changes in agriculture in general. With I-Phones, I-Pads and drones we can gather more information than ever before. The question becomes, what do we with all this data we have collected? Make informed decisions! Farmers and ranchers use this knowledge to increase production without negatively impacting air, water and land quality.

CARA will be able to give ag producers one more tool to increase their efficiency with soil analysis. The soils lab is now on site and just needs a little more tweaking before we are open for business. Opening date target is May 2018.

CARA has a Charitable Status with Revenue Canada so any donations towards this venture can be tax deductible. Many thanks to donations already received.

The CARA Board always appreciates an open and frank discussion with producers. We use these inputs to give CARA the tools to go forward and seek new endeavours for east central Alberta. Thanks to all our donors and sponsors for your support.

Good Research leads the way to Successful Farming.

Gloria Nelson, Chairperson

Manager's Message

2017 was a great testament of the evolution of CARA. What began back in 1979 with a few small scale projects has grown over the years to become a broad based program targeting many aspects of crop and forage production as well as improving agriculture's environmental footprint. Information shared with local producers now includes business management and marketing strategies in addition to production dynamics. CARA's Soil Health Lab Initiative, finally becoming a reality during the past year, is expanding CARA's role and impact within our agricultural community. Developing the ability to measure and monitor soil biological and physical components, the base of all production, will provide information farmers and ranchers across Alberta are requesting.

We were all excited at the arrival of a new WinterSteiger combine which made the 2017 harvest very manageable. The addition of the bright green member of our team has removed some of the stress typically involved with harvest.

I am proud of our staff as they met the demands of an ambitious program this past year. We are very fortunate to have a group of dedicated Technicians and full timer's who take their role with CARA seriously. Their commitment to CARA has resulted in a quality of data that has given various industry players confidence in our work. A number of very successful extension events during the year were more examples of great ideas and staff accomplishments.

I would again like to thank everyone who contributes to our association as nothing would be accomplished without a strong Board of Directors, willing project cooperators, support from our local municipalities, contributions from funders and the many partners we collaborate with. Working with the other applied research and forage associations and specialists from all facets of our industry make what we do possible, both at our local level and also for the entire province. I believe the founding members of CARA would be pleased to see the relationships we have developed and the scope of the program we now carry out.

With regards,

Dianne

2017 Board Members

Gloria Nelson, Veteran (President)

James Madge, Hanna (Vice President)

David Eaton, Sibbald (Past President)

Marvin Molzan, Sibbald (Financial Supervisor)

Ann Rafa, Acadia Valley (ARECA Rep.)

Richard Bailey, Veteran
Nathan Berg, Cessford
Kyle Christianson, Sedalia
Darryl Conners, Hanna
Matthew Gould, Consort
Danny Grudecki, Acadia Valley
John Kimber, Youngstown
Kirby Laughlin, Youngstown
Kevin Letniak, Consort
Landon Olsen, Cereal
Barry Redel, Consort
Walter Suntjens, Hanna

2017 CARA Staff

Manager & Forage Agronomist: *Dianne Westerlund*

Crop & Soil Nutrient Management Specialist: *Dr. Yamily Zavala*

Conservation & Extension Coordinator: *Olivia Sederberg*

Conservation Agronomist & Animal Nutritionist: *Lacey Gould (Part time)*

Office Manager: *Shelley Norris*

Field Technicians: *Jerry Pratt, Karen Raynard*

Summer Technicians: *Laycee Gorgichuk, Danny Rude, Megan Snell & Irene Timm*

2017 Acknowledgements

Completion of CARA's 2017 program was again testament to the tremendous support and partnerships we have with a number of organizations and individuals. There is no doubt that the scope of projects CARA is able to carry out would not happen without our local municipalities, Special Areas 2, 3 and 4 and the Municipal District of Acadia behind us. There are many benefits to the relationships which have developed with Alberta applied research and extension associations and ARECA on projects and extension activities. Contributions from Alberta Agriculture & Forestry and Agriculture Canada specialists have enhanced our work and the information we are able to pass on to our producers. Alberta's commodity commissions have also made important contributions to our program.

A number of Agricultural Societies, agri-businesses, producer and community groups support our trials, demonstrations and events in various ways. Finally, we work with a great group of farmers and ranchers in all aspects of the program and are very proud to be part of the agricultural industry in our community.

Many thanks to all who have contributed to CARA's program by providing funding, donations, inputs, partnering or extension or otherwise have lent a helping hand.


HENDERSON 500


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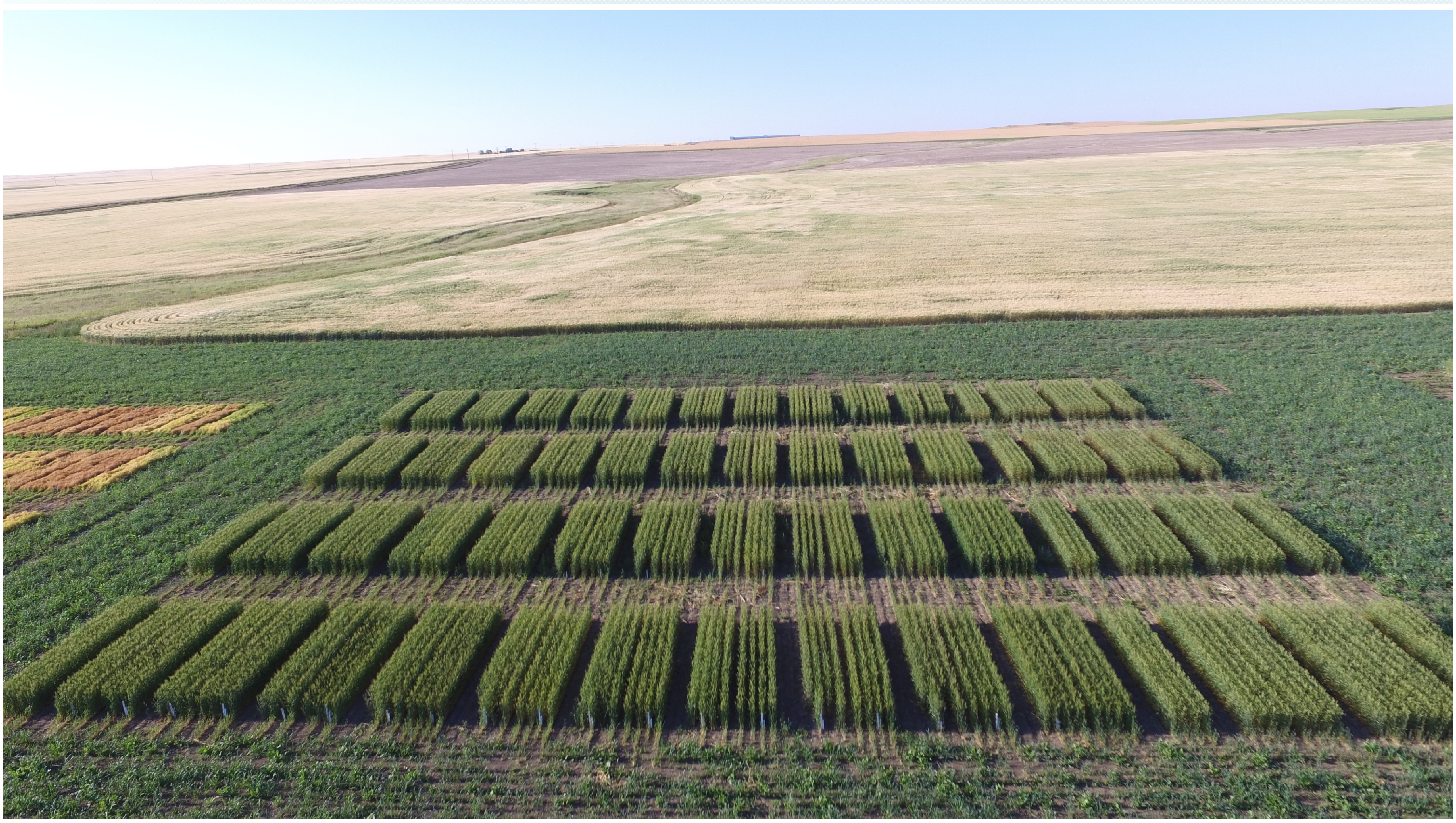
CARA
Physical Indicators
• Aggregation Stability
• Compaction
• Texture
Chemical Indicators

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Crop Trials & Demonstrations



Variety Trials

The following project description applies to all the variety trials. Site differences are noted in the individual reports. Long term data from past years and sites are not included in individual 2017 reports, please review previous year reports.

Purpose: To provide information on the performance of new and established crop varieties when grown under dryland conditions in east-central Alberta.

Project Description:

Fallow or stubble fields selected for the project sites are soil tested to determine soil fertility prior to seeding. In the case of stubble seeding, the plots are seeded directly into standing stubble following a pre-seed burn-off with glyphosate. The plots are seeded with CARA's Henderson 500 drill, with Morris contour openers, through a single belt cone with spinner/splitter in 5 paired rows (separated by 4 inches) on 11 inch spacings. Fertilizer is delivered through a chute between the paired rows. Plots are 1.4 m x 5.0 m laid out in a randomized complete block design with 3 or 4 replications.

CARA uses seeding rates that are based on recommendations for this area: The targeted plant population for cereals is 18 - 24 plants per sq. ft. and for pulses is 4 -12 plants/square foot. The amount of seed required for each plot is calculated using the thousand kernel weight of that particular seed lot, percent germination and estimated seed mortality.

Weed control is obtained by the appropriate use of herbicides and manually when it is required. Performance of the varieties is evaluated periodically throughout the season. At maturity, height measurements are taken and the plots are straight cut with CARA's WinterSteiger plot combine. The samples are air dried, cleaned and weighed for yield determination. Bushel weight and thousand kernel count are then determined. Thanks to the Richardson Pioneer Grain staff in Oyen for grade and protein determination.

A statistical analysis has been carried out on the yields harvested in 2017. Reference to Least Significant Difference (LSD) in the tables indicates the lb/A difference between yields that is significant at a 95% level of confidence. This also means that if two or more varieties have yields that fall within the LSD range, they are not significantly different from each other at a 95% confidence level. The 95% confidence level means that we are 95% certain that the result is not a chance occurrence. A Coefficient of Variance (C.V.) of less than 20 means the data is reliable

More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca. Feel free to call the CARA office with your questions.

Site Precipitation Summary (May – September inches)

	Oyen	Consort	Stanmore	Acadia Valley
1997	5.2	9.3	-	4.9
1998	5.3	3.9	-	5.1
1999	12.2	14.5	-	12.2
2000	3.6	N/A	-	6.8
2001	2.8	N/A	-	3.0
2002	N/A	N/A	-	N/A
2003	N/A	10.0	-	N/A
2004	N/A	15.1	-	N/A
2005	N/A	N/A	-	N/A
2006	N/A	N/A	-	N/A
2007	9.3	N/A	-	N/A
2008	10.6	7.95	-	N/A
2009	7.8	N/A	-	N/A
2010	12.4	N/A	N/A	12.4
2011	8.0	8.0	8.3	8.7
2012	7.6	13.0	14.9	7.0
2013	7.5	9.0	7.1	7.8
2014	7.5	10.0	9.0	8.7
2015	8.6	9.0	7.1	8.7
2016	13.1	13.8	10.8	14.6
2017	5.95	9.05	6.08	6.84

Wheat and Durum Variety Trials

Summary

Wheat variety trials were conducted during 2017 to evaluate the performance of several varieties in east-central Alberta. Varieties of durum, winter wheat, CPSR (Canada Prairie Spring Red), CNHR (Canadian Northern Hard Red), CWRS (Canada Western Red Spring), CWHWS (Canadian Western Hard White Spring) and CWSWS (Canadian Western Soft White Spring), CWSP (Canadian Western Special Purpose) and CWSWS (Canada Western Soft White Spring) wheat were tested at Oyen, Stanmore and Acadia Valley.

Performance of all varieties tested at the Stanmore site was severely affected by moisture conditions during the growing season. On the contrary, same varieties tested at the Acadia Valley site performed very well and some varieties yielded 10 bu/A more than previous years within similar variety groups. These variety trials are part of Alberta's and Saskatchewan's Regional Variety Testing Programs.

More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca. Feel free to call the CARA office with your questions.

Cooperators:		
	Madge Farms, Stanmore	NE 32-30-11-W4
	Vince Grudecki, Acadia Valley	SE 28-24-02-W4
	Donna Scory Estate, Oyen	NE 35-27-04 W4
	Corey Berg, Oyen	SW 30-29-03 W4

Project Description and Precipitation Summary from previous years – see "Variety Trials" report, pages 1 and 2.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis	**Stanmore**	**Acadia Valley**	**Oyen (1)**
Nitrogen* (0-24")	102 lb/A (M)	23 lb/A (D)	19 lb/A (D)
Phosphorus* (0-6")	55 lb/A (O)	10 lb/A (D)	38 lb/A (M)
Potassium* (0-6")	831 lb/A (O)	1200 lb/A (E)	548 lb/A (O)
Sulfate* (0-24")	421 lb/A (E)	20 lb/A (M)	28 lb/A (O)
Soil Salinity* (E.C.)	0.71 (G)	0.56 (G)	0.57 (G)
pH	7.3 (Neutral)	8 (alkaline)	7.6 (alkaline)
OM (%)	3.0 (Normal)	4.3 (normal)	1.7 (very low)
Soil Texture	Clay	Clay	Sandy Loam

* D = Deficient, M = Marginal, O = Optimum, E = Excess,

Table 2 **Precipitation 2017 (inches)**

Month	Acadia Valley	Stanmore	Oyen
May	1.14	1.47	1.05
June	3.72	1.89	2..21
July	1.05	0.98	0.49
Aug	0.79	0.84	1.56
Total	6.70	5.18	5.31

Table 3 **Agronomic Information 2017**

	Acadia Valley	Stanmore	Oyen[1]	Oyen[2]
Previous crops	Field Peas	Chem Fallow	Flax/Canola	Canola
Seeding Date	May 19	May 18	May 22	Sept 21/16
Seeding Depth	1.5-2 inches	1.5-2 inches	1.5-2 inches	1 inch
Seedbed Condition	Good moisture conditions			
Seeding Rate	18 plants per square foot			
Fertilizer* (26-18-5-3)	300 lb/A	100 lb/A	200 lb/A	150 lb/A 31-18-3
Seeder**	Henderson 500 drill			
Seedbed Preparation	Pre-seed glyphosate			
Herbicide	Buctril M + Achieve Liquid Gold + Turbocharge			
Fungicide	None applied			
Harvest Dates:				
Durum	Aug 31	Aug 22	Sept 6	
All wheat	Aug 31	Aug 22		July 26

*placed between paired rows ** 5 paired rows on 11" spacing,
1 Durum site
2 Winter wheat site

Results:

Table 4A **Durum – Acadia Valley 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Congress	3961	66	79	68	41
Brigade	4040	67	83	67	44
CDC Alloy	4067	68	83	67	41
CDC Credence	3946	66	84	66	40
CDC Dynamic	3950	66	80	66	41
DT871	4249	71	80	66	46
Strongfield	3586	60	77	67	43
Transcend	4116	69	82	67	41
Mean	3989	66	81	67	42
LSD (0.05)	NS				
C.V. %					

Comments: Yield of the durum varieties at the Acadia Valley site for 2017 did not show statistically significant differences. Yields averaged 66 bu/A with a range between 60 to 71 bu/A. Bushel weight average was 6 lb above the industry standard (60 lb/bu). It was noticed that during 2016 the variety which has the highest yield was CDC Dynamic but during 2017 it yielded 6 bu/A less.

Table 4B **Durum – Stanmore 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Congress	1586	26	66	60.7	31.0
Brigade	1331	22	56	61.8	34.0
CDC Alloy	1217	20	56	60.1	30.0
CDC Credence	1560	26	59	61.9	31.0
CDC Dynamic	1297	22	51	60.5	32.0
DT871	1358	23	56	60.5	31.0
Strongfield	1228	20	60	60.7	30.0
Transcend	1621	27	62	61.9	34.0
Mean	1400	23	58	61	32
LSD (0.05)	NS				
C.V. %					

Comments: Yields of the durum varieties at Stanmore site did not responded in the same way that the same variety did in Acadia Valley and the reason might be attributed to moisture stress (Table 2) that this site had during the growing season for 2017. All of them yielded at least one third of the yield in Acadia Valley. Varieties averaged 23 bu/A. Bushel weight average was not even half of the industry standard (60 lb/bu).

Table 4C **Sask Durum – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Cabri	1805	30	14	58	65	40
AAC Congress	1847	31	15	59	64	37
AAC Durafield	1763	29	15	56	64	36
AAC Marchwell VB	1885	31	16	56	64	39
AAC Spitfire	1944	32	15	58	63	38
AAC Stronghold	1665	28	15	56	65	39
CDC Alloy	1760	29	15	59	64	38
CDC Carbide VB	1638	27	16	59	64	35
CDC Credence	1746	29	14	60	65	35
CDC Dynamic	1534	26	16	56	64	39
CDC Fortitude	1746	29	15	60	63	35
CDC Precision	1619	27	16	57	65	38
DT587	1533	26	15	58	63	37
DT871	1808	30	16	56	62	41
Strongfield	1583	26	16	56	64	39
Mean	1725	29	15	57	64	38
LSD (0.05)	NS					
C.V. %						

Comments: Yield of the Saskatchewan RVT durum varieties at the Oyen site for 2017 were not statistically significant different with yields ranging from 26 to 32 bu/A and averaging 29 bu/A. It appears moisture (Table 2) availability played a negative role during the growing period, affecting the average yields of those varieties on this site.

Table 5A. **CPSR-CNHR Wheat – Acadia Valley 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Concord	3908	65	12	75	66	34
AAC Crossfield	4159	69	11	72	66	36
AAC Entice	4067	68	11	70	66	37
AAC Penhold	4152	69	10	60	67	38
AC Barrie	3744	62	11	81	67	39
AC Foremost	3732	62	10	61	67	37
BW968	4085	68	11	71	68	36
Carberry	3781	63	12	75	68	36
CDC Terrain	4191	70	10	70	66	33
Elgin ND	3937	66	11	77	66	36
HY2003 VB	4054	68	11	75	66	31
SY Rowyn	4131	69	11	67	67	34
Mean	3995	67	11	71	67	36
LSD (0.05)	NS					
C.V. %						

CPSR: Canadian Prairie Spring Red   CNHR: Canadian Northern Hard Red

Comments: Yields for the CPRS wheat ranged between 62 to 70 bu/A with an average of 67 bu/A. When comparing this year's yield with the 2016 average yield, it was noticed that the average range was only few lb/A less. The overall mean yield was very similar. The protein average was very poor 11%. Bushel weights were all 7 lb above the industry standard of 60 lb.

Table 5B. **CPSR-CNHR Wheat – Stanmore 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Concord	1900	32	16	58	57	28
AAC Crossfield	1948	32	16	63	58	28
AAC Entice	1327	22	17	52	57	26
AAC Penhold	1767	29	16	48	60	28
AC Barrie	1397	23	17	55	59	27
AC Foremost	1788	30	16	51	62	33
BW968	1780	30	16	61	59	27
Carberry	1936	32	15	66	61	29
CDC Terrain	1923	32	15	57	58	28
Elgin ND	2136	36	16	62	58	26
HY2003 VB	1738	29	16	54	57	27
SY Rowyn	1558	26	16	55	58	23
Mean	1766	29	16	57	59	28
LSD (0.05)	NS					
C.V. %						

CPSR: Canadian Prairie Spring Red CNHR: Canadian Northern Hard Red

Comments: Yields for the CPRS-CNHRS wheat in Stanmore did not perform as well as the same varieties tested in Acadia Valley. Their average range was between 22 to 36 bu/A with an overall average of 29 bu/A. There was no statistical significant difference in yield (lb/A) between varieties. The protein average was high at 16%. This high level of protein was due to the N accumulation by the plants which was not used for plant growth or filling the heads (likely due to moisture stress) but was synthetized as protein. Bushel weights of several varieties were below the industry standard of 60 lb/bu. The poor yield of these varieties might be attributed to moisture stress (Table 2) during the growing season of 2017.

Table 6A **CWRS & CWHWS Wheat – Acadia Valley 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Cameron	3888	65	11	86	67	33
AAC Jatharia VB	3672	61	11	89	68	31
AAC Redberry	3785	63	11	79	68	30
AAC Viewfield	4093	68	11	65	68	31
AC Barrie	3705	62	11	81	66	29
BW1011	3904	65	12	77	67	34
BW488	3627	60	11	74	67	29
BW5005	3615	60	11	77	66	30
BW5007	4103	68	11	77	68	31
BW980	3989	66	12	77	68	34
Carberry	3955	66	12	75	68	33
CDC Bradwell	3907	65	11	82	68	38
CDC Go	4012	67	11	74	67	33
CDC Hughes	3765	63	12	75	68	35
CDC Landmark VB	3594	60	13	76	67	32
HW388	3859	64	12	75	68	30
Parata	3581	60	12	82	67	30
PT250	3644	61	12	79	66	32
Stettler	3983	66	12	76	67	32
SY Slate	3860	64	11	81	67	31
Mean	3827	64	12	78	67	32
LSD (0.05)	NS					
C.V. %						

CWRS: Canada Western Red Spring CWHWS (Canadian Western Hard White Spring)

Comments: The **CWRS & CWHWS** wheat varieties for 2017 at Acadia Valley averaged 64 bu/A (22 and 12 bu/A more than 2015 and 2016), ranging from 60 to 68 bu/A. Protein levels averaged 12%which was similar to 2016. The high yield reported during 2017 might be attributed to better soil moisture availability during the growing season.

Table 6B **CWRS & CWHWS Wheat – Stanmore 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Cameron	1853	31	16	59	60	24
AAC Jatharia VB	1281	21	16	61	59	26
AAC Redberry	1535	26	16	67	60	25
AAC Viewfield	1471	25	17	58	59	25
AC Barrie	1176	20	17	60	61	26
BW1011	1643	27	16	59	60	26
BW488	1393	23	16	60	59	25
BW5005	1452	24	15	54	60	24
BW5007	926	15	17	60	59	23
BW980	1455	24	17	53	58	24
Carberry	1184	20	17	57	59	25
CDC Bradwell	1295	22	17	57	59	23
CDC GO	1620	27	17	62	60	25
CDC Hughes	1536	26	17	63	58	24
CDC Landmark VB	1632	27	16	65	60	24
HW388	1385	23	17	54	60	24
Parata	1422	24	18	59	59	24
PT250	1310	22	17	53	59	23
Stettler	1376	23	18	55	60	24
SY Slate	1455	24	16	58	60	27
Mean	1420	24	17	59	59	25
LSD (0.05)	NS					
C.V. %						

CWRS: Canada Western Red Spring CWHWS (Canadian Western Hard White Spring)

Comments: Yields for the **CWRS & CWHWS wheat** at Stanmore did not perform as well as the same varieties tested in Acadia Valley. Their average range was 20 to 31 bu/A with an overall average of 24 bu/A. There was no statistical significant difference in yield (lb/A) between varieties. The protein average was very high with 17%. This high level of protein was due to the N accumulation by the plants which was not used for plant growth or filling the heads (likely due to moisture stress) but was synthetized as protein. Bushel weights of several varieties were below the industry standard of 60 lb/bu. The poor yield of these varieties might be attributed to moisture stress (Table 2) during the growing season of 2017 in this site.

