Regional Silage Trial – Cereals

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Objectives:

- 1. To determine the best yielding cereal forage varieties (barley, oats, triticale) for whole plant forage production in Northeastern Alberta.
- 2. To determine the best quality cereal forage varieties (barley, oats, triticale) for cattle feed in Northeastern Alberta.

Background:

An important aspect of crop production is variety selection and, with new varieties continually becoming available, current and comprehensive forage variety yield and quality data is essential to producers. Previous experience with cereal grain production and the Regional Variety Trials has shown that there can be a 15% increase in production from selecting the best varieties, which, on average, can be an increase of \$25/acre.

Through the use of experience, neighbors and publications such as the Alberta Seed Guide (seed.ab.ca), we make variety selection decisions to benefit producers. However, there has been a lack of whole-plant annual forage production information to aid us in making cropping decisions for forage production.

The purpose of this trial is to supply producers with current and comprehensive annual forage variety yield and quality data for silage, greenfeed or swath grazing in Northeastern Alberta (crop zones 3 and 5) and across the province.

Method:

The cereal trials were grown in three blocks of plots: barley, oats and triticale/wheat, in two locations: Fort Kent (NE25-61-5-W4) and St. Paul (SE15-59-9-W4). The trial blocks were seeded as a randomized complete block design (RCBD) with four replicates to reduce error. The plots measured 1.15m by 6m in area.

Agronomic information on the trials can be found in table 1. The trials were seeded using the LARA fiverow zero-till small plot drill and blend fertilizer was side-banded at the time of seeding. The trials in Fort Kent were seeded on May 18th, 2017 and the trials in St. Paul were seeded on May 17th, 2018. The trials were sprayed with a 3-point hitch sprayer once during the growing season.

Total rainfall at the St. Paul site was 274.9 mm and the Fort Kent site was 231.4 mm.

Crop height and stage of maturity was recorded prior to harvest with the LARA alfalfa-omega selfpropelled forage harvester. The total plot weight was recorded and samples were taken to assess dry matter content. Additional composite samples were taken from each variety, frozen and sent to A & L Canada Laboratories for wet chemistry analysis. Statistical analysis of the data was conducted using ARM 9, P = 0.05.

The following varieties were grown in the Regional Silage Trials in 2017:

Barley

- *Champion* high yielding 2-row feed barley variety with excellent standability and improved disease resistance.
- *CDC Coalition* high yielding 2-row feed barley variety.
- *CDC Cowboy* tall, 2-row dual purpose barley variety that responds well to low moisture and low fertility.
- *CDC Austenson* 2-row barley variety with semi-smooth awns, short and strong straw and high feed yield.
- *Claymore* 2-row barley variety developed from CDC Copeland x Xena.
- *CDC Meredith* outstanding 2-row malting barley variety with high grain yield.
- *Sundre* high yielding 6-row barley variety with good disease resistance.
- *Amisk* -rough awned, 6-row, semi-dwarf general purpose barley with strong straw for decreased lodging.
- *CDC Maverick* 2-row forage barley variety with high yields. Ideally suited to low input management and lighter soils or drought conditions.
- *Conlon* early maturing, 2-row feed and malting barley variety with smooth awns.
- *Canmore* high yielding 2-row general purpose barley variety with good resistance to lodging.
- *Gadsby* rough awned, 2-row general purpose barley well adapted to the brown and black soil zones. Excellent disease resistance and good quality feed yield.
- AC Ranger early maturing, 6-row silage barley with a flexible planting window.
- *Altorado* 2-row, spring feed barley with good resistance to lodging and a fair to good resistance to drought conditions.

Oats

- *CDC SO-1* early maturing, very digestible brown feed oat variety with a high fat content and does not need to be rolled. Short, strong straw for reduced lodging.
- *AC Morgan* High yielding, later maturing milling oat with good lodging resistance and is commonly used for silage or greenfeed.
- AC Murphy widely adapted forage oat, with high yields, improved lodging resistance and is well suited for silage, swath grazing and green feed.
- *CDC Haymaker* later maturing forage oat variety with high forage yield and quality.
- *CDC Seabiscuit* high yielding milling oat variety with good straw strength for reduced lodging.
- *CDC Baler* very leafy, forage oat variety.
- AC Juniper early maturing general purpose oat variety with high yields and strong straw.
- *Waldern* late maturing, high yielding feed oat variety with good lodging resistance.

• AC Mustang – high yielding silage and forage oat variety with good lodging resistance.

Triticale and Wheat

- *Bunker* early maturing, reduced awn forage variety with great digestibility, high fat content and high silage yields.
- Sunray early maturing, spring triticale variety with improved ergot resistance. Short statured for increased resistance to lodging.
- *Taza* reduced awn forage and grain triticale variety with good lodging resistance.
- *Tyndal* early maturing, reduced awn forage and silage variety with good lodging resistance.
- AAC Chiffon high yielding soft white wheat variety that performs well in dry conditions.

