



Perennial Forage Variety Evaluation and Demonstration at Multiple Sites in Alberta

## QUANTIFYING YIELD AND QUALITY OF PERENNIAL VARIETIES AND MIXTURES

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**Background:** Producers are increasingly interested about perennial forage varieties and mixtures. While some yield and agronomic data may be available on these varieties from seed companies, regional data specific to soil type and growing conditions has been limited due to very little participation in the Western Forage Variety Testing System in recent years. In addition, quality data is seldom available. Over 34 species, varieties and mixtures were grown at eight sites in Alberta.

**Objectives:** The objectives of this study are to:

1. Provide unbiased, current and comprehensive regional data regarding establishment, winter survival, yield, quality, and economics of specific species and varieties of perennial forage crops
2. To identify perennial crop species and varieties that demonstrate superior establishment, hardiness, forage yield and

nutritional quality characteristics in different eco-regions of Alberta

3. To assess any benefits from growing mixtures of selected species
4. To demonstrate the regional adaptability of various forage species and varieties alone and in mixed stands

**What they did:** Twelve grass species, 15 legume species and nine legume-grass mixes were seeded into cereal stubble or chem fallow at the following sites in 2016: Barrhead, Evansburg, Fort Kent, Fort Vermilion, High Prairie, Manning, Sedalia, and Sedgewick. Establishment, height, botanical composition, dry matter weight, yield, and forage quality were measured for all plots. A partial economic analysis was conducted for each variety, comprised of seeding, establishment, chemical, and harvest costs compared to the value of the forage. Fleet meadow brome was used as the check for the grass varieties, AC Yellowhead alfalfa for the legumes, and Fleet meadow brome/AC Yellowhead alfalfa for the grass/legume mixtures at all sites.

**What they learned:** Sites were grouped by ecoregion for reporting purposes: Mixed Grassland (Sedalia), Aspen Parkland (Sedgewick), Boreal Transition (Fort Kent, Barrhead and Evansburg), Peace Lowland (Fort Vermilion, High Prairie and Manning). Adverse environmental conditions in the Aspen Parkland (all sites), Boreal Transition (one site),

and the Peace Lowland (one site) zones resulted in lost trials. In the tables below, grasses, legumes and grass/legume mixes that performed similarly to or better than the check varieties for yield averaged over 2017 and 2018 are reported for each eco-zone, along with average nutritional data over both years, and combined two-year net return.

#### *Mixed Grassland*

	Dry Matter Yield, lbs/acre (% check) <sup>1</sup>	Crude Protein (%) <sup>2</sup>	Total Digestible Nutrients (%) <sup>3</sup>	Net Return (\$/acre) <sup>4</sup>
Grasses				
Greenleaf pubescent wheatgrass	3,862 (139)	7.27	56.90	\$417.67
AC Success hybrid brome	3,504 (126)	7.30	56.47	\$342.45
AC Saltlander green wheatgrass	3,024 (109)	7.77	57.95	\$240.40
AC Knowles hybrid brome	2,929 (105)	8.54	58.12	\$237.42
Fleet meadow brome	2,782 (100)	8.01	55.01	\$238.00
Kirk crested wheatgrass	2,650 (95)	6.55	57.70	\$253.90
Legumes				
AC Yellowhead alfalfa	3,429 (100)	16.13	59.65	\$315.07
Rugged alfalfa	3,367 (98)	15.97	57.61	\$316.13
Grass/Legume Mixtures				
AC Success hybrid brome/AC Yellowhead alfalfa	3,192 (101)	12.10	58.03	\$259.68
Fleet meadow brome/AC Yellowhead alfalfa	3,159.50 (100)	11.29	56.51	\$262.89
AC Knowles hybrid brome/AC AC Yellowhead alfalfa	3,151 (100)	13.44	57.74	\$248.91
AC Success hybrid brome/Spredor 5 alfalfa	3,071 (97)	13.36	58.57	\$240.99

Checks were Fleet meadow brome, AC Yellowhead alfalfa, or Fleet/AC Yellowhead grass/legume mixture

<sup>1</sup>Average of sites and years 2017, 2018

<sup>2</sup>Average of sites and years 2017, 2018

<sup>3</sup>Average of sites and years 2017, 2018

<sup>4</sup>Average of sites, but total of years 2017, 2018

#### *Boreal Transition Zone*

	Dry Matter Yield, lbs/acre (% check) <sup>1</sup>	Crude Protein (%) <sup>2</sup>	Total Digestible Nutrients (%) <sup>3</sup>	Net Return <sup>4</sup>
Grasses				
AC Success hybrid brome	12,256 (129)	8.37	60.61	\$1,171.38
Greenleaf pubescent wheatgrass	10,858 (115)	8.54	58.68	\$1,041.73
Grindstad timothy	10,537.50 (111)	7.92	60.80	\$1,057.15