Table 7A **CWSP & CWSWS Wheat – Acadia Valley 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Awesome	3800	63	11	69	64	33
AAC Indus	4036	67	10	72	65	32
AAC Paramount	3990	66	11	70	64	30
AC Andrew	4244	71	11	69	64	28
AC Barrie	2881	48	13	74	65	28
AC Sadash	4025	67	10	70	66	29
Carberry	3156	53	12	68	67	32
KWS Alderon	3696	62	12	54	60	31
KWS Charing	4017	67	10	61	63	34
KWS Sparrow	3725	62	11	61	63	33
Pasteur	3968	66	10	61	66	31
Mean	3776	63	11	66	64	31
LSD (.05)	NS					
C.V. %						

CWSP: Canadian Western Special Purpose CWSWS: Canadian Western Soft White Spring

Comments: The CWGP & CWSWS wheat varieties at Acadia Valley in 2017 averaged 63 lb/A (8 bu/A less than 2016), ranging from 53 to 71 bu/A. The variety yields were not significantly different. The protein average was 11%. Bushel weights were 3 lb/bu above the industry standard of 60 lb/bu.

Table 7B **CWSP & CWSWS Wheat – Stanmore 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Awesome	2536	42	14	65	63	34
AAC Indus	1807	30	14	59	61	28
AAC Paramount	2427	40	14	61	59	27
AC Andrew	2865	48	14	65	61	27
AC Barrie	2302	38	15	65	61	28
AC Sadash	2284	38	14	62	59	26
Carberry	2145	36	16	63	61	27
KWS Alderon	2486	41	14	51	58	31
KWS Charing	1941	32	15	44	62	28
KWS Sparrow	2837	47	14	53	60	31
Pasteur	2420	40	15	53	62	30
Mean	2368	39	14	58	61	29
LSD (.05)	NS					
C.V. %						

CWSP: Canadian Western Special Purpose CWSWS: Canadian Western Soft White Spring

Comments: Yields for the CWSP & CWSWS in Stanmore did not perform as well as the same varieties tested in Acadia Valley. Their average range was between 30 to 47 bu/A with an overall average of 39 bu/A (24 bu/A less grain yield than in Acadia Valley). There was no statistical significant difference in yield (lb/A) between varieties. The average protein content, however, was 14%, higher than at the Acadia Valley site. This high level of protein was due to the N accumulation by the plants which was not used for plant growth or filling the heads (likely due to moisture stress) but was synthetized as protein. Bushel weights were very close to the industry standard of 60 lb/bu. The poor yield of these varieties might be attributed to moisture stress (Table 2) during the growing season of 2017. The average yield of these varieties in this group were at least 10 bu/A higher than the other varieties tested in this site (Tables 4A, 5A and 6A).

Table 8 **Winter Wheat - Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Protein (%)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
RG01	2463	41	9	64	62	33
RG02	1947	32	11	60	65	31
RG03	1741	29	12	56	63	30
RG04	2061	34	10	64	61	33
RG05	2572	43	10	61	62	31
RG06	1689	28	11	65	62	30
RG07	1408	23	12	59	75	28
RG08	2011	34	11	63	63	29
RG09	2193	37	11	60	62	29
RG10	1458	24	10	58	61	31
Mean	1954	33	11	61	64	31
LSD (.05)	NS					
C.V. %						

Comments: The winter wheat varieties at the Oyen averaged 33 bu/A. This is the lowest average yield found in the last three years of winter wheat tested in Oyen. The protein average was 11%, giving an indication that there was a poor uptake of N during the growing season. There was no significant difference in yield (lb/A) between varieties. Bushel weights of several varieties were below the industry standard of 60 lb/bu.

For the summaries data of average yield of all variety tested in east central Alberta, please refer to previous years of the CARA's Annual Reports.

Triticale Variety Trial

Summary

Triticale variety trials were conducted in 2017 to evaluate the performance of these varieties in east-central Alberta. Only two triticale varieties were tested this year. They averaged 80, 61 and 29 bu/A at Acadia Valley, Consort and Stanmore respectively. The average yield at Acadia Valley was very similar to last year. Triticale varieties did not perform well due to drought conditions during the growing season.

More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca. Feel free to call the CARA office with your questions.

Cooperator: Vince Grudecki, Acadia Valley NE 28-24-2-W4

Project Description: Please see “Variety Trials”, page 1.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Stanmore	Acadia Valley	Consort
Nitrogen*	(0-24”)	102 lb/A (M)	23 lb/A (D)	67 lb/A (D)
Phosphorus*	(0-6”)	55 lb/A (O)	10 lb/A (D)	56 lb/A (D)
Potassium*	(0-6”)	831 lb/A (O)	1200 lb/A (E)	1532 lb/A (O)
Sulfate*	(0-24”)	421 lb/A (E)	20 lb/A (M)	37 lb/A (O)
Soil Salinity*	(E.C.)	0.71 (G)	0.56 (G)	0.19 (G)
pH		7.3 (Neutral)	8 (Alkaline)	6 (Alkaline)
OM	(%)	3.0 (Normal)	4.3 (Normal)	4.0 (Normal)
Soil Texture		Clay	Clay	loam

* D = Deficient, M = Marginal, O = Optimum, E = Excess,

Table 2 **Precipitation 2017 (inches)**

Month	Acadia Valley	Stanmore	Consort
May	1.14	1.47	2.48
June	3.72	1.89	1.57
July	1.05	0.98	0.27
Aug	0.79	0.84	2.48
Total	6.70	5.18	6.80

Table 3 **Agronomic Information 2017**

	Acadia Valley	Stanmore	Consort
Previous Crop	Field Peas	Chem Fallow	Canola
Seeding Date	May 19	May 18	May 11
Seeding Depth	1.5-2 inches		
Seedbed Condition	Good moisture conditions		
Seeding Rate	18 plants per square foot		
Fertilizer* (26-18-5-3)	300lb/A	100lb/A	250 lb/A
Seeder**	Henderson 500 drill		
Seedbed Preparation	Pre-seed glyphosate		
Herbicide	Buctril M + Achieve Liquid Gold +Turbocharge		
Fungicide	None applied		
Harvest Dates:	Aug 31	Aug 22	Aug 21

*placed between paired rows ** 5 paired rows on 11" spacing,

Results:

Table 4 **Triticale – Acadia Valley 2017**

Variety	Yield (lb/A)	Yield (bu/A at 52 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Delight	4763	79	83	60	37
Brevis	4859	81	85	63	41
Mean	4811	80	84	61	39
LSD (0.05)	NS				
C.V. %					

Comments: There were no significant differences among the variety yields in the 2017 triticale variety trial at Acadia valley. Mean average for the trial was 80 bu/A, 6 bu/A less than 2016. The average yields of these two triticale varieties were 20 bu/A higher that the Pronghorn long term (7 years) average yield from previous years.

Table 5 **Triticale – Consort 2017**

Variety	Yield (lb/A)	Yield (bu/A at 52 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Delight	3545	59	89	53	43
Brevis	4034	67	82	54	41
Taza	3620	60	86	54	41
Tyndal	3523	59	84	53	43
Mean	3681	61	85	53	42
LSD (0.05)	NS				
C.V. %					

Comments: There were no significant differences among the variety yields in the 2017 triticale variety trial at Consort. Mean average for the trial was 61 bu/A, 19 bu/A less and 31 bu/A more than the same varieties tested in Acadia Valley and Stanmore, respectively (Tables 4 and 6).

Table 6 **Triticale – Stanmore 2017**

Variety	Yield (lb/A)	Yield (bu/A at 52 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Delight	1567	30	60	62	36
BrevisS	1463	28	68	57	30
Mean	1515	29	64	59	33
LSD (0.05)	NS				
C.V. %					

Comments: There were no significant differences among the triticale variety yields at Stanmore. Mean average for the trial was 29 bu/A. Triticale yield for this site was very poor and it could be attributed to the lack of moisture during the growing season at Stanmore.

Fall Rye Variety Trial

Summary

Six varieties of Fall Rye were seeded in September of 2016 to evaluate their performance for the 2017 cropping season in east central Alberta. The six varieties averaged 42 bu/A similar to the reported yield of 40 bu/A in Alberta. Fall rye has been used as a forage and also as agreen cover crop for weed control in organic farming production. In the US it has been used to improve soil health for its soil-holding rooting system, reduction of nitrate leaching, for controlling wind erosion as well as for breaking disease cycles in rotation. With all of these qualities fall rye will play an important role in the cropping system management in the area.

Cooperator: Corey Berg, Oyen SW 30-29-03 W4

Project Description: Please see "Variety Trials", page 1.

Site Information:

Table 1 **Precipitation 2017**

Month	Oyen
May	1.05 inches
June	2..21
July	0.49
Aug	1.56
Total	5.31

Table 2 **Agronomic Information**

Previous crop	Canola
Seeding Date	Sept 21 2016
Seeding Depth	1.5-2 inches
Seedbed Condition	Good moisture conditions
Seeding Rate	18 plants per square foot
Fertilizer* (31-18-3)	150 lb/a
Seeder**	Henderson 500 drill
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Buctril M + Achieve Liquid Gold +Turbocharge
Fungicide	None applied
Harvest Date	July 26

*placed between paired rows ** 5 paired rows on 11" spacing,

Results:

Table 3 **Fall Rye – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 56 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
Bono	3401	61	75	61	28
Brandie	2215	40	89	63	29
Danko	2139	38	91	63	27
Hazlet	2222	40	88	62	32
Helltop	2714	48	86	61	29
Prima	1555	28	96	62	27
Mean	2374	42	87	62	29
LSD (0.05)	207	4			
C.V. %	25				

Comments: There were significant differences in yield among the fall rye varieties in the 2017 trial at Oyen. Mean average for the trial was 42 bu/A. Those varieties with a difference of 4 bu/A between yields were statistically different. Bono has the highest yield average with 61 bu/A, at least 20 bu/A higher than the rest of the varieties, but 20 bu/A lower than 2016. Prima yield average was one-half (28 bu/A) of last year's yield (60 bu/A).

Barley Variety Trials

Summary:
Barley variety trials were conducted in 2017 to evaluate the performance of several varieties and their potential in the brown soil zone as part of the Alberta and Saskatchewan Regional Variety Testing Program. These trials performed very similar in Acadia Valley with an average of 69 bu/A for both set of varieties. Growing season moisture was less in 2017 than in 2016, however, the soil moisture at seeding was very good.

More information on varieties is available in the seed.ab.ca seed guide published by the Alberta Seed Industry Partnership, the www.seed.ab.ca website or the Varieties of Cereal and Oilseed Crops report on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca. Feel free to call the CARA office with your questions.

Cooperators: Vince Grudecki, Acadia Valley SE 28-24-02-W4

Project Description and Precipitation Summary from previous years – see "Variety Trials" report, pages 1 and 2.

Site Information:

Table 1 **Soil Analysis**

Soil Analysis		Acadia Valley
Nitrogen*	(0-24")	23 lb/A (D)
Phosphorus*	(0-6")	10 lb/A (D)
Potassium*	(0-6")	1200 lb/A (E)
Sulfate*	(0-24")	20 lb/A (M)
Soil Salinity*	(E.C.)	0.56 (G)
pH		8 (Alkaline)
OM	(%)	4.3 (Normal)
Soil Texture**		Clay

* D = Deficient, M = Marginal, O = Optimum, E = Excess,

Table 2 **Precipitation 2017**

Month	Acadia Valley
May	1.14 inches
June	3.72
July	1.05
Aug	0.79
Total	6.70 inches

Table 3 **Agronomic Information**

	Acadia Valley
Previous Crop	Field peas
Seeding Date	May 19
Seeding Depth	1.5 – 2.0 inches
Seedbed Condition	Good moisture conditions for germination
Seeding Rate	18 plants per square foot
Fertilizer	300 lb/A of 26-18-5-3 placed between the paired seed rows
Seeder	Henderson 500 drill (5 paired rows on 11" spacing, fertilizer between rows)
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Buctril M, Achieve, Turbocharge
Fungicide	None
Harvest Date	Aug 31

Results:

Table 4. **Two Row Barley – Acadia Valley 2017 (Alberta)**

Variety	**Yield (lb/A)**	**Yield (bu/A at 48 lb/bu)**	**Height (cm)**	**Bushel Weight (lb/bu)**	**TKW (grams)**
AAC Austenson	4329	90	60	54	43
AAC Connect	3967	83	62	53	46
AAC Synergy	4552	95	66	53	46
AC Metcalfe	4458	93	67	54	44
Altorado	4448	93	63	55	47
CDC Ascent	3409	71	61	64	40
CDC Fraser	4266	89	64	52	46
CDC GoldstarR	3943	82	66	52	43
Champion	4853	101	67	55	47
Claymore	4517	94	66	53	43
Lowe	4077	85	67	53	45
Oreana	4352	91	57	53	45
TR13606	4298	90	65	51	42
TR14928	4178	87	60	54	44
Mean	4260	90	64	54	44
LSD (0.05)	611	13			
C.V. %	11				

Comments: The two row barley Alberta variety trial at Acadia Valley averaged 90 bu/A, ranging from 71 to 94 bu/A. Champion was the variety that yielded the most (101 bu/A). These varieties showed similar responses to those varieties tested during 2016. The average yield were significantly different with a least significance difference of 13 bu/A among varieties.

Table 5 **Two Row Barley – Acadia Valley 2017 (Saskatchewan)**

Variety	Yield (lb/A)	Yield (bu/A at 48 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (grams)
AAC Connect	4327	90	66	53	45
AC Metcalfe	4361	91	68	53	45
Altorado	4859	101	66	55	47
Amisk	4029	84	65	52	44
Canmore	3964	83	65	55	47
CDC Ascent	3590	75	63	65	39
CDC Bow	3683	77	69	53	47
CDC Fraser	4470	93	66	52	44
CDC Goldstar	4445	93	65	53	45
CDC PlatinumStar	4195	87	69	53	46
Claymore	4776	100	71	54	45
Lowe	4754	99	71	53	45
Muskwa	4458	93	60	53	39
Oreana	5078	106	60	54	46
Sirish	3847	80	63	56	49
TR10214	4224	88	67	54	48
TR13606	4357	91	65	53	45
Mean	4319	90	66	54	45
LSD (0.05)	679	14			
C.V. %	12				

Comments: The two row barley variety trial for the Saskatchewan set behaved similar to the Alberta variety set. They had a similar average yield with 90 bu/A, ranging from 75 to 106 bu/A. There were statistically significant differences (least significant difference of 14 bu/A among varieties). The variety with the highest yield was Oreana (106 bu/A).

Pulse Variety Trials

Summary:
Three different pulses crops (Peas, Lentils and Fababeans) were evaluated in the brown soil zone of east central Alberta as part of the Alberta Regional Variety Testing Program.

Six green and ten yellow field pea varieties were grown at Consort and Oyen to determine yield. The sites were planted in early May and harvested in Mid-August (Oyen) and late August (Consort). Varieties at the Oyen site were taller but showed to have a lower standability compared with the Consort site. No statistically significant differences among the varieties were found in the two sites. Green peas average yield at Oyen were higher than the Consort site, 51 bu/A compared with 25 bu/A respectively. The same difference in yield was also observed with the yellow peas varieties tested in both sites: average yield of 32 bu/A for Consort and 64 bu/A for Oyen. The highest yield observed was for the yellow peas variety named AAC Carver with 73 bu/A. There was also a huge difference in height of the yellow pea plants at Oyen. They were at least 40 cm higher than the same varieties tested at the Consort site.

Twelve lentil varieties were evaluated in Oyen during 2017. Lentil average yields ranged from 44 to 64 bu/A with an average yield of 57 bu/A. CDC Proclaim CL and CDC KR-1 had the highest yield at 64 bu/A. Even though there was no statistically significant difference among the varieties tested, these yields might be considered high when compared with previous years of lentil varieties tested in this region. Lentils have been receiving a lot of attention lately. It has a lot of potential in the region as a cash crop for international markets and should be considered as part of a crop rotation.

Six fababean varieties were planted in Oyen during 2017. The yields ranged from 25 to 34 bu/A, with an average yield of 29 bu/A. No statistically significant differences among the varieties were found. Fababean has a lot of potential in the region not only as a cash crop for international marketing but also as a benefit in crop rotations.

Long term yield for previous field pea variety trials are not included in this report (for long term reference of this varieties please refer to last year's CARA's report). More information on varieties is available in the variety guide in the seed.ab.ca seed guide or website or on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca.

Cooperators: Barry Redel, Consort NE 11-35-7-W4
Dwayne Smigelski, Oyen SE 16-28-3-W4

Project Description: Please see "Variety Trials", page 1.

Table 1 **Soil Analysis**

Soil Analysis		Consort	Oyen
Nitrogen*	(0-24")	67 lb/A (D)	18 lb/A (D)
Phosphorus*	(0-6")	56 lb/A (D)	29 lb/A (D)
Potassium*	(0-6")	1532 lb/A (O)	633 lb/A (O)
Sulfate*	(0-24")	37 lb/A (O)	35 lb/A (O)
Soil Salinity*	(E.C.)	0.19 (G)	0.22 (G)
pH		6 (Alkaline)	7.2 (N)
OM	(%)	4.0 (Normal)	2.7 (n)
Soil Texture**		Loam	Loam

* D = Deficient, M = Marginal, O = Optimum, E = Excess,

Table 2 **Precipitation 2017 (inches)**

Month	Consort	Oyen
May	2.48	1.05
June	1.57	2..21
July	0.27	0.49
Aug	2.48	1.56
Total	6.8	5.31

Table 3 **Agronomic Information**

	Consort	Oyen
Previous Crop	Canola	Chem Fallow
Seeding Date	May 10	May 11
Seeding Depth	1.5 inches	
Seedbed Condition	Excellent moisture conditions	
Seeding Rate	6 plants per square foot	
Fertilizer (11-52-0)	70 lb/A placed between the paired seed rows	100 lb/A
Seeder	Henderson 500 drill*	
Seedbed Preparation	Pre-seed glyphosate	
Herbicide	Odyssey	
Fungicide	None applied	
Harvest Dates:		
Green Peas	Aug 21	Aug 18
Yellow Peas	Aug 21	Aug 18
Lentil		Aug 24
Fababean		Sept 06

* 5 paired rows on 11" spacing,

Results:

Table 4 **Green Peas – Consort 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Comfort	1456	24	56	64	190	2
AAC Royce	1180	20	52	65	231	3
CDC Forest	1419	24	54	65	208	2
CDC Limerick	1526	25	53	66	191	2
CDC Spruce	1674	28	50	64	211	2
LRP 1424	1630	27	50	64	193	2
Mean	1481	25	52	65	204	2
LSD (0.05)	NS					
C.V. %						

*1 = erect 9 = flat

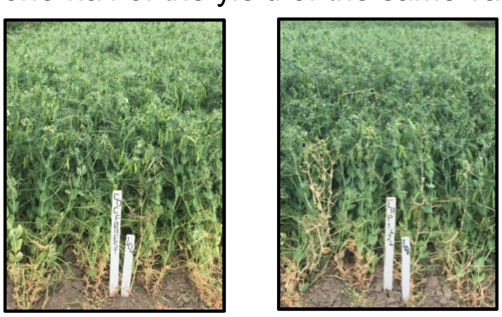
Comments: Green peas yield at Consort during 2017 ranged from 20 to 28 bu/A, with an average yield of 25 bu/A. Yields were half of the average yield recorded in 2016.

Table 5. **Yellow Peas – Consort 2017**

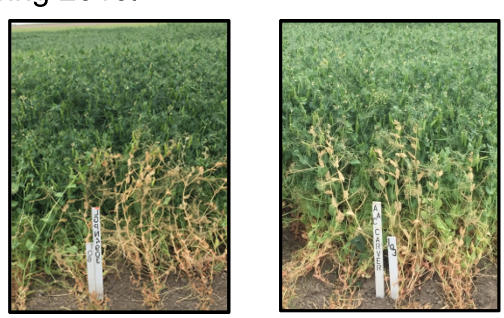
Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Barrhead	1539	26	55	65	185	2
AAC Carver	2286	38	52	64	205	2
AAC Lacombe	2124	35	54	66	241	2
CDC Amarillo	2022	34	51	66	204	3
CDC Athabasca	1977	33	50	65	216	5
CDC Canary	1816	30	47	65	229	3
CDC Meadow	1576	26	53	65	204	3
CDC Spectrum	1661	28	48	65	213	2
LGPN 4903	1790	30	46	65	205	4
P0520-116	2505	42	56	64	203	3
Mean	1930	32	51	65	211	3
LSD (0.05)	NS					
C.V. %						

* 1 = erect 9 = flat

Comments: Yellow peas average yields at Consort ranged from 26 to 42 bu/A, with an average yield of 32 bu/A. The average yellow pea yield at Consort in 2017 yielded only one-half of the yield of the same varieties tested during 2016.



Green peas (52 & 56 bu/A)



Yellow peas (69 & 73 bu/A)

Table 6. **Green Peas – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Comfort	2795	47	85	65	191	6
AAC Royce	3038	51	81	64	183	4
CDC Forest	3111	52	85	65	190	2
CDC Limerick	3019	50	96	65	172	4
CDC Spruce	3055	51	95	65	205	3
LRP 1424	3359	56	93	65	174	4
Mean	3063	51	89	65	186	4
LSD (0.05)	NS					
C.V. %						

*1 = erect 9 = flat

Comments: Green pea varieties at Oyen yielded from 47 to 56 bu/A, with an average yield of 51 bu/A. Yields during 2017 were similar to 2016 yield averages. There was no statistical difference in yield among the green peas varieties. Green peas at Oyen averaged double the yields at the Consort site. Height average was also higher – plants were more than 30 cm taller.

Table 7 **Yellow Peas – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
AAC Barrhead	3894	65	94	66	190	2
AAC Carver	4385	73	100	66	187	3
AAC Lacombe	3856	64	103	66	203	3
CDC Amarillo	3613	60	97	66	197	3
CDC Athabasca	3338	56	94	65	205	2
CDC Canary	3746	62	104	67	200	5
CDC Meadow	3915	65	98	65	158	7
CDC Spectrum	3401	57	95	65	179	2
LGPN 4903	4148	69	105	65	180	5
P0520-116	3961	66	93	63	154	4
Mean	3826	64	98	65	185	4
LSD (0.05)	557	10				
C.V. %	11					

* 1 = erect 9 = flat

Comments: Yellow pea varieties at Oyen averaged from 56 to 73 bu/A, with an overall average yield of 64 bu/A. The highest yield was for AAC Carver with 73 bu/A. There were statistically significant differences on yield among these varieties. Varieties more than 10 bu/A in yield from another were statistically different. CDC meadow was the variety with very poor standability, as it was almost flat with a value of 7. The yellow pea plants at Oyen were more than 40 cm higher than the same varieties tested at the Consort site. Average yield of the yellow pea varieties at Oyen were also higher (double) than the same varieties tested at the Consort site.