	-	# of	Seeding	Seeding	Fertility	Weed	
Trial	Site	Varieties	Date	Rate	(lbs/ac)	Control	Harvest Date
Barley	Fort Kent	14	18-May-17	250 pl/m2	33-5-6-5 @ 275 lbs/ac	Buctril M, Merango	09-Aug-17
	St. Paul	14	22-May-17	250 pl/m2	33-5-6-5 @ 275 lbs/ac	Buctril M, Merango	23-Aug-17
Oats	Fort Kent	9	19-May-17	250 pl/m2	33-5-6-5 @ 275 lbs/ac	Buctril M	10-Aug-17
	St. Paul	9	22-May-17	250 pl/m2	33-5-6-5 @ 275 lbs/ac	Buctril M	23-Aug-17
Triticale	Fort Kent	5	18-May-17	370 pl/m2	33-5-6-5 @ 275 lbs/ac	Buctril M, Merango	18-Aug-17
	St. Paul	5	22-May-17	370 pl/m2	33-5-6-5 @ 275 lbs/ac	Buctril M, Merango	23-Aug-17

Table 1. Agronomic Information, 2017.

Results:

Barley

The barley trials are aimed to be harvested at the soft dough stage. There were 14 barley varieties grown in the trials this year at both locations. The results of the Fort Kent and St. Paul trials can be found in table 2 and table 3, respectively. The Fort Kent trial was harvested after 90 days and the St. Paul trial was harvested after 92 days. High rainfall during seeding allowed for quick establishment of the trials at both sites. Average moisture content of the Fort Kent trial was 75% and the St. Paul trial was 50%.

The varieties yielded significantly higher at the St. Paul location, with the average yield in Fort Kent of 3.09 ton/acre compared to an average of 6.27 ton/acre achieved in St. Paul. The highest yielding variety in Fort Kent was Altorado at 4.63 ton/acre. Altorado was recently registered and has been grown in the RST trials over the past 2 years as TR13740. The second highest yielding variety was Canmore at 3.61 ton/acre, significantly lower than Altorado. Canmore was also one of the higher yielding varieties in St. Paul at 6.58 ton/acre. However, the highest yielding variety was CDC Cowboy at 6.95 ton/acre.

Similar to 2016, feed quality was higher in the barley varieties grown at the Fort Kent location when compared to the St. Paul trial. This is likely due to a later harvest stage for the St. Paul trial beyond the recommended soft dough stage, which is seen in the lower moisture content of the samples

			-	-		2017 Quality Data						
	DM Yield		DM Yield	СР	ADF	NDF	TDN	Ca	Р	к	м	
Variety	(ton/	ac)	(% Austenson)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	
Altorado	4.63	а	168	12.13	34.15	57.77	62.30	0.44	0.29	1.80	0.22	
Canmore	3.61	b-e	131	11.40	29.28	50.65	66.09	0.36	0.19	1.32	0.19	
Champion	3.57	bcd	129	13.74	34.98	60.11	61.65	0.40	0.22	1.76	0.21	
CDC Coalition	3.34	bcd	121	11.64	32.84	56.59	63.32	0.41	0.23	1.73	0.25	
Claymore	3.30	bcd	120	12.51	35.91	58.30	60.93	0.26	0.12	0.73	0.12	
Sundre	3.02	b-e	109	13.67	23.91	43.41	70.27	0.39	0.38	1.88	0.22	
CDC Cowboy	2.93	b-e	106	13.43	35.41	60.10	61.32	0.43	0.26	1.63	0.24	
CDC Maverick	2.91	b-e	105	11.84	33.68	54.93	62.66	0.46	0.26	1.51	0.25	
Conlon	2.84	b-e	103	10.43	27.98	47.96	67.10	0.49	0.24	1.37	0.23	
AAC Austenson	2.76	b-e	100	12.60	36.36	62.08	60.58	0.45	0.22	1.78	0.24	
Gadsby	2.71	b-e	98	12.50	32.64	54.08	63.47	0.43	0.13	0.78	0.16	
Ranger	2.68	cde	97	12.68	34.95	59.47	61.67	0.75	0.28	1.94	0.34	
Amisk	2.59	de	94	12.11	39.45	62.44	58.17	0.53	0.21	1.84	0.22	
CDC Meredith	2.42	е	88	10.04	37.98	61.09	59.31	0.46	0.25	1.84	0.22	
Average	3.09			12.19	33.54	56.36	62.77	0.45	0.23	1.57	0.22	
CV	6.63											

 Table 2. RST Barley Fort Kent, 2017 (ton/acre, 1 ton = 2000 lbs).