Courtney tall fescue	10,503 (111)	8.36	60.44	\$1,041.98
AC Saltlander green wheatgrass	10,275.50 (108)	9.28	61.17	\$995.02
Fleet meadow brome	9,481.50 (100)	9.73	60.08	\$900.15
AC Knowles hybrid brome	9,350.50 (99)	8.46	62.43	\$915.06
Legumes				
AC Yellowhead alfalfa	9,850.50 (100)	15.60	54.00	\$922.64
Dalton alfalfa	9,319.50 (95)	15.01	55.45	\$922.64
Grass/Legume Mixtures				
AC Knowles hybrid brome/AC Mountainview sainfoin	12,213 (115)	10.29	61.97	\$1,183.56
AC Success hybrid brome/AC AC Yellowhead alfalfa	11,220.50 (105)	10.10	58.52	\$1,247.05
AC Knowles hybrid brome/AC AC Yellowhead alfalfa	10,969 (103)	11.42	59.42	\$1,117.58
AC Knowles hybrid brome/Spredor 5 alfalfa	10,889 (102)	11.44	61.52	\$1,130.20
Fleet meadow brome/AC Mountainview sainfoin	10,772.50 (101)	8.71	59.54	\$1,083.30
Fleet meadow brome/AC Yellowhead alfalfa	10,639 (100)	10.49	58.51	\$1,085.94
AC Success hybrid brome/Spredor 5 alfalfa	10168.50 (96)	10.99	58.94	\$972.30

Checks were Fleet meadow brome, AC Yellowhead alfalfa, or Fleet/AC Yellowhead grass/legume mixture

<sup>1</sup>Average of sites and years 2017, 2018

<sup>2</sup>Average of sites and years 2017, 2018

<sup>3</sup>Average of sites and years 2017, 2018

<sup>4</sup>Average of sites, but total of years 2017, 2018

#### *Peace Lowland Zone*

	Dry Matter Yield, lbs/acre (% check) <sup>1</sup>	Crude Protein (%) <sup>2</sup>	Total Digestible Nutrients (%) <sup>3</sup>	Net Return <sup>4</sup>
Grasses				
AC Saltlander green wheatgrass	3,311 (125)	10.02	59.94	-\$58.08
Killarney orchardgrass	3,257.50 (123)	9.01	62.54	-\$37.59
Greenleaf pubescent wheatgrass	3,209.50 (121)	10.69	59.42	-\$24.61
AC Admiral hybrid brome	3,168.50 (119)	10.83	63.49	-\$42.92
Grindstad timothy	3,017.50 (114)	11.19	62.38	\$17.29
Kirk crested wheatgrass	2,872 (108)	10.48	60.22	-\$25.71
AC Success hybrid brome	2,811 (106)	11.40	61.66	-\$64.99
AC Knowles hybrid brome	2,776.50 (105)	10.92	62.06	-\$65.38
Fleet meadow brome	2,655 (100)	10.40	62.62	-63.59

Legumes				
AC Yellowhead alfalfa	3,429.50 (100)	15.52	59.47	\$81.26
20-10 alfalfa	3,356 (98)	15.83	58.09	\$90.35
PV Ultima alfalfa	3,350.50 (98)	15.42	58.27	\$72.03
Oxley II cicer milkvetch	3,347 (98)	15.98	62.07	\$85.43
Dalton alfalfa	3,297.50 (96)	15.52	57.42	\$77.17
Spredor 5 alfalfa	3,280.50 (96)	15.70	57.38	\$72.49
Assalt alfalfa	3,278.50 (96)	17.09	60.17	\$73.71
44-44 alfalfa	3,256 (95)	15.77	59.37	\$72.60
Grass/Legume Mixtures				
Fleet meadow brome/AC Yellowhead alfalfa	3,614 (100)	16.51	63.03	\$39.11

Checks were Fleet meadow brome, AC Yellowhead alfalfa, or Fleet/AC Yellowhead grass/legume mixture

<sup>1</sup>Average of sites and years 2017, 2018

<sup>2</sup>Average of sites and years 2017, 2018

<sup>3</sup>Average of sites and years 2017, 2018

<sup>4</sup>Average of sites, but total of years 2017, 2018

**What it means:** Adverse conditions such as drought, flooding or weed pressure during the establishment year have a large impact on the productivity of a forage stand regardless of variety. As 2018 was a dry year in most of the province, yields were significantly decreased; however, there were varieties that seemed to handle drought better than others. Generally, the check varieties of legumes and grass/legume mixtures out-yielded the grass check varieties, but depending on eco-zone, some straight grass varieties were equal to or higher yielding than the top legume varieties and grass/legume mixtures. While two growing seasons is a relatively short time frame, this speaks to the importance of ensuring regional adaptation for forage varieties because local growing conditions will have a large impact on the productivity of the stand. Alfalfa had better persistence in these trials than did the sainfoin or cicer milkvetch varieties. Forage quality varied significantly between varieties, years, and even between sites in the same eco-zone. This was especially apparent in nutrients such as phosphorus, magnesium, potassium, sodium, sulphur, copper, manganese and zinc, but was also present in crude protein and energy values. This variation highlights the importance of yearly forage testing to ensure

animal requirements are being met. Economic return, as expected, was most impacted by yield and seed cost of the various varieties.

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