Table 8 **Lentil – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
CDC Dazil	3284	55	39	66	31	2
CDC Greenstar	3743	62	43	63	60	4
CDC Impower	2925	49	47	64	63	4
CDC Improve	3750	62	42	64	67	3
CDC Impulse	3267	54	43	65	43	2
CDC Imvincible	3325	55	40	67	30	3
CDC KR-1	3860	64	46	66	49	2
CDC Maxim	3492	58	38	67	35	1
CDC ProClaim CL	3817	64	40	66	37	2
CDC Rosie	2645	44	40	68	30	3
CDC Roxy	3379	56	41	64	27	4
CDC Scarlet	3626	60	37	66	35	1
Mean	3426	57	41	65	42	3
LSD (0.05)	NS					
C.V. %						

* 1 = erect 9 = flat

Comments: Yield of lentil varieties at Oyen ranged from 44 to 64 bu/A, with an overall average of 57 bu/A. CDC Proclaim CL and CDC KR-1 had the highest yield at 64 bu/A. There were no statistical differences among the varieties tested.

Lentils (64 bu/A)

Table 6. **Fababean – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Bushel Weight (lb/bu)	TKW (g)	Standability*
Athena	1602	27	86	67	414	1
Fabella	1871	31	90	67	385	1
Malik	1947	32	84	62	454	1
Rodeo	2030	34	89	66	420	1
Snowbird	1513	25	82	63	347	1
Vertigo	1651	28	98	66	442	1
Mean	1769	29	88	65	410	1
LSD (0.05)	NS					
C.V. %						

*1 = erect 9 = flat

Comments: Fababean average yields at Oyen ranged from 25 to 34 bu/A, with an overall average yield of 29 bu/A.

Fababeans (32 & 34 bu/A)

Flax Variety Trial

Summary:

Eight flax varieties were evaluated in Oyen to determine their performance in the brown soil zone as part of the Alberta Regional Variety Testing Program. The site was planted in late May and harvested in early October. The flax varieties performed very poorly (12 bu/A) during 2017, similar to yields reported in 2015 but four times lower than the 2016 yield (46 bu/A). Drought conditions during the growing season in 2017 affected the performance of the flax trials.

Long term yield for previous field pea variety trials are not included in this report (for long term reference of this varieties please refer to last year CARA's report). More information on varieties is available in the variety guide in the seed.ab.ca seed guide or website or on the Alberta Agriculture and Rural Development website at www.agric.gov.ab.ca.

Cooperator: Donna Scory Estate, Oyen NE 35-27-04 W4

Project Description: Please see "Variety Trials", page 1.

Table 1 **Soil Analysis**

Soil Analysis	Oyen
Nitrogen* (0-24")	19 lb/A (D)
Phosphorus* (0-6")	38 lb/A (M)
Potassium* (0-6")	548 lb/A (O)
Sulfate* (0-24")	28 lb/A (O)
Soil Salinity* (E.C.)	0.57 (G)
pH	7.6 (alkaline)
OM (%)	1.7 (very low)
Soil Texture**	Sandy Loam

* D = Deficient, M = Marginal, O = Optimum, E = Excess,

Table 2 **Precipitation 2017 (inches)**

Month	Oyen
May	1.05
June	2.21
July	0.49
Aug	1.56
Total	5.31

Table 3 **Agronomic Information**

	Oyen
Previous crop	Oats
Seeding Date	May 23
Seeding Depth	1 inch
Seedbed Condition	Excellent moisture conditions
Seeding Rate	6 plants per square foot
Fertilizer (26-18-5-3)	250 lb/A placed between the paired seed rows
Seeder	Henderson 500 drill*
Seedbed Preparation	Pre-seed glyphosate
Herbicide	Odyssey
Fungicide	None applied
Harvest Date:	October 10

* 5 paired rows on 11” spacing,

Results:

Table 4. **Flax – Oyen 2017**

Variety	Yield (lb/A)	Yield (bu/A at 60 lb/bu)	Height (cm)	Standability*
CDC BETHUNE	696	12	47	1
CDC BURYU	697	12	45	1
CDC PLAVA	565	10	42	1
FP2401	894	16	44	1
FP2454	650	12	41	1
FP2513	621	11	45	1
TOPAZ	754	13	43	1
WESTLIN 72	616	11	43	1
Mean	686	12	44	
LSD (0.05)	164	3		
C.V. %	18			

*1 = erect 9 = flat

Comments: Flax average yields at Oyen ranged from 10 to 16 bu/A, with an overall average 12 bu/A. There was a statistically significant difference in average yields among the varieties. Varieties with a difference higher than 3 bu/A were not equal. The average yield for the 2017 was half of the average yield reported for dryland areas.

For the summaries data of average yield of all variety tested in east central Alberta please refer to previous years of the CARA’s Annual Reports.

The Effect of Nitrogen Placement on Yield and Protein Quality in Hard Red Spring Wheat.

Yamily Zavala, Ph.D

This study was funded by the Alberta Wheat Commission (AWC) and the Alberta Crop Industry Development Fund (ACIDF).

Abstract

A research activity was conducted during 2017 to evaluate the effect of rate, timing and source of nitrogen (N) on hard red spring wheat grain yield and protein content on a loam in central eastern Alberta. Treatments were: three basal levels of N based on soil fertility status (0, 40 and 80 lb/A) with urea at sowing, with or without topdressing N (half of recommended N, 25 lb/A) at flag-leaf and anthesis (flowering) stages with two N sources: (urea (broadcast) or urea-ammonium solution (UAN-dribble banded).
Wheat average yields were significantly different statistically. A general trend increase in yield was observed as the level of N increases for both liquid and broadcasted N regardless of the time of application. The highest yield (58 bu/A) was obtained at the recommended rate of N applied at seeding, yielding 24 bu/A more when compared with the control treatment (0 lb N/A). The lower average yields (30 to 32 bu/A) were obtained when liquid N was applied at late growth stages. Even though protein content was affected by N topdressing applications, there was no statistical significant difference among the additional N treatments but there was a difference between some of the treatments and the control. A similar trend was observed in the 2016 Oyen study when N was applied at a late stage of growth. This report also discusses previous years (2015 and 2016) yield and protein responses of N placement in two other locations in Central Eastern Alberta.

Material and Methods

The 2017 evaluation of N placement was located at SE 16-28-4-W4 (Oyen). Hard red spring wheat (c.v. Stettler) was seeded on peas stubbles to evaluate different N (urea) rates applications at seeding and two growth stages. Table 1 shows soil analysis and precipitation for the three years and sites of this study. Wheat was seeded using CARA's Henderson 500 small plot drill.

Table 1 **Soil Analysis and precipitate on 2015, 2016 and 2017**

	2015	**2016**	**2017**		**Precipitation (inches)**		
Soil Analysis	**Oyen**	**Acadia Valley**	**Oyen**	**Month**	**2015**	**2016**	**2017**
Nitrogen*	47 (D)	42 (D)	18 (D)	May	0.6	2.7	1.05
Phosphorus*	25 (D)	12 (D)	29 (D)	June	0.6	2.9	2..21
Potassium*	560 (O)	1200 (E)	633 (O)	July	2.3	6.1	0.49
Sulfate*	549 (E)	169 (E)	35 (O)	Aug	3.6	2.7	1.56
Soil Salinity (dS/m)	0.54 (G)	1.2 (G)	0.22 (G)	**Total**	**7.0**	**14.4**	**5.31**
pH	7.1 (N)	8.3 (A)	7.2 (N)				
OM (%)	1.7 (L)	3.8 (N)	2.7 (N)				
Soil Texture	Sandy Loam	Clay	Loam				

* (lb/A) D = Deficient, M = Marginal, O = Optimum, E = Excess, G =Good, N=Neutral, A= alkaline, N=normal, L= Low Sampling depth (Nitrogen and Sulfur 0-24"), rest of analysis 0-6"

The experiment was laid out in a randomized complete block design with 4 replications (plot area of 1.4 m by 5 m) and 19 treatments. Treatments of N included: three base levels (0, 40, 80 lb N/A as urea) at sowing and topdressing N (40 lb N/A) at flag-leaf and anthesis (flowering) with urea (broadcast) and UAN-dribble banded, respectively. Nitrogen recommended rate 80 lb/A was selected to target 35-40 bu/A based on soil fertility analysis recommendations. The soil had a good moisture condition when the experiment was seeded. All plots were harvested on Sept 28, 2017. A sub-sample of each plot was analyzed for protein quality. Measurement of N-Leaf Index (chlorophyll) was done using the AtLeaf Chlorophyll meter one week after anthesis treatment was applied. All plots were harvested with a Wintersteiger plot combine. Yield and protein data were analyzed for statistical significance by using one-way ANOVA and LSD of the mean by Minitab 17. Basic economics of the various fertility treatments (fertilizer and application costs vs returns/A) were calculated for the three years of the trial (Table 3).

Results and Discussion:

Table 2 shows the mean average for grain yields and protein for the three years and sites of this study.

Table 2. Mean Average Yield and Protein (2015, 2016 and 2017) Affected by Different N Treatments on Hard Red Spring Wheat (Stettler)

	Yield (bu/A)			Protein (%)		
Treatment	**2015**	**2016**	**2017**	**2015**	**2016**	**2017**
Control P-K	43cde	37f	34cdef	15b	13fgh	11g
1/2RN	47abcd	44e	44bc	14b	13gh	13ef
1/2RN + 1/2RN Liquid-FL	**51a**	47de	**52ab**	16ab	14efgh	13def
1/2RN + 1/2RN Liquid-PF	48abcd	47de	**51ab**	16ab	14defg	13cdef
1/2RN + 1/2RN Broadcast-FL	49abc	51cd	46b	16a	15a	13ef
1/2RN + 1/2RN Broadcast-PF	50abc	46de	**54ab**	16a	14cdef	13cdef
1/2RN Liquid-FL	-	34f	31ef	-	14bcdef	12f
1/2RN Liquid-PF	-	27g	30f	-	14efg	13ef
1/2RN Broadcast-FL	-	32fg	**52ab**	-	14abcde	13cdef
1/2RN Broadcast-PF	-	34f	43bcdef	-	14bcde	13def
Rec N Rate	44bcde	**61ab**	**58a**	16a	**15ab**	13ef
RN Liquid-FL	39e	33fg	31ef	17a	13h	13bcdef
RN Liquid-PF	42de	32fg	32def	17a	14efgh	14abc
RN Broadcast-FL	49abc	37f	49ab	17a	15ab	14ab
RN Broadcast-PF	48abcd	35f	49ab	17a	15abc	14ab
RN + 1/2RN Liquid-FL	**53a**	56bc	**53ab**	17a	14efgh	14abcd
RN + 1/2RN Liquid-PF	**50ab**	56bc	43bcd	16a	12i	14a
RN + 1/2RN Broadcast-FL	46abcd	**65a**	**49ab**	17a	**15abc**	14abcd
RN + 1/2RN Broadcast-PF	48abcd	**61ab**	**49ab**	17a	**15ab**	14abc
Trial Average/Year	**47±4**	**44±12**	**45± 9**	**16±0.9**	**14±0.8**	**13±0.8**

Grain Yield and Protein means with different letters are statistically significant different.
RN: recommended N; Broadcast: Urea Granular, Liquid: UAN-dribble, FL:Flag Leaf, PF: Post Flowering

Nitrogen treatments for half and recommended rates as determined by soil analysis were 25, 28 and 40 lb/A in 2015 and 2016 and 50, 56 and 80 lb N/A for 2017. During 2015 no N applications were made for the broadcast and liquid N source for late stage growth to be compared with the control. It was observed that grain yield increases as N rates increases. The highest grain yield reached during 2016 could be attributed to better moisture distribution during the growing season for this year when compared to 2015 and 2017 (Table 1). There were statistically significant differences for each year. The best yield for each year were for **RN + ½ RN Liquid-FL** and **½ RN + ½ RN Liquid-FL, RN + ½ RN Broadcast-FL and Rec N Rate treatments** with 53 and 51 bu/A, 65 bu/A and 58 bu/A for 2015, 2016 and 2017, respectively. The recommended N rate was not statistically different from half and recommended N rate with additional N top dressing at flag leaf growing stage with 61 and 58 bu/A during 2016 and 2017.

The protein levels were in the ranges of 14 to 17 % (2015), 12 to 14 % (2016) and 11 to 14 (2017). Adding additional N at flag leaf and post flowering showed a slight increase on the protein content at the recommended N rate when compared with the rest of the treatments (Table 2).

There was an increase in yield when additional N applications were made at the late stage of the growing season. These trends were more consistent for the broadcast source of N at both flag and flowering stages during 2017 (Figure 1). Late applications of liquid N had a decrease on yield (Figure 2), suggesting that N was needed at the early stage of the growing season especially with the lack of moisture (Table 1).

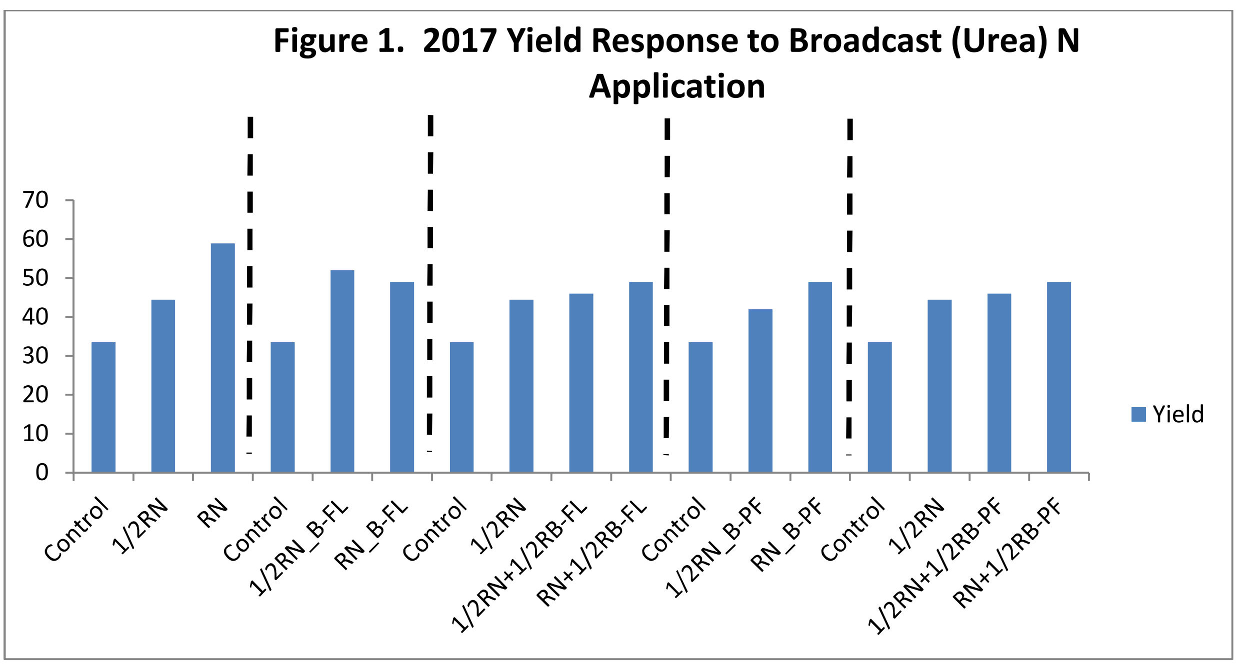
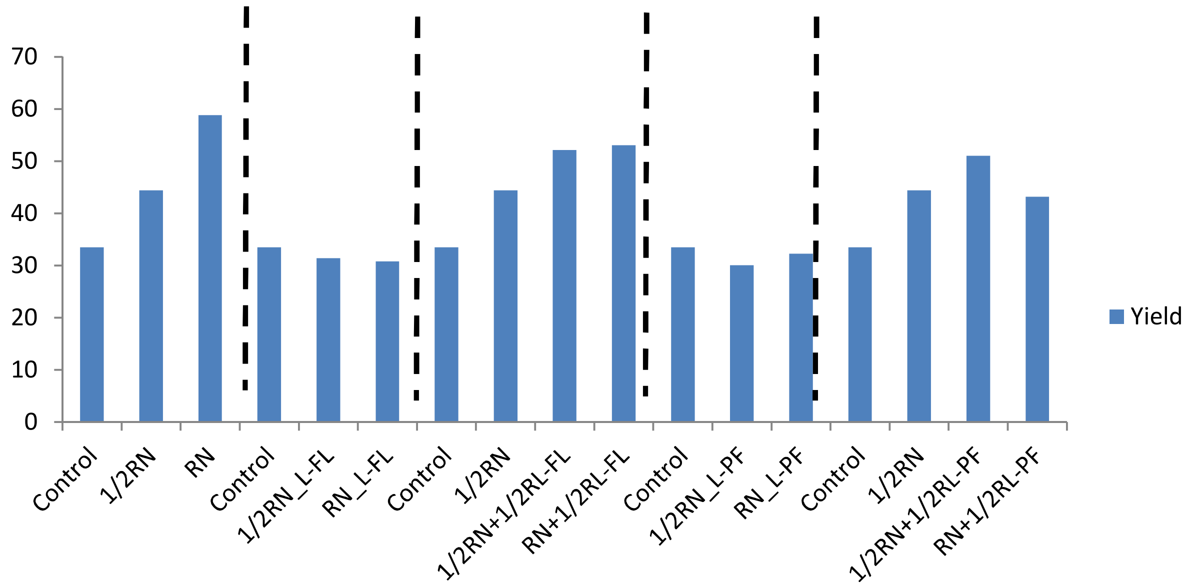
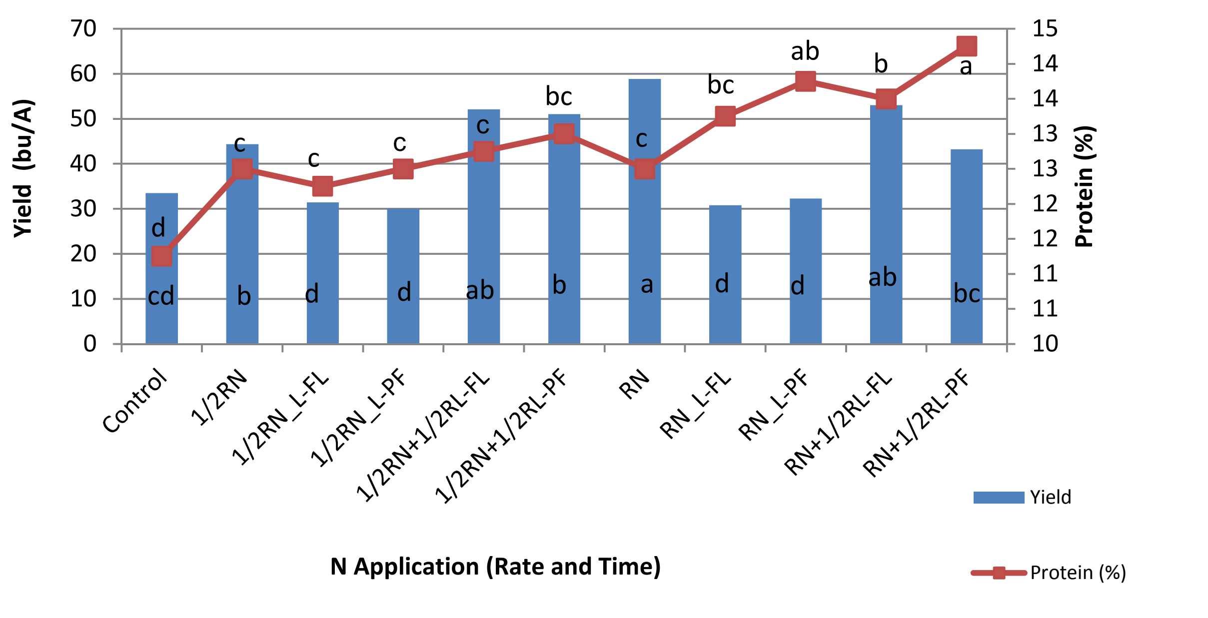


Figure 2. 2017 Yield Response to Liquid (UAN-dribble) N Application



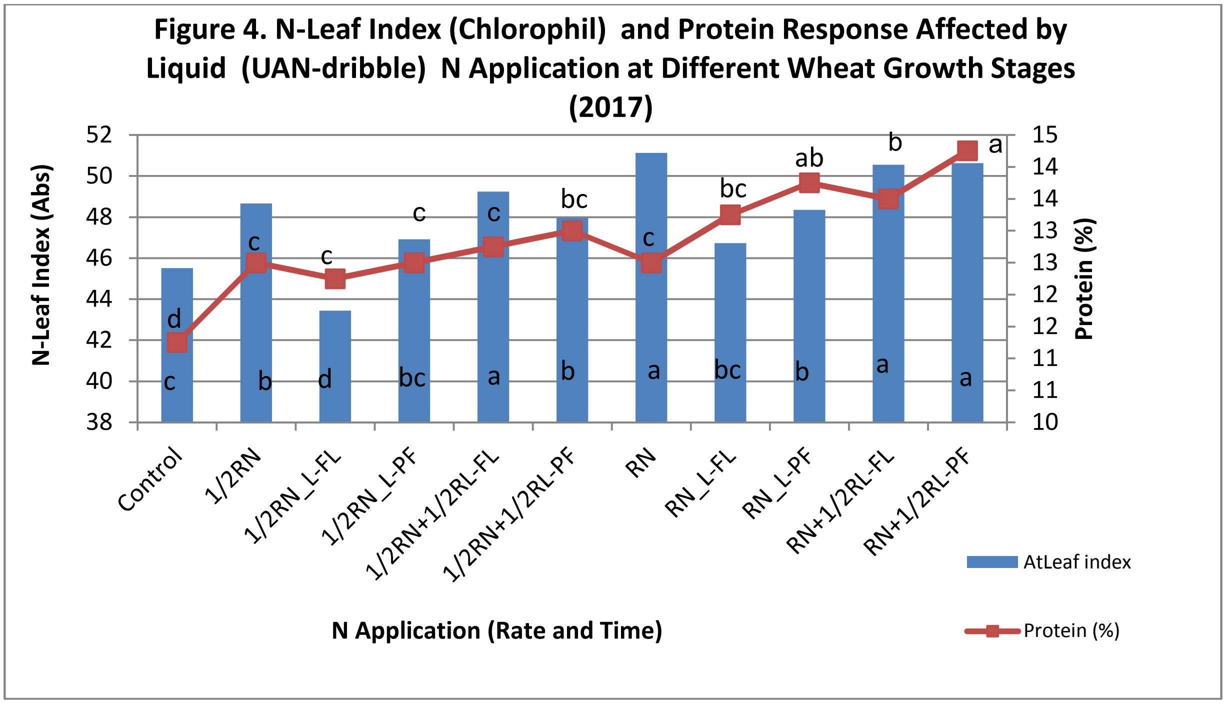
For statistical analysis purposes, data was divided based on N application forms (Granular and Liquid). Comparison of grain yield, protein responses, leaf N index and grain protein content for topdressing UAN are reported in Figure 3 and 4. The same letter indicates that there were no significant differences in yield and protein for those treatments.

