High Legume Pasture Project 2016/2017 (Sainfoin-Alfalfa)

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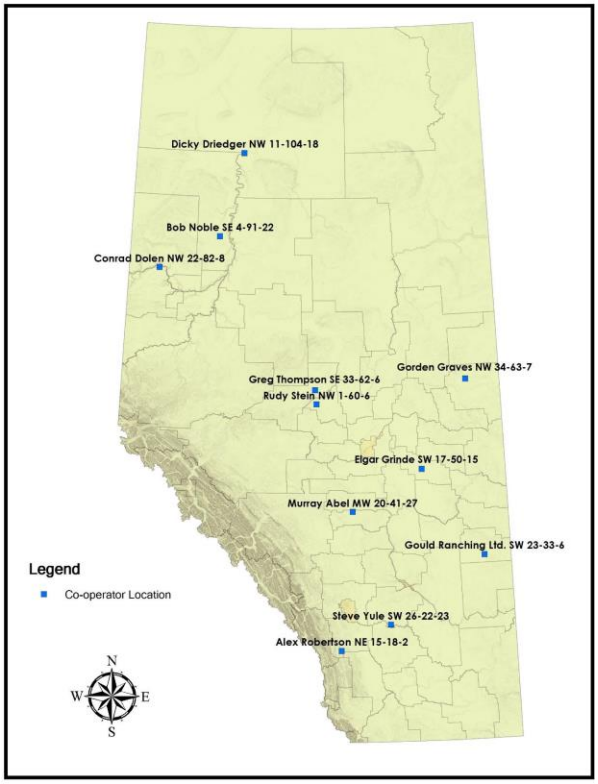
Partners:

Agricultural Research and Extension Council of Alberta
Alberta Agriculture and Forestry
Battle River Research Group
Chinook Applied Research Association
Farming Smarter
Foothills Forage Association
Gateway Research Organization
Grey-Wooded Forage Association
Lethbridge Research and Development Centre / Agriculture and Agri-Food Canada
Mackenzie Applied Research Association
North Peace Applied Research Association
Peace Country Beef and Forage Association
Peace River Forage Association of British Columbia
West-Central Forage Association



High Legume Pasture Project Co-operators

1. Battle River Research Group / Holden / Elgar Grinde
2. Chinook Applied Research Association / Consort / Gould Ranching Ltd.
3. Foothills Forage Association / Gleichen / Steve Gleichen
4. Foothills Forage Association / Longview / Alex Robertson
5. Gateway Research Organization / Fort Assiniboine / Greg Thompson
6. Grey-Wooded Forage Association / Lacombe / Murray Abel
7. Mackenzie Applied Research Association / La Crete / Dicky Driedger
8. North Peace Applied Research Association / Manning /Bob Noble
9. Peace Country Beef and Forage Association / Fourth Creek / Conrad Dolen
10. Peace River Forage Association of British Columbia / Fred Schneider
11. West-Central Forage Association / Tiger Lily /Rudy and Darlene Stein

Background

Feed costs and their systems are the single greatest expense to a cattle operation, so feed is almost always the primary factor that determines the profitability of that operation. There are management practices that can help livestock producers optimize production through feeding/grazing management which include enhancing pasture productivity and extending the grazing season. Both of these strategies can be addressed through grazing higher legume forages. "*Alberta Agriculture and Forestry, Grazing High Legume Pastures, March 2017".*

New sainfoin varieties have shown promise for persistence under grazing in alfalfa-sainfoin mixtures, with comparable yields to alfalfa/grass mixes and are bloat mitigating. The threat of bloat in grazing livestock has stymied efforts by the livestock industry to use higher producing forage crops like alfalfa which could reduce the acres required to support livestock production and provide competitive gain opportunities for feeder cattle. The new emerging sainfoin cultivars will offer the livestock industry the opportunity to take advantage of the productivity, flexibility and profitability of legume based pastures. Sainfoin contains tannins that bind with the soluble proteins and inhibit the activity of rumen microbes; thus slowing the rate of digestion of the forages. A rapid rate of forage digestion has been determined to be a major cause of bloat.

By managing the pasture to ensure the sainfoin remains, animals will consume the tannins from the sainfoin and therefore reduce the chances of a bloat incident. The grass also present in the pasture gives another non-bloat grazing forage that when consumed will reduce the amount of alfalfa consumed, and therefore also reduce potential for animal bloat. The new sainfoin variety, AC Mountainview, that has been developed at the Lethbridge Research Centre is proving to be competitive in forage stands and has higher regrowth than previous varieties, allowing it to regrow at the same rate as alfalfa. Livestock producers could now use AC Mountainview as a natural bloat control and graze higher legume pastures confidently.