Table 3. RST Barley St. Paul, 2017 (ton/acre, 1 ton = 2000 lbs).

				2017 Quality Data									
	DM Yield		DM Yield	СР	ADF	NDF	TDN	Ca	Р	К	м		
Variety	(ton/	/ac)	(% Austenson)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)		
CDC Cowboy	6.95	а	107	9.69	32.78	53.87	63.36	0.46	0.19	1.82	0.17		
Gadsby	6.81	ab	105	8.89	31.12	52.57	64.66	0.45	0.15	1.48	0.13		
Claymore	6.76	ab	104	9.06	35.28	54.50	61.42	0.42	0.18	1.70	0.14		
Champion	6.60	ab	101	9.97	29.03	47.98	66.29	0.34	0.18	1.73	0.13		
Canmore	6.58	ab	101	8.88	36.15	57.76	60.74	0.45	0.14	1.97	0.15		
AAC Austenson	6.51	ab	100	9.16	31.63	52.30	64.26	0.40	0.18	1.84	0.15		
Altorado	6.44	ab	99	10.30	25.00	44.13	69.42	0.30	0.21	1.59	0.14		
CDC Meredith	6.34	ab	97	9.16	36.39	57.46	60.55	0.37	0.16	1.94	0.13		
CDC Maverick	6.21	ab	95	11.31	28.95	47.90	66.35	0.39	0.23	1.63	0.17		
Amisk	6.18	ab	95	10.06	26.99	46.83	67.87	0.47	0.20	1.71	0.16		
Ranger	5.95	abc	91	9.64	29.11	48.31	66.22	0.45	0.19	2.01	0.16		
Sundre	5.82	abc	89	10.04	28.57	48.45	66.64	0.53	0.20	1.75	0.18		
CDC Coalition	5.61	bc	86	10.11	60.69	51.54	64.99	0.36	0.19	1.79	0.15		
Conlon	4.97	С	76	9.37	28.65	48.70	66.58	0.40	0.22	1.56	0.14		
Average	6.27			9.69	32.88	50.88	64.95	0.41	0.19	1.75	0.15		
CV	8.31												

Oats

The oat trial is aimed to be harvested at the milk stage. There were 9 oat varieties grown in the trials this year in Fort Kent (NE25-61-5-W4) and St. Paul (SE15-59-9-W4). The results of the Fort Kent trial can be found in table 4 and the results of the St. Paul Trial can be found in Table 5. Average moisture content at the time of harvest in Fort Kent was 75% and in St. Paul was 65%.

The varieties yielded significantly higher at the St. Paul site when compared to the Fort Kent site with an average yield of 4.29 ton/acre in Fort Kent and 5.61 ton/acre in St. Paul. Murphy was among the highest yielding varieties at both locations with an average yield of 5.11 ton/acre in Fort Kent and an average yield of 5.98 ton/acre in St. Paul. Murphy is a well-established forage oat variety that is widely grown across the prairies. It was the highest yielding variety in Fort Kent, followed closely by CDC SO-1 at 5.10 ton/acre. CDC SO-1 has increased in popularity over the last few years although is has consistently yielded low in the regional silage trials with the exception of 2017.

The highest yielding variety in St. Paul was CDC Haymaker at 6.23 ton/acre although it was not significantly higher than CDC Seabiscuit, CDC Baler or Murphy. CDC Haymaker is a high yielding forage oat that was developed as a replacement for CDC Baler and is easily distinguished throughout the growing season by its large, wide leaves.

The Fort Kent trial was harvested 83 days after seeding and the St. Paul trial was harvested 92 days after seeding.

							2017 Qu	ality Dat	ta		
	DM Yield		DM Yield	СР	ADF	NDF	TDN	Ca	Р	к	М
Variety	(ton/	/ac)	(% Murphy)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Murphy	5.11	а	100	10.96	38.51	59.11	58.90	0.24	0.24	1.73	0.20
CDC SO-1	5.10	а	100	11.12	36.75	58.75	60.27	0.29	0.20	2.07	0.25
AC Morgan	4.73	ab	93	11.47	38.95	58.58	58.56	0.31	0.22	2.71	0.22
CDC Seabiscuit	4.40	abc	86	12.44	41.30	62.75	56.73	0.25	0.23	1.96	0.20
Waldern	4.28	abc	84	12.69	39.87	60.91	57.84	0.32	0.23	2.22	0.24
CDC Baler	3.87	bc	76	11.60	38.77	59.14	58.70	0.33	0.22	2.14	0.24
AC Mustang	3.87	bc	76	9.87	38.52	60.07	58.89	0.27	0.23	1.74	0.22
CDC Haymaker	3.82	bc	75	13.19	33.86	55.69	62.52	0.29	0.32	1.64	0.19
AC Juniper	3.43	С	67	13.38	41.05	63.14	56.92	0.29	0.23	2.89	0.28
Average	4.29		84	11.86	38.62	59.79	58.81	0.29	0.24	2.12	0.23
CV	7.34										

Table 4. RST Oats Fort Kent, 2017 (ton/acre, 1 ton = 2000 lbs).