Figure 3. Yield and Protein Response Affected by Liquid (UAN-dribble) N Application at Different Wheat Growing Stages (2017)



RN: Recommended N, FL:Flag leaf, PF:Post Flowering

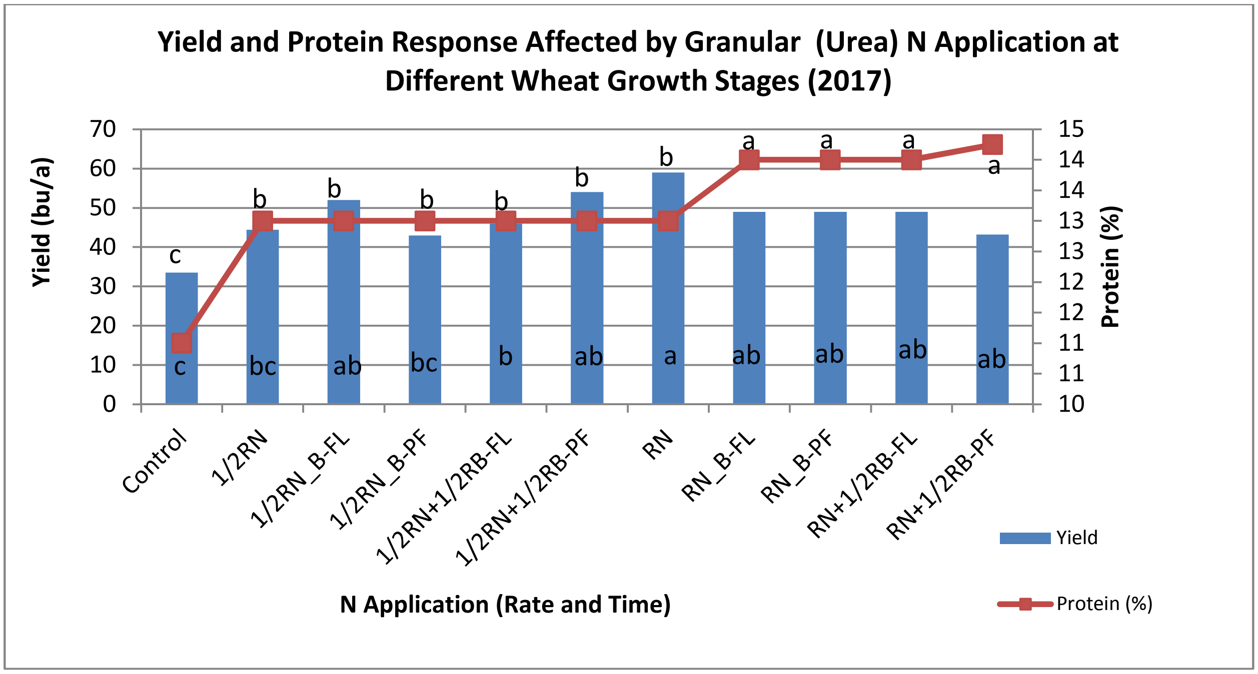
Additional topdressing applications with UAN (dribbled in bands) seemed to have a positive impact on increasing yield when compared with the control but they were not statistically different among themselves. The N recommended rate has the highest yield for 2017 with 58 bu/A.



Abs: Absorbance, RN: Recommended N, FL:Flag leaf, PF:Post Flowering

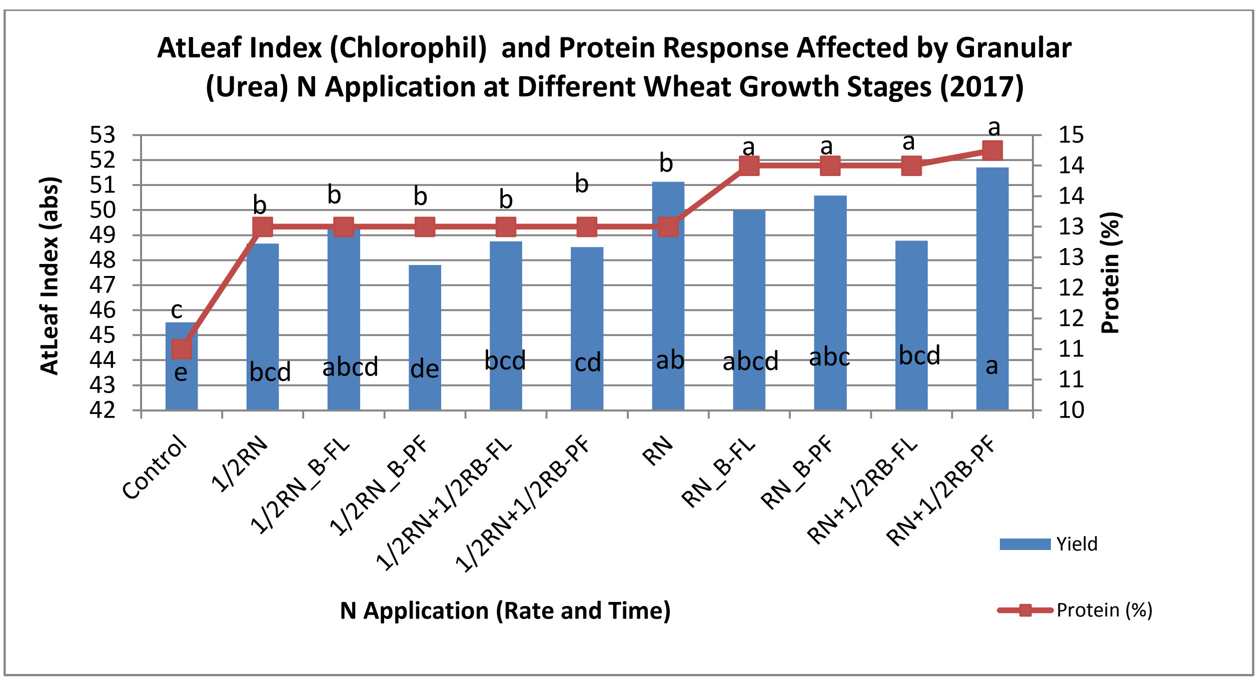
There was a slight increase on N-Leaf Index and grain protein content when N was applied later in the season especially at the post flowering stage. N-Leaf index was high for the recommended N rate applied at seeding but it did not influence protein content in the grain. This poor correlation between N-leaf index and protein could be attributed to the climatic conditions (August) during production, synthesis and translocation of protein to the grain when compared to previous years (Table 1).

Comparison of grain yield, protein responses, leaf N index and grain protein content for topdressing granular Urea are reported in Figure 5 and 6. The same letter indicates that there were no statistically significant differences in yield, protein and N-Leaf Index. There were no statistically significant differences among treatment applications at later growing stages but they were statistical different when compared with the control. No additional granular N increased grain yield or protein level was observed during previous years (Table 2).
`



RN: Recommended N, FL:Flag leaf, PF:Post Flowering

Protein content response with Liquid N presented more variability than banded urea applied at the same time and rates (Figure 3 and Figure 5). A correlation of 0.49 and 0.55 were found between Leaf N Index and protein contents for Liquid and Granular N applications, respectively.



Abs: Absorbance, RN: Recommended N, FL:Flag leaf, PF:Post Flowering

Table 3 **Partial Economic Analysis from Various N Placements 2015 – 2017**

Treatment	2015			2016			2017			Avg Net Return
	Yield (bu/A)	Protein (%)	Net Return	Yield (bu/A)	Protein (%)	Net Return	Yield (bu/A)	Protein (%)	Net Return	
Control P-K	43	15	$273.91	37	13	$224.22	34	11	$179.52	$225.88
1/2RN	47	14	281.13	44	13	253.08	44	13	268.12	267.44
1/2RN+1/2RN L-FL	**51**	**16**	294.37	47	14	253.92	**52**	13	296.72	281.67
1/2RN+1/2RN L-PF	48	16	274.96	47	14	253.92	**51**	13	290.39	273.09
1/2RN + 1/2RN BC-FL	49	16	281.41	51	15	283.64	46	13	261.88	275.64
1/2RN + 1/2RN BC-PF	50	16	287.88	46	14	247.74	**54**	13	312.52	282.71
1/2RN L-FL	-	-		34	14	187.4	31	12	155.59	171.50
1/2RN L-PF	-	-		27	14	144.28	30	13	167.86	156.07
1/2RN BC-FL	-	-		32	14	175.06	**52**	13	307.10	241.08
1/2RN BC-PF	-	-		34	14	187.38	43	13	250.13	218.76
Rec N Rate	44	16	257.56	**61**	**15**	354.74	**58**	13	346.34	319.55
RN L-FL	39	17	220.06	33	13	163.81	31	13	160.06	181.31
RN L-PF	42	17	239.77	32	14	160.95	32	14	168.79	189.84
RN BC-FL	49	17	286.31	37	15	196.00	49	14	284.55	255.62
RN BC-PF	48	17	279.74	35	15	183.48	49	14	284.55	249.26
RN+1/2RN L-FL	**53**	**17**	299.05	56	14	295.80	**53**	14	296.63	297.16
RN+1/2RN L-PF	**50**	**16**	274.34	56	12	290.20	43	14	232.58	265.71
RN+1/2RN BC-FL	46	17	253.04	65	15	357.72	49	14	274.15	294.97
RN+1/2RN BC-PF	48	17	266.18	61	15	332.68	49	14	288.85	295.90

Based on: $226.24/tonne 2015; $222.36/tonne 2016 and $256.17/tonne 2017; protein bonus $.01 per percentage point 2015 & 2016, between $.05 and $.08 per percentage point in 2017; 46-0-0 $550/tonne; Floater truck $8.50/A; High clearance sprayer $7.90/A.

Conclusions:

Data collected during the three years of this study indicates a trend in grain yield and protein content despite variability between years. It also suggested that topdressing N may have the potential for improving grain yield and protein content. Yield and protein content for the Stettler wheat variety increased when additional topdressing N was applied at the flag and/or flowering stage. However, these responses could be related to soil moisture conditions at the time of their applications. The responses found in this evaluation may give farmers the opportunity of making decisions later in the growing season to apply N. Unfortunately, the increased yield and bonus for protein content did not provide higher net return than that from applying the recommended N at seeding. **These preliminary results need to be evaluated further before solid recommendations can be made.** It is suggested this study be continued with additional observations such as monitoring moisture content at the time of topdressing applications, evaluating only topdressing granular N applications with additional N rates and sources such as ammonium sulfate at both flag leaf and post flowering wheat growing stages.

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Forage Trials & Demonstrations

Annual Forage Dry Matter Trial

Background:
This project is part of a provincial initiative developed to evaluate the yield and quality potential of a number of annual crops grown for forage use. 2017 is the ninth year of this project which includes sites at several locations in the province. CARA's site in the Special Areas represents the brown soil zone. Data from the project sites in Alberta is summarized and included in the Alberta Seed Guide (Seed.ab.ca). The Summary tables as they appear in this guide are attached to this report. Many thanks to Alexander Fedko, AAF for distributing seed, summarizing data and preparing the tables.

Objective:
To evaluate the forage potential of various annual crops when grown under dryland conditions.

Cooperators: James Madge, Stanmore NE 20-30-11-W4 (Special Area 2)

Project Description:
Seeder: Henderson 500 plot drill with Morris contour openers
Seeding Rate: 18 plants per square foot for cereals
8 plants per square foot for peas
Previous Crop: Fallow
Seedbed Preparation: Glyphosate was applied prior to seeding
Seeding Depth: 2 - 2 ½ inches
Seeding Date: May 18
Plot Size: 1.4 m by 5 m, replicated 4 times in randomized block design
Fertilizer: 100 lb A 26-18-5-3 on the cereals; 62 lb/A 11-52-0 on pulse mixes
Herbicides: MCPA Sodium
Harvest: The target harvest stage for all crops was soft dough.
Barley and Pulse Mixes – July 27; Oats & Triticale – July 28

Site Information:

Table 1 **Soil Analysis**

Nutrient	Spring 2017
Nitrogen (0-24)	102 lb/A (marginal)
Phosphorus (0-6)	55 lb/A (optimum)
Potassium (0-6)	831 lb/A (optimum)
Sulfate (0-24)	421 lb/A (excess)
Soil Salinity (E.C.)	0.71 (good)
pH	7.3 (neutral)

Table 2 **Precipitation**

Month	Inches
May	1.5
June	1.9
July	1.0
August	0.8
Total	5.18

Note: Of the 2017 precipitation, only one rainfall event resulted in over 1" accumulation which occurred on June. The rest were only .3" or less.

Results:

Table 3 **Summary of Height and Dry Matter Forage Yield at Stanmore**

	2017 Height (cm)	2017 Yield (lb/A)	2017 Yield as % Check	Average Yield as % Check①
Barley (CDC Austenson Check)				
CDC Coalition	54	5626	107	96 (4)
Sundre	61	5654	107	93 (5)
CDC Maverick	74	5561	105	101 (4)
Champion	57	5369	102	108 (3)
CDC Austenson	51	5280	100	100 (6)
CDC Cowboy	65	5162	98	100 (5)
AC Ranger	55	5117	97	114 (3)
CDC Meredith	53	5038	95	103 (3)
Claymore	56	4978	94	100 (2)
Canmore	51	4821	91	103 (3)
Amisk	52	4677	89	100 (3)
Altorado	54	4585	87	93 (2)
Conlon	60	4521	86	88 (3)
Gadsby	52	4465	85	92 (4)
Chigwell				90 (3)
Busby				107 (3)
Ponoka				105 (3)
Seebe				97 (3)
Trochu				94 (3)
Xena				98 (3)
Vivar				89 (3)
Mean		5061		
Triticale & Wheat (Taza Check)				
AAC Chiffon	76	4170	107	99 (7)
Taza	78	3881	100	100 (8)
Sunray	78	3563	92	97 (4)
Tyndal	78	3557	92	123 (8)
Bunker	78	3308	85	99 (7)
AC Ultima				182 (3)
Companion				175 (3)
Pronghorn				145 (3)
Mean		3696		

① 2010 - 2017 data combined

Table 3 *con't* **Summary of Height and Dry Matter Forage Yield at Stanmore**

	2017 Height (cm)	2017 Yield (lb/A)	2017 Yield as % Check	Average Yield as % Check
Oats (CDC Baler Check)				
AC Juniper	69	4098	113	103 (5)
AC Morgan	62	4003	111	97 (7)
CDC Haymaker	63	3893	108	108 (5)
AC Mustang	64	3707	103	99 (7)
CDC S0-1	66	3676	102	90 (5)
CDC Baler	69	3616	100	100 (7)
Murphy	61	3552	98	100 (7)
Waldern	65	3472	96	80 (6)
CDC Seabiscuit	75	3245	90	91 (3)
Derby		-	-	83 (3)
Everleaf		-	-	76 (2)
Foothill		-	-	89 (5)
Jordan		-	-	97 (4)
Mean				
Pulse Mixes (CDC Austenson Check)				
CDC Austenson/ CDC Leroy	50	5781	138	n/a
CDC Baler	77	4629	125	n/a
Taza/CDC Meadow	88	5190	124	n/a
CDC Austenson/ CDC Meadow	53	4901	117	n/a
Taza	75	4605	110	n/a
CDC Baler/ CDC Meadow	78	4240	101	n/a
CDC Austenson	48	4179	100	n/a
CDC Baler/ CDC Leroy	74	3939	94	n/a
Taza/CDC Leroy	82	3681	88	n/a
Mean		4572		

① 2010 - 2017 data combined

Table 4 **Feed Quality Analysis 2017**

	Feed Quality (as % of Check*)							
	Crude Protein	**ADF**	**NDF**	**TDN**	**Ca**	**P**	**K**	**Mg**
Oats								
AC Juniper	80	105	107	97	82	59	97	71
AC Morgan	87	100	99	100	80	76	97	71
CDC Haymaker	93	101	102	99	93	76	100	83
AC Mustang	93	100	102	100	89	82	103	79
CDC S0-1	89	89	107	101	91	53	100	83
Murphy	94	105	109	97	82	71	118	71
Waldern	103	107	107	96	87	65	98	79
CDC Seabiscuit	103	105	100	97	80	76	83	75
***CDC Baler**	**10.08**	**43.69**	**59.37**	**54.87**	**.45**	**.17**	**2.59**	**.24**
Barley								
CDC Coalition	84	101	94	106	109	106	81	95
Sundre	93	109	112	89	97	63	108	89
CDC Maverick	96	94	98	102	119	100	80	105
Champion	100	85	88	93	116	88	103	95
CDC Cowboy	89	83	99	96	113	106	97	105
AC Ranger	106	101	98	97	119	100	103	105
CDC Meredith	100	86	90	99	94	94	85	100
Claymore	95	73	86	93	94	94	86	84
Canmore	108	92	88	106	113	119	96	105
Amisk	94	88	95	101	116	106	105	121
Altorado	94	85	96	100	78	100	74	84
***CDC Austenson**	**10.62**	**38.53**	**53.58**	**63.19**	**.32**	**.16**	**1.82**	**.19**
Triticale								
AAC Chiffon	209	104	106	97	86	86	112	105
Sunray	109	96	92	102	117	100	93	89
Tyndal	107	99	100	100	100	86	92	89
Bunker	93	112	101	93	110	79	72	105
***Taza**	**8.22**	**41.88**	**62.41**	**56.28**	**0.29**	**0.14**	**1.93**	**0.19**

Table 4 *con't* **Feed Quality Analysis 2017**

	Feed Quality (as % of Check*)							
	Crude Protein	**ADF**	**NDF**	**TDN**	**Ca**	**P**	**K**	**Mg**
Pulse Mixes								
CDC Austenson/ CDC Leroy	93	107	104	96	161	69	82	115
CDC Baler	89	119	116	91	104	92	89	100
Taza/CDC Meadow	87	121	116	90	229	69	75	135
CDC Austenson/ CDC Meadow	95	104	103	98	179	92	112	125
Taza	101	124	102	89	104	85	117	105
CDC Baler/ CDC Meadow	96	128	119	87	175	85	104	130
CDC Baler/ CDC Leroy	85	128	115	87	139	62	82	110
Taza/CDC Leroy	84	106	106	97	150	123	116	115
CDC Austenson	**9.34**	**36.58**	**55.61**	**60.4**	**0.28**	**0.13**	**1.75**	**0.20**

Discussion:
Moisture conditions at the site in 2017 were less than half that of 2016 which resulted in lower yield for all varieties. There wasn't a large difference in yields within each crop block except for AAC Chiffon wheat leading the triticale varieties and the CDC Austenson/CDC Leroy combination out-yielding the other entries in the pulse mix block. Due to the variations in yield from year to year, the average yield as a percentage of the check variety is more meaningful for variety selection. AC Ranger and Champion barleys have the yielding average percentage yield (114 and 108% respectively). CDC Haymaker oats is leading the oat varieties at 108% of check over 5 years of trials. Tyndal triticale is 23% above the check over 8 years.

The variability of nutritional components between varieties points to the importance of feed testing when evaluating feed sources. Although adequate for a cow in mid-pregnancy, crude protein levels of some varieties included in the trial would require supplementation for other classes of cattle. Mineral supplementation may also be required with these cereals. With a feed analysis, the Cowbytes ration balancing program can assist in developing a feeding program which will meet requirements for various classes of cattle. Contact the CARA Center (403-664-3777) if you'd like assistance.

Note – the following appears in the spring 2018 Alberta Seed Guide

2017 Regional Silage Variety Trials

An important component of the annual feed supply for Alberta's cattle producers comes in the form of silage, green feed and swath grazing. It could be argued that there is more grain forage than cereal grain fed to take many market animals from conception to plate. Selection of annual crop varieties which produce the highest forage yield and/or nutritional quality becomes increasingly important.

Participating Organizations (2017)

- Battle River Research Group, Forestburg, AB, (780) 582-7308
- Chinook Applied Research Association, Oyen, AB, (403) 664-3777
- Gateway Research Organization, Westlock, AB, (780) 349-4546
- Lakeland Agricultural Research Association, Bonnyville, AB, (780) 826-7260
- Mackenzie Applied Research Association, Fort Vermilion, AB (780) 927-3776
- Peace Country Beef and Forage, Fairview, AB, (780) 836-3354
- Smoky Applied Research and Demonstration Association, Falher, AB, (780) 837-2900

Major Sponsors

- Government of Alberta (Agriculture and Forestry): Alex Fedko, RVT Coordinator; Doug Mccaulay, AOF Coordinator
- A & L Canada Laboratories Inc.
- Davidson Seeds, Degenhardt Farms, Dyck Seed Farm, Kevin Elmy, Fabian Seeds, Lindholm Seed Farm, Mastin Seeds, Solick Seeds, H. Warkentin,

Trial Information

Silage yield and nutritional information was collected by seven applied research associations in 2017 at sites from Oyen in the south to Fort Vermilion in the north. Data from additional sites grown during the past six years has been included in the variety summaries below. Varieties of barley, oats, triticale and peas commonly used for silage, green feed and swath grazing were included in the trial. The cereal trials, (barley, oats & triticale), were seeded at recommended seeding density rates with recommended fertility. The pulse mixture trial looked at increasing the nutritional value of silage, with a potential side benefit of decreasing future nitrogen costs. The pulse mix plots were seeded with 50 pounds of 11-52-0-0. Peas were seeded at 75 percent of their recommended seeding rate and cereals at 50 percent when in mixtures. Growing conditions at the trial sites in 2017 ranged from below average to excessive moisture.

The tables below show a summary of data from 2012 through 2017 as compared to the control variety (**in bold**). Yield of the test varieties are expressed as wet tons/acre (ie. 65% moisture, typical of silage production). Data sets which did not meet minimum quality standards and variance levels were excluded.

Test Yield Categories

The defined range for each Test Yield Category is provided in tons per acre. Variety yields are reported as average yields in Low, Medium and High Test Yield Categories. This allows for comparison with the check when growing conditions, management regimes and/or target yields are anticipated to be of low, medium or high productivity. Caution is advised when interpreting the data with respect to new varieties that have not been fully tested. It should also be noted that the indicated yield levels are those from small plot trials, which can be 15 to 20 per cent higher than yields expected under commercial production. As yield is not the only factor that affects net return, other important agronomic and disease resistance characteristics should also be considered. The genetic yield potential of a variety can be influenced by various management and environmental factors.

Nutritional Analysis

Nutrition was assessed using NIRS for macro-nutrient assessments and wet chemistry for the micro-nutrients. Full nutritional analysis was done on each sample, however, only six nutritional categories are reported: crude protein (CP), total digestible nutrients (TDN) which is an estimation of energy, calcium (Ca), phosphorus (P), potassium (K) and magnesium (Mg).

OATS

Variety	Overall Station Years of Testing	Overall Yield	Area: 2	3	4	5	6	Yield Category: Low < 8.0 (t/ac)	Medium 8.0 - 11.0 (t/ac)	High > 11.0 (t/ac)	Nutritional Data: CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2017 trials (Yield, significant differences and agronomic data only directly comparable to CDC Baler)																
CDC Baler (T/A)		**9.9**	**9.6**	**10**	**8.6**	**11**	**7.9**	**5.9**	**9.9**	**13.3**	**9.5**	**61.4**	**0.3**	**0.2**	**1.8**	**0.2**
CDC Baler	**39**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
AC Juniper	29	93-	96	91	XX	87-	104	103	78-	93	101	101	94	107	103	106
AC Morgan	38	101	105	100	XX	97	114	105	96	101	98	101	100	111	100	97
AC Mustang	39	98	99	97	XX	99	99	99	97	99	101	99	99	103	101	99
CDC Haymaker	34	100	106	100	XX	97	100	105	97	98	98	100	98	101	103	98
CDC Seabiscuit	12	98	XX	XX	XX	96	101	97	96	101	99	100	88	99	95	97
CDC SO-1	39	96-	88	104	XX	95	99	100	93-	95-	102	102	95	103	98	104
Murphy	33	103	104	106	XX	102	103	105	101	103	92	95	94	96	103	98
Waldern	32	103	98	103	XX	100	113	104	107	98	94	99	105	102	95	98
Previously tested varieties (Yield, significant differences and agronomic data only directly comparable to CDC Baler)																
Derby	6	96	XX	XX	XX	XX	XX	XX	XX	XX	89	100	98	99	100	110
Everleaf	5	94	XX	XX	XX	XX	XX	XX	XX	XX	96	98	105	97	110	92
Foothills	21	99	XX	95	XX	99	XX	99	97	102	99	98	103	103	102	100
Jordan	20	100	XX	92	XX	100	XX	103	100	94	97	100	96	105	97	112

BARLEY

Variety	Overall Station Years of Testing	Overall Yield	Area: 2	3	4	5	6	Yield Category: Low < 9.0 (t/ac)	Medium 9.0 - 12.0 (t/ac)	High > 12.0 (t/ac)	Nutritional Data: CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2017 trials (Yield and agronomic data only directly comparable to CDC Austenson)																
CDC Austenson (t/ac)		**10.7**	**9.3**	**12.1**	**11**	**11.6**	**8.6**	**6.8**	**11.4**	**14.8**	**10.3**	**67.2**	**0.3**	**0.2**	**1.4**	**0.2**
CDC Austenson	**41**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Altorado	22	102	XX	XX	XX	105	103	107	98	102	98	99	101	103	100	92
Amisk	29	91-	XX	XX	XX	90-	86-	90-	91-	92-	103	102	130	106	104	108
CDC Coalition	33	94-	XX	XX	XX	88-	101	96	91-	XX	101	100	104	108	105	100
CDC Cowboy	33	101	XX	XX	XX	102	101	102	100	XX	96	99	117	110	108	117
CDC Maverick	35	104	XX	XX	XX	104	107+	106	102	102	96	99	122	108	95	116
CDC Meredith	22	100	XX	XX	XX	98	103	102	99	101	95	98	99	101	102	94
Canmore	22	99	XX	XX	XX	100	99	101	95	101	99	99	118	102	98	102
Champion	22	102	XX	XX	XX	103	104	107	99	102	99	100	103	100	102	99
Claymore	22	100	XX	XX	XX	102	93	100	93	105	93	97	119	97	96	99
Conlon	27	86-	XX	XX	XX	83-	90-	82-	88-	XX	97	102	125	113	97	103
Gadsby	33	99	XX	XX	XX	99	100	101	98	XX	96	100	127	100	96	101
Ranger	19	94-	XX	XX	XX	94-	89-	91-	96	XX	99	99	161	105	122	128
Sundre	33	93-	XX	XX	XX	90-	98	91-	94-	XX	102	100	132	106	112	113

BARLEY

Variety	Overall Station Years of Testing	Overall Yield	Area: 2	3	4	5	6	Yield Category: Low < 9.0 (t/ac)	Medium 9.0 - 12.0 (t/ac)	High > 12.0 (t/ac)	Nutritional Data: CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Previously tested varieties (Yield and agronomic data only directly comparable to CDC Austenson)																
Busby	19	93-	XX	XX	XX	96	XX	87-	97	XX	100	99	128	100	100	103
Chigwell	19	90-	XX	XX	XX	86-	XX	90-	91-	XX	101	99	152	101	105	116
Muskwa	13	90-	XX	XX	XX	86-	XX	89	90-	XX	104	100	167	107	121	127
Ponoka	19	96	XX	XX	XX	96	XX	95	97	XX	97	99	148	103	104	115
Seebe	19	96-	XX	XX	XX	95-	XX	95	98	XX	103	96	136	109	113	103
Trochu	18	88-	XX	XX	XX	91-	XX	82-	92-	XX	99	101	139	107	109	119
Vivar	19	93-	XX	XX	XX	92-	XX	90-	94	XX	103	100	144	99	104	123
Xena	19	95-	XX	XX	XX	92-	XX	95	95	XX	101	99	111	105	102	106

PULSE MIXTURES

Variety	Overall Station Years of Testing	Overall Yield	Area: 2	3	4	5	6	Yield Category: Low < 8.0 (t/ac)	Medium 8.0 - 10.0 (t/ac)	High > 10.0 (t/ac)	Nutritional Data: CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2017 trials (Yield and agronomic data only directly comparable to CDC Austenson)																
CDC Austenson (t/ac)	**9**	**8.4**	**5.3**	**XX**	**XX**	**9.1**	**8.5**	**6.1**	**9.1**	**12**	**10.5**	**66.8**	**0.3**	**0.2**	**1.5**	**0.2**
CDC Austenson	**9**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
CDC Baler	9	106	XX	XX	XX	XX	XX	XX	XX	XX	95	95	106	106	113	115
Taza	9	106	XX	XX	XX	XX	XX	XX	XX	XX	93	95	75	108	101	84
CDC Austenson/CDC LeRoy	4	86	XX	XX	XX	XX	XX	XX	XX	XX	128	97	167	120	116	119
CDC Austenson/CDC Meadow	9	100	XX	XX	XX	XX	XX	XX	XX	XX	116	86	162	110	107	143
CDC Baler/CDC LeRoy	4	87	XX	XX	XX	XX	XX	XX	XX	XX	107	95	135	108	121	109
CDC Baler/CDC Meadow	9	96	XX	XX	XX	XX	XX	XX	XX	XX	107	96	152	106	120	132
Taza/CDC LeRoy	4	95	XX	XX	XX	XX	XX	XX	XX	XX	122	95	183	109	98	120
Taza/CDC Meadow	9	98	XX	XX	XX	XX	XX	XX	XX	XX	106	95	181	105	103	129
Previously tested varieties (Yield and agronomic data only directly comparable to CDC Austenson)																
CDC Austenson/CDC Horizon	5	105	XX	XX	XX	XX	XX	XX	XX	XX	101	97	156	102	111	133
CDC Baler/CDC Horizon	5	101	XX	XX	XX	XX	XX	XX	XX	XX	109	94	173	101	123	145
Taza/CDC Horizon	5	108	XX	XX	XX	XX	XX	XX	XX	XX	116	96	179	106	106	137

PULSE MIXTURES

Variety	Overall Station Years of Testing	Overall Yield	Area: 2	3	4	5	6	Yield Category: Low < 8.0 (t/ac)	Medium 8.0 - 10.0 (t/ac)	High > 10.0 (t/ac)	Nutritional Data: CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2012 - 2014 trials (Yield and agronomic data only directly comparable to Vivar)																
Vivar (t/ac)		**8.6**	**7.9**	**11.2**	**4.4**	**9**	**8**	**5.8**	**9.7**	**10.3**	**9.4**	**63.5**	**0.5**	**0.2**	**1.2**	**0.2**
Vivar	**19**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
Murphy	18	119+	XX	XX	XX	123+	XX	XX	108	125+	88	94	77	99	129	88
Pronghorn	19	111	XX	XX	XX	116	XX	106	105	122	96	101	63	105	103	75
Murphy/40-10	12	105	XX	XX	XX	102	XX	XX	XX	XX	142	98	161	129	117	141
Pronghorn/40-10	12	104	XX	XX	XX	105	XX	XX	XX	XX	125	98	150	115	103	134
Vivar/40-10	12	97	XX	XX	XX	92	XX	XX	XX	XX	140	98	170	107	108	141
Murphy/CDC Horizon	19	112	XX	XX	XX	113	XX	121	97	120+	114	94	130	100	124	114
Pronghorn/CDC Horizon	19	111	XX	XX	XX	111	XX	120	101	112	125	98	143	105	105	106
Vivar/CDC Horizon	19	98	XX	XX	XX	96	XX	103	87-	105	128	97	162	101	107	116
Murphy/CDC Meadow	7	105	XX	XX	XX	XX	XX	XX	XX	XX	104	95	116	101	123	95
Pronghorn/CDC Meadow	7	101	XX	XX	XX	XX	XX	XX	XX	XX	122	99	124	113	105	95
Vivar/CDC Meadow	7	99	XX	XX	XX	XX	XX	XX	XX	XX	115	100	187	89	98	119

TRITICALE

			Area:					Yield Category:			Nutritional Data:					
Variety	Overall Station Years of Testing	Overall Yield	2	3	4	5	6	Low < 10.0 (t/ac)	Medium 10.0 - 12.5 (t/ac)	High > 12.5 (t/ac)	CP (%)	TDN (%)	Ca (%)	P (%)	K (%)	Mg (%)
Varieties tested in the 2017 trials (Yield and agronomic data only directly comparable to Taza)																
Taza (t/ac)		**10.9**	**11**	**12.3**	**8.8**	**11.1**	**9.8**	**7.5**	**11.3**	**14.7**	**9**	**62.7**	**0.2**	**0.2**	**1.4**	**0.1**
Taza	**44**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**
AAC Chiffon	15	104	XX	XX	XX	92-	XX	XX	102	XX	107	100	87	94	109	111
Bunker	36	99	100	XX	XX	99	101	102	98	98	103	99	109	94	95	115
Sunray	37	100	99	99	XX	99	103	100	102	99	104	103	106	102	103	109
Tyndal	43	99	101	103	XX	97-	98	100	99	99	103	101	100	103	96	105
Previously tested varieties (Yield and agronomic data only directly comparable to Taza)																
94I043057	7	100	XX	XX	XX	XX	XX	XX	XX	XX	106	102	91	102	90	108
AAC Innova	8	104	XX	XX	XX	XX	XX	XX	XX	XX	108	100	87	106	109	107
AAC Ryley	8	97	XX	XX	XX	XX	XX	XX	XX	XX	103	100	95	106	89	117
AC Ultima	7	103	XX	XX	XX	XX	XX	XX	XX	XX	110	100	101	93	97	122
Pasteur	8	94	XX	XX	XX	XX	XX	XX	XX	XX	107	103	96	99	107	117
Pronghorn	21	102	XX	XX	XX	99	XX	105	8	XX	103	100	102	99	109	106
Sadash	8	102	XX	XX	XX	XX	XX	XX	XX	XX	99	99	88	91	110	105

Perennial Forage Variety Evaluation

Thanks to the Alberta Beef Producers, the Alberta Livestock Meat Agency and several forage seed companies for supporting this project.

Background:

This project will provide performance information on a number of perennial grass and legume species and varieties. It is part of a provincial initiative with sites in 8 regions of Alberta. Establishment, winter survival and yield are being monitored.

Objective:

To provide unbiased, current and comprehensive regional data regarding the establishment, winter survival, yield and economics of specific species and varieties of perennial forage crops.

To identify perennial crop species/varieties that demonstrate superior establishment, hardiness, forage yield and nutritional quality characteristics in different eco-regions of Alberta.

To assess any benefits from growing mixtures of selected species.

Cooperator: Rude Farms, Sedalia SW 2–31–06–W4

Table 1 **Soil Quality**

Nutrient	Spring 2016
Nitrogen (0-24)	43 lb/A (Deficient)
Phosphorus (0-6)	75 lb/A (Optimum)
Potassium (0-6)	1200 lb/A (Optimum)
Sulfate (0-24)	36 lb/A (Excess)
Soil Salinity (E.C.)	0.39 (Good)
pH	7.8 (Slightly alkaline)

Table 2 **Precipitation (inches)**

Month	2016	2017
May	1.5	1.6
June	3.0	2.3
July	2.4	0.9
August	1.9	1.1
September	1.2	0.6
Total	10.0	6.5

Description:

Seeding Date: June 6, 2016
Seeder: Henderson 500 plot drill with Morris contour openers
Seeding Rates: As listed below
Previous Crop: Canola stubble
Seedbed Preparation: Glyphosate was applied prior to seeding
Seeding Depth: ½ - 1inch
Plot Size: 1.4 m by 5 m, replicated 4 times in randomized block design
Fertilizer: 50 lb/A 26-18-05-03
Herbicide: Basagran
Harvest: No harvest in 2016
July 5, 2017

Table 1 **Varieties Seeded and Seeding Rates:**

	Species	Variety	Seeding Rate (lb/A)
Grasses	Meadow Brome	Fleet	14
	Hybrid Brome	AC Admiral *(low germ)*	18
		AC Knowles	12
		Success	12
	Wheatgrasses		
	Pubescent	Greenleaf	10
	Crested	Kirk	6
	Green Wheatgrass	AC Saltlander	9
	Russian Wildrye	Tom	8
	Fojtan Festulolium		20
	Orchard Grass	Killarney *(low germ)*	10
	Tall Fescue	Courtney	8
	Timothy	Grinstad	4
Legumes	Alfalfa	20-10	8
		44-44	8
		Assalt ST	8
		Dalton	8
		Halo	8
		PV Ultima	8
		Rangelander	8
		Rugged	8
		Spreder 4	8
		Spredor 5	8
		Yellowhead	8
	Sainfoin	AC Mountainview	30
		Nova	30
	Cicer Milk Vetch	Veldt	13
		Oxley 2	13
Mixes	Mix 1	Fleet Meadow Brome	7
		Yellowhead Alfalfa	4
	Mix 2	AC Knowles Hybrid Brome	7
		Yellowhead Alfalfa	4
	Mix 3	Success Meadow Br	7
		Yellowhead Alfalfa	4
	Mix 4	Fleet Meadow Brome	7
		Spredor 5 Alfalfa	4
	Mix 5	AC Knowles Hybrid Brome	7
		Spredor 5 Alfalfa	4
	Mix 6	Success Meadow Brome	7
		Spredor 5 Alfalfa	4
	Mix 7	Fleet Meadow Brome	7
		AC Mountainview Sainfoin	15
	Mix 8	AC Knowles Hybrid Brome	7
		AC Mountainview Sainfoin	15
	Mix 9	Success Meadow Brome	8
		AC Mountainview Sainfoin	15

Table 2 **2017 Perennial Trial Dry Matter Yield at Sedalia**

Grasses		**2017 Yield lb/A**
Meadow Brome	Fleet	4088
Hybrid Brome	AC Admiral	3810
	AC Knowles	4381
	Success	4890
Wheatgrasses		
Pubescent	Greenleaf	5174
Crested	Kirk	3311
Green Wheatgrass	AC Saltlander	3840
Russian Wildrye	Tom	1605
Fojtan Festulolium		573
Orchard Grass	Killarney	902
Tall Fescue	Courtney	1640
Timothy	Grinstad	2022
Legumes		
Alfalfa	Dalton	3748
	20-10	4262
	Halo	3372
	Rangelander	3914
	Rugged	4243
	Spreder 4	3802
	Spredor 5	3552
	Yellowhead	4879
	PV Ultima	3566
	44-44,	3997
Sainfoin	AC Mountainview	2278
	Nova	2654
Cicer Milk Vetch	Oxley 2	2930
	Veldt	2812

Mixes	**% Alfalfa**	**% Grass**	**lb/A**
Fleet Meadow Brome & Yellowhead Alfalfa	28	79	4045
Success Hybrid Brome & Yellowhead Alfalfa	37	63	3995
AC Knowles Meadow Brome & Yellowhead Alfalfa	60	40	4098
Fleet Meadow Brome & Spredor 5 Alfalfa	59	41	3283
Success Hybrid Brome & Spredor 5 Alfalfa	42	58	3866
AC Knowles Meadow Brome & Spredor 5 Alfalfa	57	43	3710
Fleet Meadow Brome & AC Mountainview Sainfoin	23	77	2791
Success Hybrid Brome & AC Mountainview Sainfoin	21	79	3189
AC Knowles Meadow Brome & AC Mountainview Sainfoin	56	44	3396

Table 3 **2017 Perennial Trial Nutritional Qualities at Sedalia**

		CP (%)	TDN (%)	NEM (Mcal/kg)	Ca (%)	P (%)	RFV
Grasses:							
Meadow Brome	Fleet	7.43	54.63	1.30	0.33	0.14	79.39
Hybrid Brome	AC Admiral	7.07	56.94	1.37	0.28	0.13	86.31
	AC Knowles	8.23	58.47	1.41	0.27	0.12	90.37
	Success	7.98	56.59	1.36	0.21	0.12	85.53
Wheatgrasses	Greenleaf Pubsecent	7.72	55.62	1.33	0.21	0.11	81.99
	Kirk Crested	6.80	57.36	1.38	0.20	0.11	89.53
	AC Saltlander Green	7.77	57.83	1.39	0.29	0.11	90.90
Tom Russian Wildrye		8.75	55.15	1.32	0.38	0.11	82.02
Killarney Orchard Grass		9.93	55.19	1.31	0.42	0.20	89.43
Grinstad Timothy		7.67	56.79	1.36	0.28	0.16	86.84
Fojtan Festolium		9.08	56.04	1.34	0.33	0.19	85.35
Courtney Tall Fescue		9.98	56.03	1.34	0.37	0.14	89.63
Legumes							
Alfalfa	20--10	15.73	58.89	1.42	1.65	0.13	108.38
	44-44	16.80	60.04	1.46	1.94	0.15	114.20
	Assalt ST	15.43	58.80	1.42	1.79	0.15	152.77
	Dalton	15.56	59.44	1.44	1.68	0.14	107.32
	Halo	15.73	59.06	1.43	1.58	0.13	105.09
	PV Ultima	15.79	58.98	1.43	2.05	0.14	104.80
	Rangelander	13.35	56.19	1.35	1.27	0.14	92.36
	Rugged	16.60	58.84	1.42	1.79	0.14	108.31
	Spredor 4	15.18	58.07	1.40	1.51	0.13	104.38
	Spredor 5	16.68	60.03	1.45	1.75	0.15	109.95
	Yellowhead	15.47	58.51	74.18	1.37	0.16	102.99
Sainfoin	AC Mountainview	12.96	55.81	1.33	1.08	0.16	94.64
	Nova	13.30	54.20	1.29	0.99	0.18	87.95
Cicer Milk Vetch	Oxley 2	18.01	61.73	1.50	1.32	0.16	125.80
	Veldt	18.90	61.49	1.50	1.11	0.17	126.30
Mixes							
Fleet MB/Yellowhead Alfalfa		9.94	55.76	1.25	0.57	0.14	86.50
Knowles HB/Yellowhead		13.04	57.81	1.39	0.94	0.15	99.46
Success HB/Yellowhead		11.47	58.52	1.41	0.75	0.16	96.86
Fleet MB/Spredor 5 Alfalfa		12.67	57.65	1.39	1.05	0.16	97.99
Knowles HB/Spredor 5		10.07	43.01	1.40	0.68	0.12	93.13
Success HB/Spredor 5		13.97	59.67	1.45	1.16	0.14	103.73
Fleet MB/Mountainview Sainfoin		7.03	55.50	1.32	0.26	0.14	79.73
Knowles HB/Mountainview		8.00	57.69	1.39	0.33	0.12	87.68
Success HB/Mountainview		7.51	56.46	1.35	0.34	0.12	87.25

Observations

Establishment of most trial entries in the project was generally very good in 2016. Basagran herbicide was applied and some volunteer canola and broadleaf weeds were hand pulled. The 2016 growth was left standing to enhance snow trap and was mowed early in 2017.

Heights and maturity was evaluated in just before harvest in early July 2017. Early season moisture was much less than in 2016 due to limited snow cover and low rainfall which impacted growth potential. The entire volume of all plots was harvested with CARA's forage harvestor. A sub sample was collected and dried for dry matter determination. A sample was submitted to A & L Labs for feed quality evaluation.

Table 2 summarizes the dry matter yield. It is important to consider that the yield information is based only on one year at one site and has not been statistically evaluated. Based on the one site year, Greenleaf pubescent wheatgrass was the higher yielding grass followed by Success hybrid brome. Highest lb/A in the alfalfa block was recorded by Yellowhead, followed by 20-20. Yellowhead, combined with 3 different brome grasses, produced the highest yields in the mixed block as well. Yields between the 3 brome grass Yellowhead mixes were within 100 lbs of each other.

Table 3 contains a summary of selected feed quality parameters for the perennial forages. As expected, the legumes contained a higher level of protein than the individual grasses. The legumes also contributed to a higher level of protein from the grass/legume mixes. A higher grass percentage in the mixes containing the sainfoin resulted in those mixes containing a lower level of protein than the mixes containing alfalfa.

Data from CARA's site will be combined with data from 7 other sites in Alberta for a more complete evaluation of the perennials included in this trial. Yield will be monitored for one more year under the current funding program Support will be pursued to monitor longevity of the forages.

Pictures just prior to harvest in early July 2017

High Legume Pasture Demonstration Project

This project was funded in part by the Growing Forward 2 Program and was administered by ARECA and Alberta Agriculture and Forestry

Background/Purpose

Incorporating legumes into tame grass pastures has been shown to:

- increase gains in yearling and calves
- extend the productivity of tame grasses further into the summer grazing period
- fix nitrogen which benefits grass quality and quantity
- improve soil moisture utilization and carbon capture depths with their root structure and growth pattern

This project is intended to demonstrate the above characteristics of high legume content in tame pastures. It introduces AAC Mountainview sainfoin in a forage mix with alfalfa, providing productivity benefits along with reduced bloat potential. Field demonstrations were established at 12 sites across Alberta in 2016.