				2017 Quality Data									
	DM Yield		DM Yield	СР	ADF	NDF	TDN	Ca	Р	К	М		
Variety	(ton/	ac)	(% Murphy)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)		
CDC Haymaker	6.23	а	104	10.91	32.69	52.93	63.43	0.40	0.18	2.02	0.21		
CDC Seabiscuit	6.22	а	104	9.82	29.73	48.02	65.74	0.32	0.24	1.62	0.20		
CDC Baler	6.19	а	104	10.27	34.97	54.45	61.66	0.36	0.15	1.90	0.18		
Murphy	5.98	а	100	9.39	35.54	55.32	61.21	0.32	0.14	1.53	0.18		
Waldern	5.84	ab	98	9.14	39.07	60.09	58.46	0.37	0.10	1.76	0.18		
CDC SO-1	5.71	ab	95	9.66	31.89	50.95	64.06	0.30	0.17	1.76	0.19		
AC Mustang	4.98	ab	83	8.86	36.82	56.89	60.22	0.46	0.13	1.97	0.22		
AC Morgan	4.83	ab	81	8.94	33.50	52.38	62.80	0.39	0.17	2.00	0.19		
AC Juniper	4.53	b	76	8.82	36.99	56.16	60.08	0.39	0.12	2.25	0.23		
Average	5.61			9.53	34.58	54.13	61.96	0.37	0.16	1.87	0.20		
CV	11.72												

Table 5. RST Oats St. Paul, 2017 (ton/acre, 1 ton = 2000 lbs).

Triticale

The triticale trials are targeted to be harvested at the late milk stage. There were 4 spring triticale varieties and 1 soft white wheat variety grown in the trials this year. The results of the Fort Kent and St. Paul trials can be found in table 6 and table 7, respectively. Average moisture content at the time of harvest at the Fort Kent site was 63% and at the St. Paul site was 50%.

Similar to the oat and barley trials, the triticale and soft wheat varieties yielded higher at the St. Paul site with an average of 6.61 ton/acre compared to an average yield of 4.79 ton/acre in Fort Kent. However, at each site, there were no significant differences in yield between the five varieties. At both sites, Taza was among the higher yielding varieties at 5.13 ton/acre in Fort Kent and 6.62 ton/acre in St. Paul.

Overall quality was comparable between locations, with the Fort Kent trial being slightly lower in crude protein content than the St. Paul trial although both sites are adequate to meet beef cattle nutrient requirements.

				2017 Quality Data									
	DM Yie	ld	DM Yield	СР	ADF	NDF	TDN	Ca	Р	к	М		
Variety	(ton/ac)		(% Taza)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)		
Taza	5.13	а	100	9.69	34.36	54.47	62.13	0.31	0.22	2.05	0.15		
Sunray	4.88	а	95	7.92	35.29	54.47	61.41	0.25	0.20	1.79	0.16		
Tyndal	4.79	а	93	10.68	34.56	56.90	61.98	0.26	0.26	1.76	0.16		
Bunker	4.73	а	92	9.72	34.50	54.87	62.60	0.26	0.23	1.56	0.19		
AAC Chiffon	4.40	а	86	9.53	39.21	60.26	58.36	0.22	0.24	2.27	0.16		
Average	4.79			9.51	35.58	56.19	61.30	0.26	0.23	1.89	0.16		
CV	6.85												

Table 6. RST Triticale Fort Kent, 2017 (ton/acre, 1 ton = 2000 lbs).

							2017 Quali	ty Data			
	DM Yield		DM Yield	СР	ADF	NDF	TDN	Ca	Р	К	М
Variety	(ton/ac)		(% Taza)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
Bunker	6.86	а	104	11.03	32.98	51.23	63.21	0.24	0.21	1.34	0.15
Taza	6.62	а	100	10.61	32.93	52.60	63.25	0.20	0.23	1.40	0.13
Sunray	6.57	а	99	10.69	32.96	51.06	63.22	0.23	0.22	1.52	0.14
AAC Chiffon	6.56	а	99	10.15	34.21	52.99	62.25	0.24	0.24	1.97	0.16
Tyndal	6.44	а	97	10.72	32.88	51.78	63.29	0.21	0.23	1.40	0.13
Average	6.61			10.64	33.19	51.93	63.04	0.22	0.23	1.53	0.14
CV	6.85										

 Table 7. RST Triticale St. Paul, 2017 (ton/acre, 1 ton = 2000 lbs).

Look for province-wide results in the 2017 Alberta Seed Guide.