CARA Cooperator: Gould Ranching Ltd, Consort
SW 23-33-06-W4

Site Information:

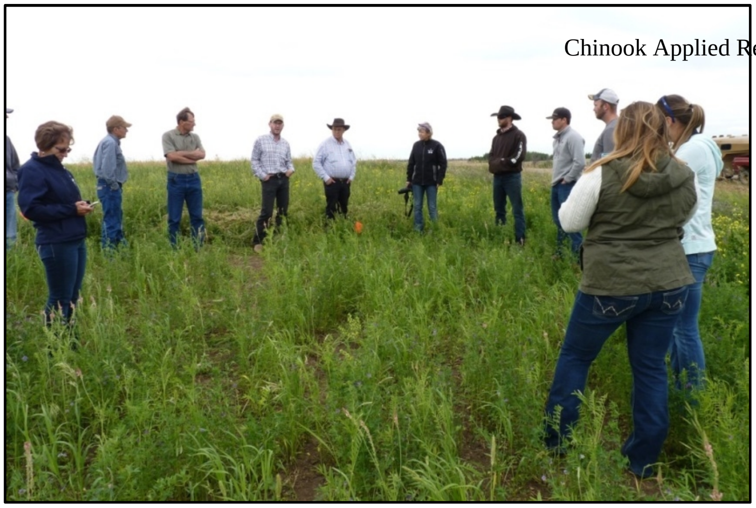
Seeding Date – June 15, 2016
Pre-seed Treatments – Glyphosate (early May and late May)
Entire field was rolled just prior to seeding
Fertilizer – 70 lbs/A 11-52-0 banded 1.5 inches deep just prior to seeding
Soil Conditions – Firm seedbed, no weeds, top dry but moisture one inch below
Seeder – JD Van Brunt double disc
Seed Depth – ½ inch
Target Seeding Rates – 33 lb/A of Ultimate Pasture Mix (70 % Haygrazer alfalfa pelletized plus 30 % ACC Mountainview sainfoin)
4 lb/A AC Knowles Hybrid bromegrass
Target Establishment – 3 to 5 plants/square foot
No companion crop

Table 1 **Precipitation (inches)**

Month	2016	2017
May	3.0	2.0
June	3.4	2.1
July	3.8	0.8
August	2.7	1.1
September	0.9	0.6
Total	13.8	6.5

Plant counts per foot^2 August 26, 2016:

Sainfoin	1.5	*(4.1 /1/4 m^{2})*
Alfalfa	1.9	*(5.2 /1/4 m^{2})*
Grass	2.0	*(5.3 /1/4 m^{2})*
Weeds	22.4	



A Field Day was held August 18

Different areas of the demo site May 30, 2018

Summary:
Establishment of the sainfoin, alfalfa and hybrid brome grass at the Consort site was quite good in 2016. Above average growing season precipitation provided excellent growing conditions. Approximately 10% of the stand in mid-August was sainfoin, 14% alfalfa and the remainder grass or weeds. Intentions to mow down the volunteer cereals and weed growth did not happen in August due to mower availability and high moisture conditions. As the weeds matured, a decision was made to leave them standing going into the winter to improve the snow trap potential. Many of the alfalfa and sainfoin plants went to seed within the field. No areas were re-seeded in the fall of 2016.

Growing season precipitation in 2017 was much lower than in 2016. Narrow leafed hawksbeard, dandelion, flixweed and sow thistle were observed, particularly in areas where the desired forage growth was thin. Some foxtail barley grew in small areas where water had accumulated the previous year. Sainfoin plants were beginning to flower June 9. Measurements in August indicated the stand was comprised of approximately 50% alfalfa, 14% sainfoin and 36 % grass and weeds.

Seed set on both the sainfoin and alfalfa plants was observed late in the summer. Germination of sainfoin and alfalfa seed was found in late October following a warm spell which melted snow received earlier in the month. Electric fence was constructed to separate the pasture demo site into 2 parcels. 130 cows were turned into the east half of the site November 2. Snow was 3 – 4 inches deep at the time. The cattle remained on the 4 acres for 24 hours, consuming the majority of the stockpiled growth and potentially trampling in some of the seed production. 2018 growth in the grazed area and the acres left standing will be checked in the spring. Future grazing potential and longevity of the legumes in the stand will be monitored.

November 2, 2017

Hayland Rejuvenation

This project is funded by an Alberta Beef Producers/Alberta Livestock Meat Agency research partnership. It is led by Dr. Akim Omokanye, Research Coordinator with the Peace Country Beef and Forage Association, who manages a duplicate site near Fairview, Alberta.

Background:
Grazing is generally understood to be the lowest cost option to maintaining a beef cow herd. Unfortunately, productivity and carrying capacity of seeded hayfields and pastures may decline because of reduced stand vigor, periods of drought, invasion of undesirable species, over-grazing, compaction and poor soil fertility as the stands age. The purpose of this study is to investigate the effects of different methods of rejuvenating an old forage stand, to test chemical brush control and to demonstrate practical and low cost options. The study is replicated at locations in two different eco-zones.

Objectives:
1. To test a variety of methods to:
    A. rejuvenate the productivity of low producing forage stands and
    B. improve soil conditions under a hay/grazing system.
2. To examine the effect of herbicide application on brush control in pastures and forage stand rejuvenation.
3. To evaluate the economics of various pasture rejuvenation methods.
4. To communicate findings to beef cattle producers and related beef cattle industry members.

Cooperator: Madge Farms, Stanmore
NE 10-31-11-W4

Site Information

Nutrient	Spring 2016
Nitrogen (0-24 in)	15 lb/A (Deficient)
Phosphorus (0-6)	22 lb/A (Deficient)
Potassium (0-6)	699 lb/A (Optimum)
Sulfate (0-6)	21 lb/A (Marginal)
Soil Salinity (EC)	.16 dS/m (Good)
pH	6.4 (Neutral)
Organic Matter	1.4%
Texture	Sandy Loam

Precipitation (inches)

	2016	2017
April	1.0	0.5
May	2.7	1.5
June	2.6	1.9
July	3.0	1.0
August	2.5	.8
September	.5	0.9
Total	12.3	6.6

Description:
Three replications of various treatments were applied in a Randomized Complete Block Design (RCBD) onto an aged brome grass/alfalfa stand in 2016. Plot size measures 30 by 30 meters (.22 A). Plant counts were taken prior to the treatments. 2016 and 2017 yield was measured by clipping three one meter square areas within each plot. A nutrient analysis for the forage from each treatment was conducted by A & L Labs.

The treatments at each site will be:
1. Check (control) - grazed or hayed only, no other treatments will be imposed
2. Summer rest - one year summer rest, no grazing or haying for one year (2016)
3. Fertility/fertilization - fertilize with dry inorganic fertilizer in spring. Field soil sampling and testing will be done to develop proper fertilizer recommendations
4. Complete renovation (plow under/cultivate) and reseed with a legume-grass mixture in spring
5. Spray Roundup® herbicide in spring or early summer
6. Spray Grazon® herbicide in spring or early summer
7. Spray field with herbicide in fall, cultivate & seed in spring
8. Spray field with herbicide in fall and direct seed in spring
9. Aerate/spike field/paddock in fall
10. Aerate/spike field/paddock in spring
11. Broadcast seed & aerate/spike field/paddock in fall
12. Broadcast seed & aerate/spike field/paddock in spring
13. Subsoil field/paddock in the fall to a depth of 9-12”
14. Subsoil field/paddock in the fall to a depth of 9-12” and direct seed in the spring

Note: Wet weather in the fall prevented treatments 13 & 14.

Where seeding is indicated (treatments 4, 7, 8, 11, 12 & 14), Pickseed’s Cattlemen Pro forage Mix (40% MB-A meadow brome, 15% AC Grazeland alfalfa, 8% Dahurian wildrye, 7% slender wheatgrass, 15% Kirk crested wheatgrass and 15% Duramax tall fescue). No grazing or haying will take place during the seeding year to allow proper establishment. Soil and forage yield and quality will be monitored in 2017 and subsequent years.

Table 1 **Yield from Rejuvenation Treatments 2016-2017**

	2016				2017			
Treatment	**Grass lb/A**	**Legume lb/A**	**Other lb/A**	**Total lb/A**	**Grass lb/A**	**Legume lb/A**	**Other lb/A**	**Total Lb/A**
Broadcast seed & aerate/spike in spring	885	495	31	1411	1255	280	38	1573
Summer rest - one year summer rest (fencing)	1257	1400	129	2786	1580	570	19	2169
Spray with herbicide in fall, cultivate, seed in spring	1981	1455	73	3509	1734	325	7	2066
Subsoil field in fall	1237	1300	191	2728	n/a	n/a	n/a	
Aerate/spike field/paddock in fall	1863	1305	767	3935	1487	733	15	2235
Spray with herbicide in fall, direct seed in spring	1795	636	129	2560	2154	338	36	2528
Broadcast seed & aerate/spike in fall	4941	779	13	5733	1354	691	24	2069
Spray Grazon herbicide, seed in spring	n/a	n/a	n/a	n/a	2307	0	0	2307
Fertilization - 100 lb/A 46-0-0 fertilizer in spring	1709	930	115	2754	1960	333	15	2308
Spray Roundup herbicide, seed in spring	n/a	n/a	n/a	n/a	1332	182	643	2157
Complete renovation spring (plow/cultivate/reseed)	n/a	n/a	n/a	n/a	1315	236	54	1605
Check- Grazed or hayed only	**1835**	**1303**	**206**	**3344**	**2444**	**673**	**74**	**3191**
Aerate/spike field/paddock in spring	1380	1216	73	2669	1477	360	51	1888
Subsoil field in fall, direct seed in spring	1563	614	78	2255	n/a	n/a	n/a	n/a

*Mcal/kg

Table 2 **Forage Nutritive Values of Grasses and Legumes 2016-2017**

	2016					2017				
Treatment	**CP %**	**TDN %**	**NEM***	**Ca %**	**P %**	**CP %**	**TDN %**	**NEM***	**Ca %**	**P %**
Broadcast seed & aerate/spike in spring	6.61	57.1	1.37	0.30	0.10	13.1	56.9	1.4	0.90	0.10
Summer rest - one year summer rest (fencing)	6.52	57.2	1.37	0.31	0.10	13.5	58.5	1.4	1.10	0.10
Spray with herbicide in fall, cultivate, seed in spring	6.56	55.3	1.31	0.34	0.10	13.7	58.2	1.4	1.30	0.10
Subsoil field in fall										
Aerate/spike field/paddock in fall	6.91	57.1	1.37	0.36	0.11	13.5	58.8	5.6	1.20	0.20
Spray with herbicide in fall, direct seed in spring	6.15	55.9	1.33	0.33	0.09	12.7	58.2	1.4	0.80	0.10
Broadcast seed & aerate/spike in fall	7.48	57.3	1.37	0.34	0.10	12.8	57.3	1.4	0.90	0.10
Spray Grazon herbicide, seed in spring	6.2	57.5	1.38	0.24	0.09					
Fertilization – 100 lb/A 46-0-0 fertilizer in spring	6.04	56.4	1.35	0.34	0.11	13.0	58.1	1.4	1.20	0.10
Spray Roundup herbicide, seed in spring	7.07	57.8	1.39	0.29	0.09	13.8	57.2	1.4	1.20	0.10
Complete renovation spring (plow/cultivate/reseed)	6.42	57.3	1.37	0.28	0.09	13.1	57.7	1.4	1.10	0.20
Check- Grazed or hayed only	**6.02**	**56.6**	**1.35**	**0.27**	**0.09**	**12.7**	**57.3**	**1.4**	**1.00**	**0.10**
Aerate/spike field/paddock in spring	7.42	56.1	1.34	0.39	0.10	13.5	57.8	1.4	1.20	0.20
Subsoil field in fall, direct seed in spring										

*Mcal/kg

Observations:

Weather conditions in both 2016 and 2017 seem to have influenced response to the treatments included in the study. High moisture levels in 2016 encouraged growth on all treatment areas including the untreated check. The best grass response appeared to come from the broadcast seed and aerate/spike in 2016 but the yield did not carry through into 2017. Highest yielding treatment in 2017 was the check strip.

Grasses from the broadcast seed & aerate/spike in fall, Round-up herbicide and seed in spring and aerate/spike in spring treatments all met the 7% Crude protein required by a dry gestating cow while other methods fell short (Table 2). All legumes exceeded the CP requirements of mature beef cattle.

Silage Quality Demonatration

Background:
The quality of feed within a silage pit is dependent on many factors, including the species, variety and maturity of the forage material ensiled; the degree of packing; whether the pit is covered properly and/or weather conditions at the time of harvest as well as how long the face of the pit is left open. Collecting representative samples from the pit can also be challenging, both in timing of sampling and also how the samples are physically gathered.

Objectives:
To evaluate the feed quality of silage within a pit during the course of a feeding season.
To provide guidance for producers regarding when and how often to test their silage pits for nutritional quality.

Description:
Grab samples were collected from two silage pits during the period November 2016 through to April of 2017. One of the pits had been properly sealed at the time of harvest in August 2016 and the second was not covered. The samples were taken once per month by the same sampler using the same sampling technique. Each sample submitted to the lab contained a combination of ten handfuls taken from various points in the open face of the pit.

1. **Uncovered Haylage** (refer to chart 1)

Pit one consisted of a combination of legume and grass haylage from various fields packed into a surface pit. The pit was packed but left uncovered due to high winds after the silage was packed down.

As expected, heating and caramelization occurred in this pit. When opened in November, a 3-5 foot depth from the top surface of the pit was black. Prolonged and excessive heating is indicated by a black or brownish appearance with a tobacco or burnt odour. This process is called caramelization. Proteins join with carbohydrate, lowering available protein and energy in the feed. Therefore, the crude protein value is not useful when creating a ration in these situations and a soluble protein test should be done. Heat damage can occur in any kind of storage and can be avoided or reduced by harvesting, ensiling and storing the crop using good management practices.

Mold was also observed in this pit and was tested for potential adverse effects. All feeds contain microbial contaminants and not all molds are toxic. Molds that produce mycotoxins, however, are and may cause decreased productivity or create adverse health effects in livestock. As this pile was not properly sealed to exclude oxygen, complete oxidation did not occur. Many microbial contaminants grow when oxygen is present resulting in spoilage. In this pit, Botrytis, Nigrospora and Penicillium molds were present. Botrytis and Nigrospora are considered non-toxic but when present in high quantities the value of the feed as a whole is greatly reduced. Penicillium, however, can be a toxic mold to cattle. Fortunately, the level in the sample from this pit was not high enough to cause problems. A producer must keep in mind that when a toxic bacteria is present, high levels of the mycotoxin may occur at specific parts of the pit in high enough concentrations to cause health issues. The entire pit should be fed with caution, although no ill effects were observed from feeding out of this pit.

Quality parameters, specifically the protein, calcium and overall digestibility, decreased over the winter months in samples collected from the uncovered pit mostly likely due to increased fiber (NDF & ADF) and caramelization. Energy seemed to remain constant which may be because the samples collected into the new year were from parts of the pit which had ensiled better than the face. The discrepancy in phosphorous from February and March vs November, December, January and April could be explained by the lab process used to evaluate them. The analysis conducted in February and March was done by near infrared technology (NIR), while analysis for the other samples was done by wet chemistry. Wet chemistry analysis of minerals in a feed test provides the most accurate assessment of minerals.

Overall, it appears the quality of the uncovered haylage pit was compromised due to not sealing the pit properly which resulted in caramelization throughout the top 3-5 feet of the top and sides of the surface pit. About 45-50% of the pit (deep in the center and bottom areas), however, seemed to be properly ensiled and produced good quality silage. When planning to utilize a silage/haylage source such as the uncovered pit in this demonstration, it is important to consider the needs of the recipient feed groups. The lower quality end and upper portions of the pit could be fed to animals requiring less nutrients, or mixed with a better quality feed source. The caramelized portion of this demonstration pit was combined with a properly ensiled cereal silage and fed to mature cows in early to mid-pregnancy. Areas within the pit which contained properly ensiled material was selected for weaned calves and young cows.

2. **Properly Covered Cereal Silage** (refer to chart 2)

Pit two contained chopped and well packed wheat silage harvested all from the same field. The pit was covered with silage plastic using square bales to hold it down. . Overall quality of the pit was good and during the 6 month course of the feeding period no significant change in quality was noted other than a steady increase in dry matter content. It was observed that the calves did consume a bit less as the dry matter content increased, while still meeting the dry matter intake of 2.5% of body weight.

A small amount of mold observed on one edge of the pit was not fed out.

Summary:

A regular schedule of feed testing is optional to monitor feed quality from a silage pit, particularly if the pit was not packed or sealed using good management practices. Proper sampling technique by the same sampler with analysis by the same lab is suggested for consistency and for best comparison of results between sampling dates. Regular testing is especially important if caramelization has occurred. If molds are present, a sample should be tested and molds identified for toxicity potential. Knowledge of the feed quality as the winter progresses will enable the best use of the silage. Moldy feed should not be fed to young calves that have a developing rumen, cows that are close to calving or cows compromised by health issues.

The quality of forage in the properly sealed pit in this demonstration remained consistent during the winter feeding period. Unless other concerns become obvious, repeated testing for feed quality should not be required during the feeding season.

Table 1: **Nutrition Values from Pit 1 – Haylage Which Was Not Covered**

	Nov	Dec	Jan	Feb	March	April	Coments
Dry Matter	55.6%	54.8%	45.65%	54.56%	54.56%	54.78%	No significant change
Crude Protein*	14.6%	13.3%	12.95%	10.63%	10.01%	9.32%	Decreased due to further caramelization
Available Protein*	10.2%						
Acid Detergent Fiber*	44.1%	38.8%	36.57%	36.56%	36.78%	37.05%	Decreased because samples were taken further into pit where proper ensiling occurred
Neutral Detergent Fiber*	57.2%	55.6%	51.30%	54.78%	54.78%	54.17%	Decreased because samples were taken further into pit where proper ensiling occurred
Total Digestible Nutrients *	53%	58%	60.41%	61.98%	61.17%	60.04%	Increased because samples were taken further into pit where proper ensiling occurred
Calcium*	1.47%	1.22%	1.04%	0.68%	0.68%	0.68%	Decreased steadily during first 3 months
Phosphorous*	0.15%	0.13%	0.14%	0.30%	0.20%	0.13%	No Significant Change (Feb/March abnormalities were due to tests performed by NIR instead of wet chemistry)

* Dry Matter Basis

Table 2: **Nutrition Values from Pit 2** – Wheat Silage Properly Covered

	Nov	Dec	Jan	Feb	March	April	Conclusion
Dry Matter	34.5%	36.2%	39.43%	41.76%	42.01%	42.89%	< 10/% increase in Dry Matter
Crude Protein*	10.8%	10.8%	10.72%	11.04%	10.73%	10.77%	No significant change
Acid Detergent Fiber*	34.8%	33.7%	31.18%	32.01%	32.15%	32.68%	No significant change
Neutral Detergent Fiber*	51.1%	50.3%	48.73%	49.84%	49.99%	51.09%	No significant change
Total Digestible Nutrients*	61%	63.9	64.61%	68.13%	64.65	63.44%	No significant change
Calcium*	0.14%	0.14%	0.13%	0.43%	0.14	0.14%	No significant change (Feb/March abnormalities were due to tests performed by NIR instead of wet chemistry)
Phosphorous*	0.31%	0.31%	0.26%	0.31%	0.31	0.32%	No significant change (Feb/March abnormalities were due to tests performed by NIR instead of wet chemistry)

* Dry Matter Basis

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Conservation

CARA Shelterbelt Demonstration

CARA continues to maintains and monitor a Shelterbelt Demonstration site adjacent to the CARA centre in Oyen. It was initially developed in the summers of 2003 with seedlings obtained from the PFRA Shelterbelt Enhancement Program. There was eight tree species planted in 2004, including Colorodo Spruce, Green Ash, Mountain Maple, Chokecherry, Villosa Lilac, Hawthorn, Sea Buckthorn and Silver Buffaloberry.

Once the seedlings were planted, a drip tape irrigation system was laid out at the base of the trees. Black plastic mulch was rolled out at the base of the trees. The black plastic mulch, which comes in rolls four feet wide, was placed along the entire length of the row and secured to the ground using an applicator pulled by a small tractor. Two discs, one on each side of the unit, cut a small trench in the soil when the machine moves forward. As the mulch unrolls, discs near the back of the unit throw soil over each edge of the plastic, securing it to the ground. A small hole is then cut where each seedling has been planted and the tree is gently pulled upright. The irrigation system consists of a plastic tape which has outlets at regular intervals that allow a slow trickle of water to be delivered directly to the root systems of the seedlings. At the CARA Centre, the water source includes two 1250 gallon water tanks on either side of the equipment storage shop.

Adequate precipitation prior to 2017 limited the need for direct watering or by the drip tape. The trees were watered by hand in 2017 as there wasn't enough precipitation to fill the storage tanks. The progress of all species included in the demonstration has been maintained and monitored. Few losses have occurred and most species are showing good growth for our prairie climate. The plastic mulch has become weathered in places, particularly where it was not held firmly to the soil. Deer hooves have broken the plastic in several places. Damage from wildlife has also caused leaks in the drip tape.

The White Spruce in the Big Country Agriculture Society (BCAS) nursery section of the site have grown to exceed 4-5 feet in height. Before the root systems grow too large, several have been relocated to permanent sites. Since this relocation process was started, ATCO Electric has advised that all White Spruce within the BCAS nursery will have to be relocated due to potential interference with the over head power lines in the future.





Shelterbelt Mulch Demonstration

Applying mulch suppresses weeds, keeps soil warm in the winter and cools it in the summer. It also conserves moisture, supports and encourages numerous beneficial organisms such as earthworms and eliminates stress in shallow-rooted plants. Mulch improves soil structure and drainage and can provide aesthetically pleasing and beneficial effects. Overall, the healthiest plants are those that have access to a consistent supply of water and nutrients and mulch helps with this. Mulches allow for moisture retention, weed reduction as well as increased competitiveness and survival in shelterbelts.

Objectives:

To demonstrate the benefits of various mulches for weed reduction and moisture retention in new shelterbelts.

Summary of mulch application and weed control:

Mulch	Application	Weed Reduction	Comments
Landscape Fabric/ Large Rock	High Labour	Medium	Fabric can be costly for long lengths of shelterbelts; good use for old rock piles
Landscape Fabric/ Large Rock with Gravel	High labour	High	Can be costly for long lengths of shelterbelts; good use for old rock piles
Landscape Fabric/ Gravel	Medium	High	Can be costly for long lengths of shelterbelts
Wood Chips	Medium	Low*	Cost depends on availability
Hay	Easy	High	Low cost
Straw	Messy/Medium	Medium	Low cost
Grass Clippings	Easy	Medium	Low cost
* Flax Straw	Easy	Undetermined	Low cost

*Flax Straw was just applied in the summer of 2015

Observations:

Weed growth was monitored in 2017:

- Perennial sow thistle was not as big an issue as it has in previous years because the CARA field crew did an thorough job of pulling back the majority of the mulches to remove the creeping root system to prevent further weed spread.
- The most weed growth appeared in the rototilled area.
- The landscape fabric and rock had minimal to no weed production.
- Buckwheat weed seeds were inadvertently imported with the wood chips when they were replaced in 2013, demonstrating the importance of knowing where the mulches are coming from and what may come along with it. The wood chips were replenished in 2017 to create a thick even layer to prevent further weed growth.
- The hay & straw mulches have deteriorated over the past two years, so a portion of the straw mulch was replaced with flax straw in the summer of 2016.
- Moisture retention in the mulched strips was significantly better than that of the rototilled area. The trees required watering only once after planting and twice during the summer of 2013. The trees in the mulch appeared to grow much faster and better than those of the rototilled area.

Bio-Control of Canada Thistle With the Stem Mining Weevil

Background

Canada thistle (*Cirsium arvense*) is a competitive noxious weed that is widespread across Alberta and much of North America. This perennial herb can grow up to 4 feet tall, has prickly leaves and urn-shaped purple flowers. It causes intensive crop losses from its extensive, horizontal creeping root system. Canada thistle is attracted to sites that have had disturbance and moisture, either by overgrazing, tillage and/or earthmoving. It is listed under the Alberta Weed Control Act as noxious. Canada thistle has a high tolerance to many different environmental conditions and is highly competitive with other vegetation. It is prevalent in many locations such as riparian areas that do not allow for chemical or mechanical control methods. Biological control agents, such as the weevil are of interest in controlling Canada thistle in sensitive areas.

There are 4 beetles that are considered as potential biocontrol agents for Canada thistle including the Stem-mining weevil, scientifically known as *Hadropontus litura* (formerly *Ceutorhynchus litura*). *H.litera* has one generation per year with 3 distinct stages of life: larva, pupa and adult. The adult lifespan is approximately 10 months as they overwinter in the soil and leaf litter, emerging in the spring to feed on rosette leaf foliage and stem tissue. Eggs are laid in May and June in the mid vein of the leaf and hatch 9 days later. The larva tunnel down the stem into the root collar consuming plant tissue and when several larva are present the stem turns black from tunneling and dies several days later. Early summer, once fully fed, the larva will emerge from the thistle shoot. This is the where the main damage happens to the thistle because it opens up holes to where secondary invaders, such as nematodes, parasite and fungi enter and further damage the stems. They then enter the soil, and the papal stage begins, in which they transform into adults. A few weeks later (late June and July) these new adults emerge from the soil and feed on the thistle foliage until heavy frost occurs in fall.

Reported success of the weevils seem to vary according to geographic locations. Research in the Eastern States, California and British Columbia have indicated that *h.litura* provides poor to moderate control when used alone; however, integrating additional tactics may enhance its efficacy. Research carried out in the mid-western states (i.e. Idaho and Montana) and Alberta indicate higher incidences of impact on Canada thistle populations. This could be open to a number of different interpretations but conjecture on the part of some researchers is that stronger winter conditions could be a factor in the geographic locations where Canada thistle are being negatively impacted by the stem mining weevil. Other biological factors, such as rust, might also be more readily apparent in these regions and so add to Canada thistle decline when the stem mining weevil is introduced.

The weevils we initially imported from Montana for this project came in dishes of 105 individuals at $125 (US). The weevils do procreate every year and while some documentation indicates that they will migrate, as long as they have a food source they remain rather sedentary and populations expand within a thistle stand. As they reproduce and feed on Canada thistle, an absence of this habitat will eliminate their existence. Adults can fly very well and are active on warm summer days, however they are content to stay among the thistle patch.

Weevils are not '*a be all and end all'* for the eradication of Canada thistle but may have a place in controlling the weed in sensitive areas of the environment. CARA is working with other ARECA member groups to evaluate establishment, survival and impact of the *h.litera* at several locations in Alberta.

Objective:

To evaluate establishment, survival and affect of the Stem mining weevil on Canada thistle.

Project Description:

CARA, along with other ARECA member groups, introduced the Stem-Mining Weevil as a biological control agent to help control Canada thistle populations at various points in Alberta. The purpose of this project is to decrease and control Canada thistle populations in sensitive areas such as riparian zones, organic farms and native pasture. It is hoped the weevil may be a tool to reduce the use of chemicals to control weeds in sensitive areas.

The *h.litera were* imported from Montana and introduced to two sites in September of 2012 and again in September 2012, one in the MD of Acadia and to the second in Special Areas 4. Weather conditions and thistle stand qualities were recorded. The sites are re-visited yearly to investigate winter survival rate of the weevils. Although no stem mining weevils (*Hadropluntus litura*) were observed at the MD of Acadia site, damage was found in the plants, so there is optimism that the stem mining weevils are living and reproducing in this stand.

Both sites were monitored in 2017. There appeared to be a reduction of Canada Thistle population within the Special Area 4 site, but no evidence of damage was found in the MD of Acadia site. Because of poor moisture conditions during August and early September in Montana the weevils could not be fully harvested in the past three years so new insects have not been introduced into the sites.

We will continue to monitor the survival and impact of the weevils and potentially release more weevils in the fall of 2018 at a new site.

Bio-Control of Western Snowberry With Sheep

Background:

Western snowberry, commonly referred to as buckbrush, is a perennial forb that reproduces both by seeds and rhizome. Rhizome is a horizontal creeping root system growing within 2-12 inches of top soil. The rhizomes can access soil moisture from a deeper profile at a much faster rate than fibrous roots of pasture grasses, giving buckbrush the competitive advantage over grass, especially in dry years. Heavy stands can reduce grass production as much as 80%, especially in dry years, and should be controlled.

Buckbrush plants usually start growing in sparse groups (patches or clusters) and then spread further if not controlled. Buckbrush has relatively no feed value for most livestock because of its low palatability. When grazing within a mixed sward, however, sheep prefer forbs. Sheep's preference for forbs makes them well-suited to biological landscape management.

Objective:

To demonstrate the biological control of Western snowberry using selective grazing by sheep.

To determine the initial state of the range field and continue to monitor specific buck brush locations overtime to measure how the sheep grazing affects the range health and the potential depletion of buck brush.

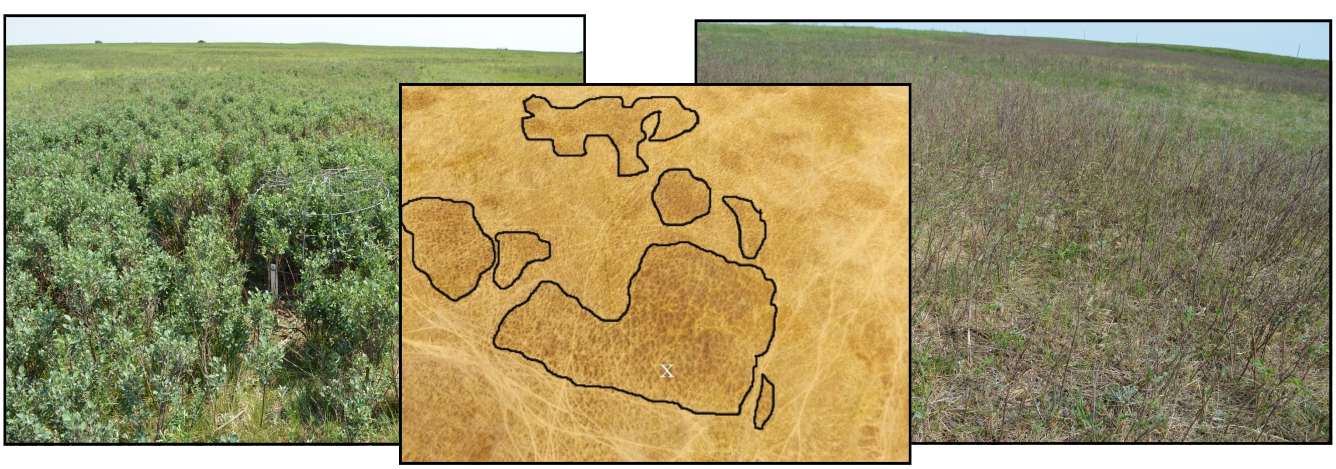
To demonstrate the impact of different grazing intensities and timing of grazing by sheep on the range condition and the western snowberry population at two locations.

Description:

Lacey Gould, Conservation Agronomist and Animal Nutritionist; Olivia Sederberg, Conservation Technician and Megan Snell, Summer Field Technician, completed a Rangeland Health Assessment at the two pastures chosen for evaluation of buckbrush control by grazing sheep. Exclusion cages were placed at each location to help determine the growth of the pasture and western snowberry. Range health of the sites will be monitored for at least 2 years to determine the if there is significant depletion of the Western Snowberry in the chosen pastures.

Arial imagery from a drone was used at certain locations to create a general picture of the site. The imagery will be over lapped with future images to see the progression of the western snowberry.

Cooperators: The Late Don Vincent, Hanna and Dylan Biggs, Veteran



2017 aerial photo of cage #3

Riparian Health Assessments

Background:

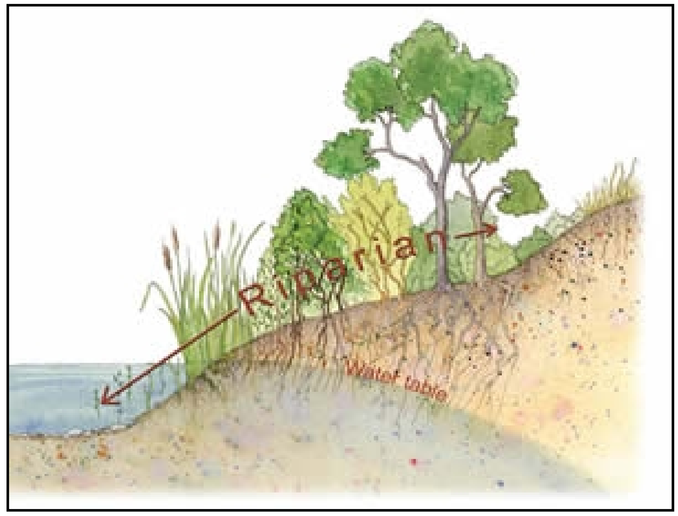
Riparian health is critical to water quality and quantity, stream stability and habitat for fish and wildlife. A Riparian Zone is the interface between the upland area and the aquatic zone. Riparian communities usually include or border water in the form of a river, wet meadows, creeks or springs. The Riparian community includes a vast and productive diversity of plants and fungi which are sought out by livestock and wildlife. The structure, function and management of these areas are not well understood compared to other types of land area. Many agricultural and industrial practises can and have drastically altered these zones. A healthy Riparian Zone, in terms of plant species, plant vigor and bank stabilization, will have enhanced filtering ability and thus less risk of water contamination from outside sources.

The constant need for consumable water for ourselves, our pets, our livestock and the fish and wildlife that surround us, requires us to focus on what is needed to keep that water clean and flowing. There are many benefits to a healthy riparian zone such as sediment filtering, stream bank building, water storage, aquifer re-charging, fish and wildlife habitat and dissipating stream energy. Evaluating the health of water systems requires a hands-on assessment.

CARA Staff have been monitoring locations along several local creeks during the past 3 years. Riparian health assessments have been completed and will be a reference point for future assessments. Points at the following creeks have been monitored to date:

Kennedy Creek, MD of Acadia
Berry Creek, Special Area 2
Blood Indian Creek, Special Area 2
Sounding Creek, Special Area 3 & 4

Riparian Health Assessment in the Special Areas



Background:
Riparian health is critical to water quality and quantity, stream stability and habitat for fish and wildlife. A Riparian zone is the interface between the upland area and the aquatic body or zone. Riparian communities usually include or border water in the form of a river, wet meadows, creeks or springs. The Riparian community includes a vast and productive diversity of plant life which are sought out by livestock and wildlife.

The structure, function and management of these areas are not well understood compared to other types of land area. Many agricultural and industrial practices can and have drastically altered these zones. A healthy Riparian Zone, in terms of plant species, plant vigor and bank stabilization, will have enhanced filtering ability and thus less risk of water contamination from outside sources.

The constant need for consumable water for ourselves, our pets, our livestock and the fish and wildlife that surround us, requires us to focus on what is needed to keep that water clean and flowing. There are many benefits to a healthy riparian zone such as sediment filtering, stream bank building, water storage, aquifer re-charging, fish and wildlife habitat and dissipating stream energy. Evaluating the health of water systems requires a hands-on assessment.

Objective:
To determine the general state of riparian health along several creeks with in the Special Areas.
To provide producers with information about riparian zones.

Description:
Lacey Ryan, Conservation Agronomist, & Olivia Sederberg, Conservation Technician & Extension Coordinator, completed Riparian Health assessments at sites along the Bullpound Creek and Berry Creek in the late summer of 2017.

Berry Creek:
Three new sites were established; two sites scored "functional, but at risk" and one site was scored "non-functional" based on Riparian Health Assessment for Creeks and Rivers provided by Cows and Fish. One site was revisited for a third year of assessment and shown to be continually scored as "functional, but at risk", 2017 was a bit lower percentage. No management changes have been made to date.

Bullpound Creek:
One new site scored "functional, but at risk" and a second site was revisited which had scored "non-functional' in a previous assessment, however on the improving end as the producer had changed management strategies. General moisture was higher in 2017 compared to the time of the previous assessment.

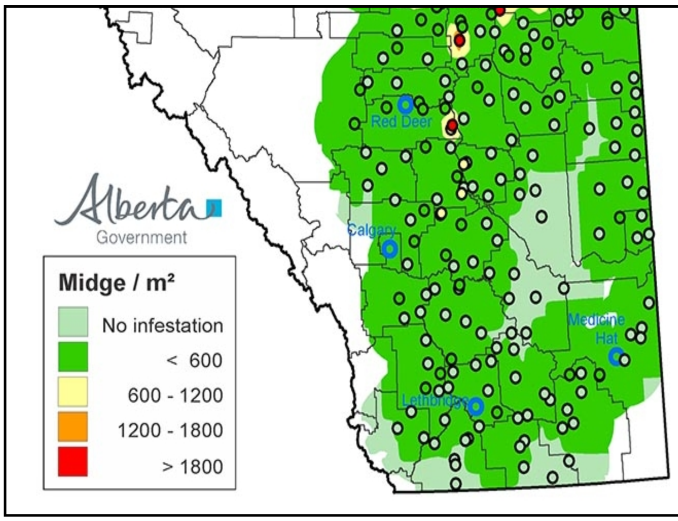
These sites will be re-visited in 2019. New sites will be added to both Berry and Bullpound Creeks as well as the Sounding Creek in 2018.

Riparian assessment scores can vary with the technicians performing them, the time of year at which they are assessed, management changes and dryness conditions. We aim to re-visit sites at the same time of year and take into account and management and moisture changes from year to year. We do not come to a conclusion about the functionality of a site until at least 3-5 years of reassessment has occurred. Simple management changes can greatly affect the health of the riparian area - such as restricting livestock access in the spring time when the area is most sensitive both structurally and biologically. Funding for the installation of fencing to protect riparian areas may be available through the Canadian Agricultural Partnership (CAP) program.

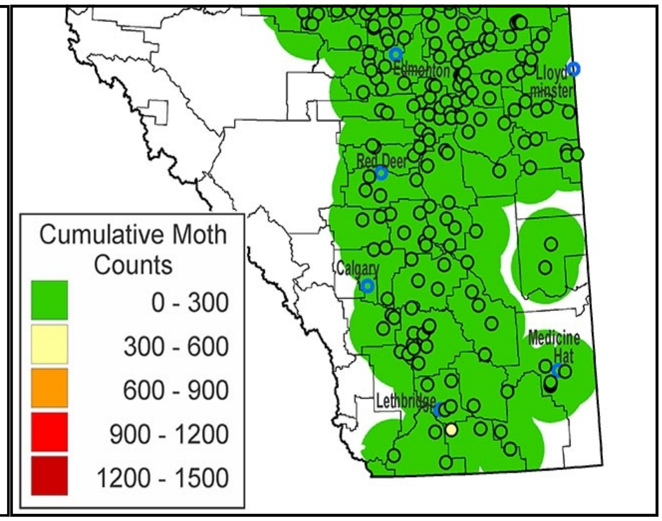
Insect Forecast for 2018

CARA participated in the provincial pest monitoring program by monitoring bertha army worm, cabbage seedpod weevil, wheat midge and wheat stem sawfly populations. To view the insect forecast summaries compiled by Scott Meers, Provincial Entomologist with Alberta Agriculture and Food go to the Alberta Insect Pest Monitoring Network Website. (http://www1.agric.gov.ab.ca/$Department/deptdocs.nsf/all/prm13779)

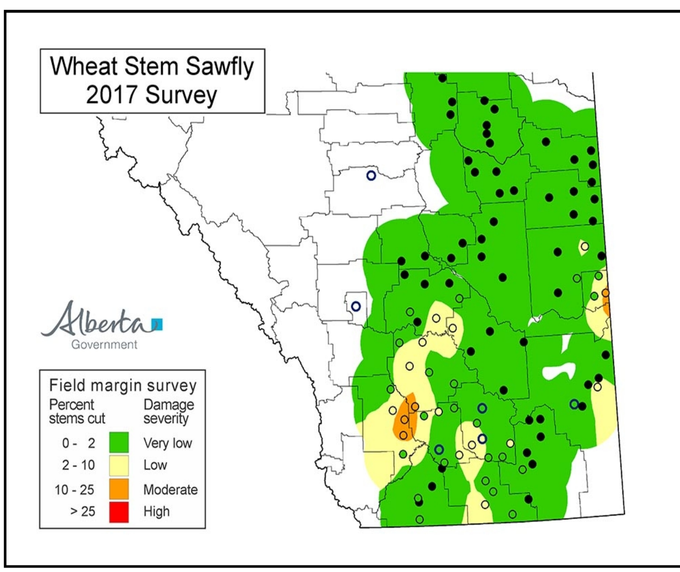
Wheat Midge



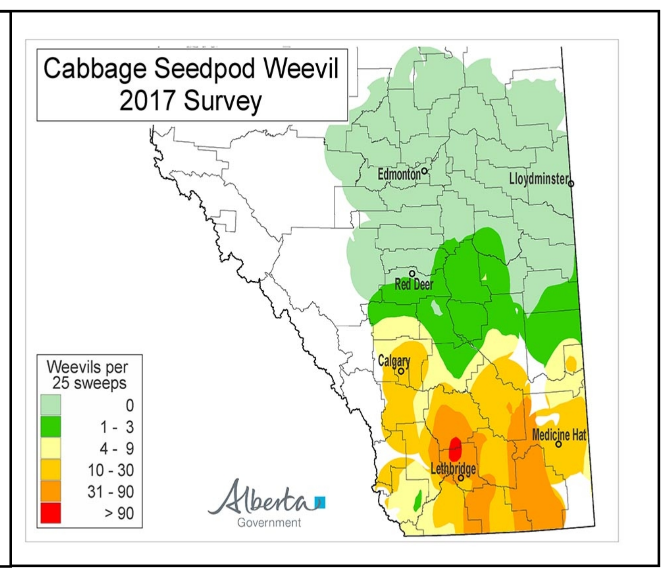
Bertha Armyworm



Wheat Stem Sawfly



Cabbage Seedpod Weevil



Alberta Insect Pest Monitoring Network

2017 Alberta Weed Survey

by Charles Geddes, Research Scientist AAFC

NOTE: *CARA Staff members Olivia Sederberg and Megan Snell surveyed 62 fields within the Special Areas and MD of Acadia as part of this survey.*

Julia Leeson, a Weed Monitoring Biologist with Agriculture and Agri-Food Canada, led a team that worked hard this year surveying weed species in Alberta field crops. Generally, the provincial weed survey takes place in July and August, following in-crop weed management, once every decade since the 1970's.

This year, the survey sampled 1,236 Alberta fields (Figure 1) with the collaboration of Linda Hall (University of Alberta) and Chris Neeser (Alberta Agriculture and Forestry). The crops sampled were canola, spring wheat, durum, barley, oat, lentil and field pea.

Each weed species found was summarized using a relative abundance index based on the frequency, uniformity, and density in the fields sampled. Then, the relative abundance index ranked the Alberta weed species from the most to least abundant.

The top five most abundant Alberta weed species in 2017 were chickweed (Stellaria media), wild buckwheat (Fallopia convolvulus), lamb's quarters (Chenopodium album), wild oats (Avena fatua), and volunteer canola (Brassica napus) (Table 1).

Chickweed was the most abundant weed species in Alberta and occurred at the greatest density (average density of 33 plants m-2) compared with all other weed species.

Wild buckwheat was the second most abundant weed and occurred in fields most frequently (42% of fields), albeit at a much lower density than chickweed (average density 4 plants m-2). Since the 1970's, false cleavers (Galium spurium) increased in relative abundance the most (increased by 35 ranks) out of the top ten most abundant weed species, followed by volunteer wheat (increased by 22 ranks since the 1980's) and volunteer canola (increased by 8 ranks).

Frequency - % of fields where the weed species occurred.

Uniformity - % of quadrants where the weed species occurred in the field.

Density – average number of plants per metre square of the weed species in the field.

There could be many reasons for shifts in abundance of weed species in Alberta in the past four to five decades. Some of these reasons include shifts in predominant tillage systems from conventional to minimum or zero-tillage, selection for herbicide resistance in weed species, the release of herbicide-resistant crops, an increase in production of pulse crops with few POST-emergence herbicide options, and potentially also changes in climate and/or weather patterns.

Seven of the top ten most abundant weeds in Alberta (including volunteer wheat and canola) are resistant to at least one herbicide mode of action. Of these, wild oats holds the record for biotypes resistant to the greatest number of herbicide modes of action.

Alberta has triple herbicide-resistant wild oat biotypes (to herbicide groups 1, 2 and 8, while quintuple herbicide-resistant wild oat biotypes (to herbicide groups 1, 2, 8, 14 and 15) are in Manitoba. Species-specific biology also can play a large role in the relative abundance of weed species.

Table 1. The ten most abundant weeds in Alberta in 2017 [a]

	Relative Abundance Rank					
	1970's	1980's	1997	2001	2010	2017
Chickweed	6	5	2	3	7	1
Wild buckwheat	3	1	3	1	1	2
Lamb's quarters	5	7	7	6	8	3
Wild oats	2	3	1	2	2	4
Volunteer canola	13	19	20	16	6	5
False cleavers	41	28	8	7	5	6
Green foxtail	4	4	17	8	19	7
Volunteer wheat	---[b]	30	22	22	18	8
Canada thistle	9	12	5	4	3	9
Dandelion	15	20	10	10	4	10

[a] Adapted from: Leeson *et al.* (2017)
[b] Volunteer wheat was not surveyed in the 1970's

Source: Leeson JY, Hall L, Neeser C (2017) Residual weed population shifts in Alberta – 1973 to 2017. Page 43, in: Proceedings of the 71st Canadian Weed Science Society Annual Meeting, Saskatoon, SK, CA. November 20-23.

CHINOOK APPLIED RESEARCH ASSOCIATION

CARA

Extension

2017 Extension Highlights

Newsletters
Seven editions of CARA's 'Grain, Grass and Growth' newsletters were mass-mailed to 1700 producers.

Cooperator Appreciation Evening *January 24, Cereal*
CARA hosted projects cooperators, local funders and other supporters to a banquet on January 14 in Cereal to show appreciation for contributors to our program during the past year. Rachel Maclean, Foothills Forage and Grazing Association, shared highlights from an Australian Farm Tour organized by FFGA.

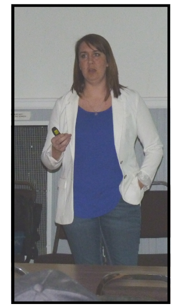
Bovine Tuberculosis information Seminar *January 26, Hanna*
The Bovine Tuberculosis Information Seminar shed some light on the pressing issue that occurred in 2016. Dr. Sylvia Checkley PhD, DVM gave information on the history, diagnosis, and control of the disease. Brian Perillat with Canfax gave a cattle market update and his comments regarding impact of the disease the markets. Dr. John Campbell, DVM, also answered questions on the disease. Along with the disease information and market outlook, Randy Weins, Chief Communications Officer with CFIA was able to give an update of the current situation in the Special Areas. The event was attended by approximately 100 producers.

Verified Beef Production Plus *February 1, Pollockville*
Christine Erichsen and Melissa Downing, both new with the Alberta Verified Beef organization, provided training to 75 producers on the Verified Beef Plus program which is now in place and shared how it differs from the original and potential benefits to producers.

Young Ranchers Forum *February 7, Hanna*
Through this forum, our goal was to increase participants' knowledge of the agriculture industry and provide positive tools to aid young ranchers in successful ranch management. Speakers included Scott McKinnon, Canfax; Jesse Williams, ASB Fieldman; Stina Nagel, Canadian Cattleman's Association; Dr. Tamara Quashnick, Steadfast Vet Service; Dianne Westerlund, CARA and Scott McKinnon, Canfax.

Young Farmers Forum *February 8, Cereal*
An enthusiastic group of young farmers listened to several speakers share their expertise related to agronomics, grain grading, marketing and insurance. Industry experts included Adrienne Bouwer, 41-9 Agro; Bill Advano, Canadian Grain Commission; Neil Blue, AAF; Lori Peacock, AFSC and Karen Murray, Global Ag Risk.

Winter Grazing Field Day *February 15, Consort*
Approximately 20 producers heard information on winter feeding programs from Barry Yaremcio, AAF. Seed company reps from Dupont and Pioneer provided information on their varieties and agronomic tips for producing corn. The afternoon was spent visiting corn fields which had been grazed during the winter.



CARA's Annual Meeting & Project Review *February 28, Cereal*
CARA staff reviewed results of CARA's 2016 program and plans for the 2017 year at the February 28th meeting. Guest speaker Jolene Noble, Farm Sustainability Extension Working Group, initiated discussion on sustainability and social license.

EFP & Growing Forward 2 Workshops *March 9, Hanna & March 16, Acadia Valley*
Several producers were assisted with their Environmental Farm Plans as well as applications to various Growing Forward Programs, including Grazing & Winter Feeding Water Management, Crop, Manure, Energy, Animal Welfare, Health and Biosecurity.

Grain Marketing Course *March 13-14, Oyen*
Neil Blue with Alberta Agriculture & Forestry provided 3 days of hands-on training to guide 10 producers in marketing their grain. Topics addressed included futures contracts and hedging, basis, grain contracting, puts and calls while learning these concepts with a futures simulator

Classroom Ag Program *March*
Presentations on CARA's program, soil health, nutrient cycles, the importance of safety, care of the environment and the diversity of agricultural production in Alberta were made by CARA staff to elementary students at eight local schools.

Shelterbelt Maintenance Workshop *May 18, Oyen*
Nigel Seymor and Shelley Barkley led discussion on the positives and negatives of various mulches for shelterbelts, identifying & dealing with pests and providing an interactive demonstration of how and when to properly prune and maintain shelterbelts.

Jim Gerrish Grazing School *June 16, Youngstown*
25 beginning, intermediate and advanced graziers attended the day long workshop to help forward management of their operations to the next level. Key concepts of stocking rate, stock density, residual, intake, balancing use and recovery were all covered in a combination of classroom and field discussions.

Crop Walks *July 18, Stanmore & July 21, Consort*
Farmers had the opportunity for one-on-one consultations with Crop Specialist Clair Langlois (AAF) during a visit to CARA's wheat trials at the Madge crop trial site. AAF's Neil Whatley and Canola Council Agronomist Keith Gabert also met farmers in the field at the Redel crop trial site near Consort.

Southern Alberta Grazing School For Women *July 25-26, Morrin*
The Southern Alberta Women's Grazing School offered a unique opportunity to learn grazing principles, range health, plant ID and the stories of other women involved in ranching and agriculture.

Soil Health and Crop Field Day *August 3, Oyen*
Lunch was served to 25 participants who joined several industry specialists to visit CARA crop trials and demonstration sites. CARA's Dr. Yamily Zavala led discussion on the basics of soil health and demonstrated differences in aggregation and moisture retention from soil samples she has collected from fields across Alberta. Keith Gabert, Canola Council of Canada Agronomist, provided some scouting and harvest tips for canola and mustard. Neil Whatley, Alberta Ag and Forestry Crop Specialist, summarized some of the benefits and tips for managing production of lentils and other pulse crops. Clair Langlois, AAF Cereal Extension Specialist, shared information on the changes in variety classification and tips for cereal management.

Corn and Cover Crop Field Day *August 14, Loverna*
20 producers spent the morning looking at demo strips of 34 crops which have potential use in improving soil as part of cover crop cocktails. The afternoon featured CARA's Dr. Yamily Zavala leading a discussion on how each crop can potentially add to a cover crop mix. The Field Day was hosted by Curtis Hoffmann of Sounding Creek Seeds at a site near Loverna.

Tools To Build Your Cow Herd *October 25, Pollockville*
CARA hosted one event in a series of seminars held across the province in partnership with Alberta Agriculture and Forestry. Dr. John Basarb, AAF discussed how genetic and genomic tools can help identify superior animals when developing a productive and profitable cow herd. Nutrition related problems due to the variability in feed supply and quality from the weather challenges of recent years was addressed by Barry Yaremcio, AAF and Mark Engstrom, DSM. Local veterinarian Dr. Kirby Finkbeiner shared recent herd health concerns and emphasized the importance of a good relationship with your vet.

8th Annual Cattlemen Clinic *November 21, Oyen*
CARA hosted another successful Cattlemen Clinic in Oyen on November 21. 45 producers participated in the day which featured Dr. Cec Ruschkowski (Oyen Vet Services) on herd health issues; Joe Harrington, AAF on water quality; Dave Becki, Endeavor Accounting on tax changes affecting farmers and ranchers; as well as Brian Perilot, Canfax on the cattle market outlook. David Mohl and other reps from the Hanna Fire Department showed attendees unique characteristics of their Animal Rescue Trailer Unit and tips on managing an animal transport accident.

Western Canada Conference on Soil Health & Grazing,
December 5-7, Edmonton
A decision to combine Soil Health with Grazing was supported by producers from all across Western Canada as they travelled to the sold out conference in Edmonton December 5 to 7th. Conference participants had the opportunity to hear scientists, specialists and producers discuss the importance of soil health – assessing specific soils, recognizing and remediating problems as well as the benefits of having a strong soil base. The beneficial role that livestock can play in a production system was discussed along with other strategies related to building soil. The final day of the conference focused on strategies to maintain grazing resources and understanding the significance of healthy soils within a grazing system. Speakers during the event included CARA's Dr. Yamily Zavala and CARA Board member and crop trial cooperator Barry Redel.

Green Certificate Testing
CARA hosted testing days for the Green Certificate Program at the CARA Center in March, May and December.

Growing Forward 2
Many producers were assisted with applications to various Growing Forward programs during the year, including Grazing & Winter Feeding Water Management, Crop, Manure, Energy, Animal Welfare, Health and Biosecurity. Since Growing Forward 2 (2013-2018) started, 89 producer projects in this area have received an estimated $686,688 funding towards their operation projects.

Feed, Seed and Soil Analysis
CARA continued to provide producers with information, use of bale sampling probes and/or facilitation of analysis of feed, seed, plant, soil and water samples in 2017.

Social Media
CARA's website (www.chinookappliedresearch.ca) has received over 170,000 hits during the past three years. Information is also distributed to producers via Facebook, Twitter and email contact lists.
Twitter: @CARAresearch Instagram: @CARAresearch Visit us on Facebook
Email: cara-1@telus.net

Growing Forward 2

A federal-provincial-territorial initiative

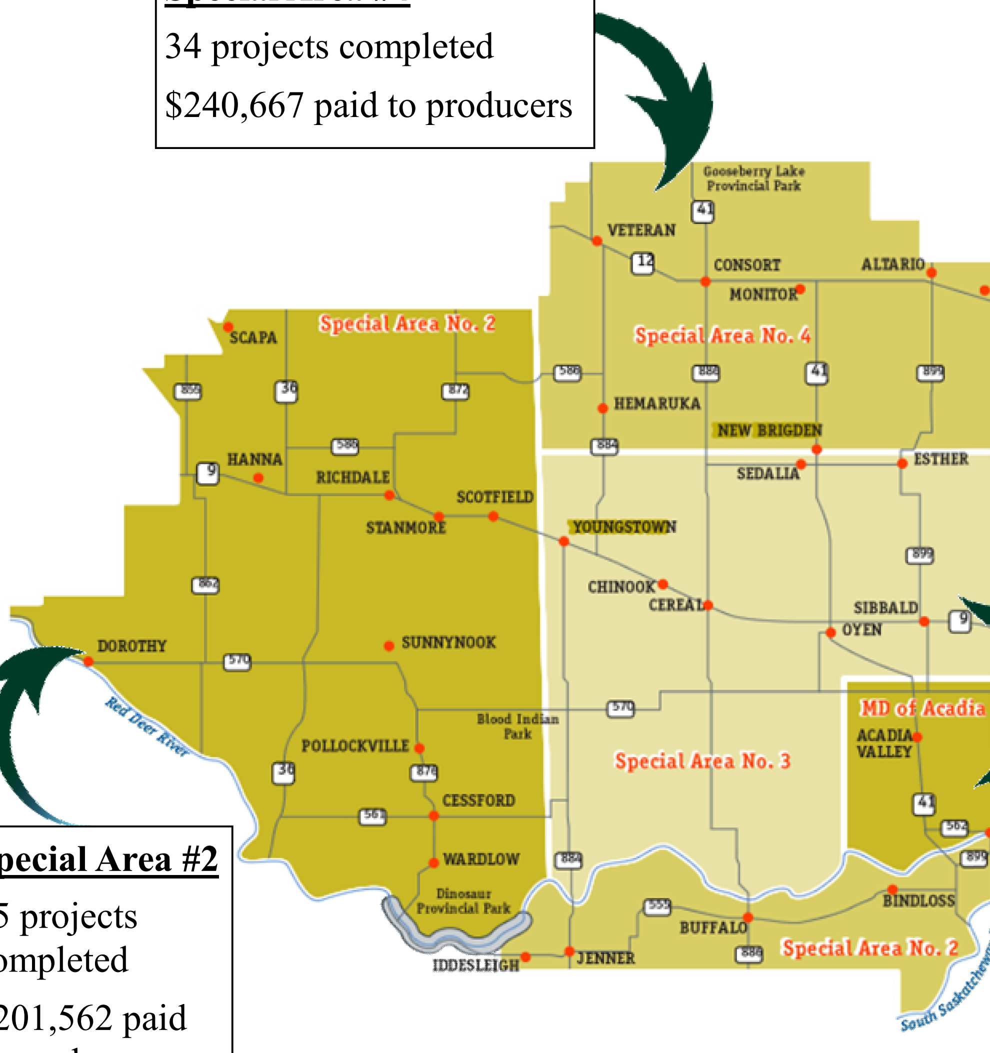
Grant funding received by producers from Growing Forward 2 (2013-2018)

Many producers were assisted with applications to various Growing Forward programs during the year, including Grazing & Winter Feeding Water Management, Crop, Manure, Energy, Animal Welfare, Health and Biosecurity.

Special Area #4

34 projects completed

$240,667 paid to producers



Special Area #3

25 projects completed

$122,920 paid to producers

Special Area #2

25 projects completed

$201,562 paid to producers

MD of Acadia #34

4 projects completed

$21,539 paid to producers

Appendix

Definitions of Common Feed Nutrient Terms

ADF Acid Detergent Fibre - consists of lignin and cellulose and is the least digestible portion of roughage. ADF content of forages is used for determination of digestibility and energies.

ADIN Acid Detergent Insoluble Nitrogen – the portion of total nitrogen bound to the fibre in a feed which may not be available to the animal.

AIP Available Insoluble Protein – the portion of the total available protein which is not soluble in rumen fluid, but is still available to the cow. Available insoluble protein which escapes degradation in the rumen is almost completely digested in the lower digestive tract (rumen un-degraded insoluble protein).

AP Available Protein (AP = CP – ADIP) – the portion of the total protein which is available to the animal if the animal could completely digest the feed (ie. not bound to the fibre in a feed).

BP Bypass Protein – ingested protein that is not degraded in the rumen (also referred to as “undegradable” or “escape” protein).

CP Crude Protein - The total protein contained in feeds as determined by measuring nitrogen content. %CP = %N x 6.25.

DE Digestible Energy – the amount of energy consumed minus the amount of energy lost in the feces. DE is calculated based on ADF analysis.

DM Dry Matter - total weight of feed minus the weight of the water.

DMI Dry Matter Intake - all the nutrients contained in the dry portion of the feed consumed by animals. Can be estimated using NDF values: DMI (as a per cent of body weight) = 120/%NDF.

GE Gross Energy – measure of total caloric energy of a feedstuff.

IP Insoluble Protein – the portion of protein which digestive juices or similar solutions cannot dissolve.

ME Metabolizable Energy – equal to DE minus energy lost in urine, feces and in methane for ruminants.

NDF Neutral Detergent Fibre – commonly called “cell walls”. NDF measures cellulose, hemi-cellulose, lignin, silica, tannin and cutin; used as an indicator of feed intake.

NEF Net Energy for fat production.

NEG Net Energy for Gain – based on the ADF; it is used for balancing rations for ruminants.

NEL Net Energy for Lactation – based on the ADF; it is used for dairy ration balancing.

NEM Net Energy for Maintenance – amount of energy required to maintain an animal with no change in body weight or composition. It is based on the ADF and is used in ruminant ration balancing.

RFV Relative Feed Value – it is an index for assessing quality based on the acid detergent and neutral detergent fibre levels. As the fibre values increase the RFV of forages decreases.
RFV = [(88.9 – (0.78 x %ADF)) x (120/%NDF)]/1.29

SP Soluble Protein – the portion of protein which digestive juices of ruminants (or similar solutions) can dissolve, soluble protein is rapidly attacked by bacteria.

TDN Total Digestible Nutrients – a term which is estimated from the ADF content and is used to describe the digestible value of a feed.

UIP Undegradable Intake Protein (also called undegradable protein – UPD or rumen bypass protein) – the portion of consumed protein that is not degraded in the rumen; i.e., it “by-passes” the rumen and is usually degraded in the small intestine.

Table 1 **Nutrient Requirements for Beef Cattle**

	Daily Gain (lb)	Dry Matter Intake (lb)	Crude Protein		TDN		Ca (%)	P (%)
			lb/day	% of DM	lb/day	% of DM		
600 lb **Calves**	1.5	13.8	1.32	9.5	9.4	68.5	0.32	0.21
950 lb **Bred Heifers**	0.9	19.0	1.5	8.0	10.3	54.1	0.27	0.02
1200 lb **Cows Mid pregnancy**	-	20.8	1.4	6.9	10.1	48.8	0.19	0.19
1200 lb **Cows Late pregnancy**	0.9	22.3	1.7	7.8	11.8	52.9	0.26	0.21
1000 lb **2 yr Heifer With calf**	0.5	20.8	2.1	10.2	12.9	61.9	0.31	0.23
1200 lb **Cow Nursing Calf** (1st 3 - 4 months)	-	23.0	2.1	9.3	12.1	55.5	0.27	0.22
1800 lb **Bull** Regain condition & maintenance	0.5	30.9	2.1	7.0	16.1	52.0	0.20	0.20

Source: NRC.1984. Nutrition Requirements of Beef Cattle (6th Ed.) National Academy Press, Washington, D.C.

Table 2 **Nutrient Requirements for Nursing Cows**

Nutrient	Recommended Range	Required	Maximum
Protein %	10 – 12	-	-
Digestible Energy Mcal/kg	2.5 – 3.3	-	-
Total Digestible Nutrients %	56 – 63	-	-
Calcium (Ca) %	0.16 - 1.53	0.27	2
Phosphorus (P) %	0.17 - 0.59	0.22	1
Sodium (Na) %	0.04 - 0.25	0.08	1.57
Salt %	0.20	0.25	4
Magnesium (Mg) %	0.05 - 0.25	0.10	0.5
Potassium (K) %	0.50 - 0.70	0.65	3
Sulphur (S) %	0.08 - 0.30	0.10	0.4
Iron (Fe) ppm	50 - 100	50	1000
Copper (Cu) ppm	4 - 10	8	100
Cobalt (Co) ppm	0.07 - 0.11	0.10	10
Iodine (I) ppm	0.20 - 2.0	0.5	50
Manganese (Mg) ppm	20 - 50	40	1000
Molybdenum (Mo) ppm	N/A	N/A	5
Zinc (Zn) ppm	20 - 40	30	1000
Selenium (Se) ppm	0.05 - 0.30	0.20	2

Adapted from NRC Nutrient Requirements for Dairy Cattle and Feedstuffs

Table 3 **Nutrient Composition of Typical Feed Sources**

Feedstuff	Percent of Dry Matter Basis								
	DM*	CP*	ADF*	Ca**	P**	K**	TDN*	Mg**	Na**
Alfalfa Hay Early	90	18	35	1.41	0.24	2.40	59	0.33	0.14.
Alfalfa Hay Late	89	16	41	1.30	0.22	1.7	54	0.20	0.05
Alfalfa Silage	40	17	37	1.40	0.29	2.6	55	0.33	0.14
Barley Silage	35	12	37	0.41	0.32	2.3	59	0.13	0.01
Barley Straw	90	3	55	0.33	0.08	2.1	46	0.23	0.14
Barley Grain	89	12	7	0.08	0.41	0.6	83	0.20	0.03
Brome Grass Hay	89	10	41	0.33	0.25	1.9	55	0.09	0.02
Sweet Clover	91	16	38	1.27	0.25	1.8	53	0.49	0.09
Corn Grain	88	9	3	0.02	0.30	0.4	87	0.13	0.02
Grain Screenings	90	14	15	0.25	0.34	0.9	65	0.15	0.05
Grass Hay	91	12	40	0.70	0.25	2.0	58	0.18	0.03
Grass Silage	40	12	39	0.70	0.25	2.1	61	0.18	0.03
Oat Hay	90	10	39	0.38	0.28	1.8	59	0.26	0.18
Oat Silage	35	12	39	0.53	0.31	2.8	60	0.20	0.37
Oat Grain	89	13	16	0.09	0.40	0.5	76	0.14	0.08
Oat Straw	90	4	48	0.25	0.08	2.4	48	0.18	0.42
Peas Grain	89	26	10	1.30	0.47	1.4	83	0.03	0.05
Wheat Hay	90	10	36	0.25	0.23	1.6	57	0.12	0.21
Wheat Silage	35	12	37	0.38	0.28	2.0	60	0.20	0.03
Wheat Straw	91	3	58	0.16	0.05	1.3	44	0.12	0.14
Wheat Grain	89	14	4	0.05	0.42	0.5	88	0.16	0.08

* Refer to Definitions of Common Feed Nutrient Terms
** Refer to Tables 1 & 2
Note: The above figures are averages from a wide range of samples and should be used as a guide only.
To best understand if a feed is meeting the nutritional needs of a specific group of cattle, a lab analysis is recommended. Nutrient levels each year are influenced by growing conditions, plant stage, timing and weather conditions at harvest.

Table 4 **Agronomic and Tolerance Information for Perennials**

Grasses	Optimum pH Limits	Acidity Tolerance	Alkalinity Tolerance	Salt Tolerance	Winter Hardiness	Drought Tolerance
Colonial Bentgrass (browntop)		Moderate		Low	Moderate	Low
Creeping Bentgrass		High	Low	Low	Moderate-high	Low-moderate
Velvet Bentgrass	5.5 - 7.5	Moderate		Low	Moderate-high	Low
Kentucky Bluegrass	6.0 - 7.5	Moderate	Moderate	Low	High-very high	Low-moderate
Meadow Bromegrass	6.0 - 7.5	Moderate	Moderate	Low-moderate	Moderate	Moderate-high
Smooth Bromegrass		Moderate	Moderate	Low-moderate	Moderate-high	Moderate-high
Reed Canarygrass		High	Moderate	Moderate-high	Moderate-high	Low-moderate
Chewings Fescue		High	Moderate	Moderate	High-very high	Moderate-high
Creeping Red Fescue		High	Moderate	Moderate-high	High very high	Moderate high
Hard Fescue		Moderate	Low	Low	Very high	Moderate-high
Meadow Fescue				Moderate	Moderate	Low
Sheep Fescue		Moderate	Low	Low	Very high	Moderate-high
Tall Fescue	5.5 - 6.5	High	Moderate	Moderate-high	Moderate	Moderate
Creeping Foxtail		High	Low	Low	High-very high	Low-moderate
Meadow Foxtail		Moderate		Low	High	Low
Orchardgrass	6.0 - 7.5	Moderate	Low	Low-moderate	Moderate	Moderate
Redtop		High		Low	Moderate	
Italian Ryegrass (annual)	5.5 - 7.5	High	Low	Moderate	Low	Low
Perennial Ryegrass	5.5 - 7.5	High	Low	Moderate	Low	Low
Timothy	5.6 - 7.3	Very high	Low	Low	Moderate	Low
Turf Timothy	5.6 - 7.3	Very high	Low	Low	Moderate	Low
Crested Wheatgrass (Fairway)			Moderate	Moderate	Very high	Very high
Crested Wheatgrass (Standard)			Moderate	Moderate	Very high	Very high
Intermediate Wheatgrass		Low	Moderate	Moderate	Moderate	Moderate

Table 4 **Agronomic and Tolerance Information *continued***

Grasses	Optimum pH Limits	Acidity Tolerance	Alkalinity Tolerance	Salt Tolerance	Winter Hardiness	Drought Tolerance
Northern (Thickspike) Wheatgrass		Moderate	High	Moderate	Moderate	Very high
Pubescent Wheatgrass		Low-moderate	Moderate	Moderate	Moderate	Moderate-high
Slender Wheatgrass			High	Moderate-high	High	Moderate
Streambank Wheatgrass		Low	Moderate	Moderate	Moderate-high	High
Tall Wheatgrass			Very high	Very high	Moderate	High
Western Wheatgrass		Moderate	Moderate	Very high	Moderate	Moderate-high
Altai Wildrye				High	High	Very high
Dahurian Wildrye				High	Moderate-high	Moderate-high
Russian Wildrye		Low	Moderate	High	High	Very high
Legumes						
Alfalfa	6.0 - 7.8	Moderate	High	Moderate	Moderate-high	Very high
Cicer Milkvetch		Low	Moderate	Low-moderate	Very high	Moderate-high
Alsike Clover	5.7 - 7.0	Moderate	Moderate	Low	High	Low-moderate
Red Clover	5.5 - 7.5	Low	Moderate	Low	Moderate-high	Low-moderate
White Clover	5.5 - 7.0	Moderate	Low	Low	Moderate-high	Low
Crownvetch	6.0 - 7.0			Moderate	Moderate	High
Sainfain		Low	Low	Low-moderate	Moderate	Moderate
Sweetclover (white)	6.5 - 7.5	Low	High	Moderate	Moderate	Moderate-high
Sweetclover (yellow)	6.5 - 7.5	Low	High	Moderate	Moderate	Moderate-high
Birdsfeet Trefoil	6.2 - 6.5	High	Moderate	High	Low-moderate	Moderate

CARA's program includes projects located within the Special Areas and the MD of Acadia in east-central Alberta. Although results are drawn from this area, we anticipate many of the projects may be applicable to other areas as well.

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