In cooperation with eleven forage and applied research associations, thirteen producers across Alberta, in consultation with high legume grazing mentors with financial and economic analysis and Alberta Agriculture and Forestry staff, coordinated a two year field trial to demonstrate the potential of sainfoin in a high-legume pasture mix on a field scale level. WCFA partnered with Rudy and Darlene Stein from Tiger Lily, located in the County of Barrhead for this project. The Stein's had a 10 acre pasture previously cultivated for two years. The goal of this project was to provide producers with the opportunity to experience establishing a high legume pasture (60+ % legumes) and with grazing that pasture in the second year.

Objectives: Primary goal of the project is to mitigate bloat while grazing high legume pastures.

- To determine establishment and longevity of high legume pasture stands.
- To determine high legume pasture stands performance under grazing pressure.

Methodology

Soil was tested for nutrients in the spring of 2016 and results were used to prescribe fertilizer applications. The trial was seeded to a cultivated, harrowed and packed field on May 16, 2016 using a Brillon Seeder to a depth of ½ inch. 60% of the mixture was legumes (Sainfoin 70% and Alfalfa 30%) and the remaining 40% was grasses (Orchard Grass 33 %, Meadow Brome 33% and Tall Fescue33%).

Name	Percentage of varieties on the pasture (%)	Percentage of the mixture (%)	Pounds per acre (lbs/ac)
Ultimate Pasture *(Legumes)*	60	100	33
AAC Mountain View Sainfoin		30	9.9
Hay Grazer Alfalfa		70	23.1
Grass Seed Mixture *(Grasses)*	40	100	2.64
Orchardgrass Orca		33	0.66
Meadow Bromegrass Common No. 1		33	1.32
Tall Fescue Common No. 1		33	0.66

Table 1. High Legume Pasture Project 2016/2017, Pasture Mixture seeded at Tiger Lily Alberta. *Note: No herbicide treatment was administered prior to seeding.*

2016 Observations

Despite the lack of precipitation at the time of the seeding in May (28mm), the subsoil moisture was moderate and the soil temperate was 22˚C. Aggressive weed growth was observed due to the moisture conditions in early June (41mm) and July (141mm). For weed control, sheep were allowed to graze from June 23 to 27. A single cut and rake occurred on July 26 and the baling and wrapping was done on July 28. *The weeds identified at that time were: Buckwheat, Pigweed, Wild oats, Hemp nettle, Quackgrass and greater population of Wild mustard plants*.

On August 8, to determine germination and stand establishment, plant counts were conducted on an area of ¼ meter squared at 10 locations (Table 2) throughout the field. 5 locations had moderate grazing pressure (moderate grazing pressure) and the other 5 had low grazing pressure (light grazing pressure). One additional grazing took place in the fall after frost.

2016 Observations continuation

Plant counts at Tiger Lily Alberta

Location	Sainfoin (plants/.25 m²)	Alfalfa (plants/.25 m²)	Grass (plants/.25 m²)
Moderate Grazing Pressure			
1	1	7	7
2	9	12	16
3	7	15	26
4	4	10	10
5	5	12	2
total	**26**	**56**	**61**
Light Grazing Pressure			
6	2	7	1
7	6	16	14
8	8	12	3
9	6	13	5
10	10	14	12
total	**32**	**62**	**35**

Table 2. High Legume Pasture Project 2016/2017, Plant counts at Tiger Lily Alberta. *Note: Grazing pressure is the demand/supply ratio between dry matter requirements of livestock and the quantity of forage available in a pasture at a specific time.*

2017 Observations

May

Over all the snow cover all winter was good. At the start of the growing season there was an extreme amount of volunteer clover.

June

Four pasture cages were placed on the field to determine the percentage of each variety by weight. On June 29, clippings were taken, fresh weight and dry weight were measured and the percentage of each species was calculated for each cage. Species composition percentage average in the field was calculated in July (See Graph 1). *The weeds identified at that time were: Canada thistle, Quackgrass and Dandelion*.

July

On July 10, the field was grazed with 500 head of sheep. *Alfasure®* was administered to the flock 24 hours prior to grazing (just one treatment). Alfasure® *is a non-ionic surfactant that reduces the stability of the foam. When added to cattle's drinking water, it works like the anti-foaming agents that are added to hot tubs to eliminate foam buildup. When the foam bubbles in the rumen burst, the released gas collects as free gas, which stimulates a normal burping reflex.*

August

On August 29, cutting, baling and wrapping was completed. *The weeds identified at that time were: Dandelion, White clover and Quack grass.* Species composition percentage average in the field was calculated in August (See Graph 2). *NOTE: White clover was considered a weed in this trial due to the pressure to sainfoin, typically it's not considered a weed.* Some observations on the filed prior to the cutting were:

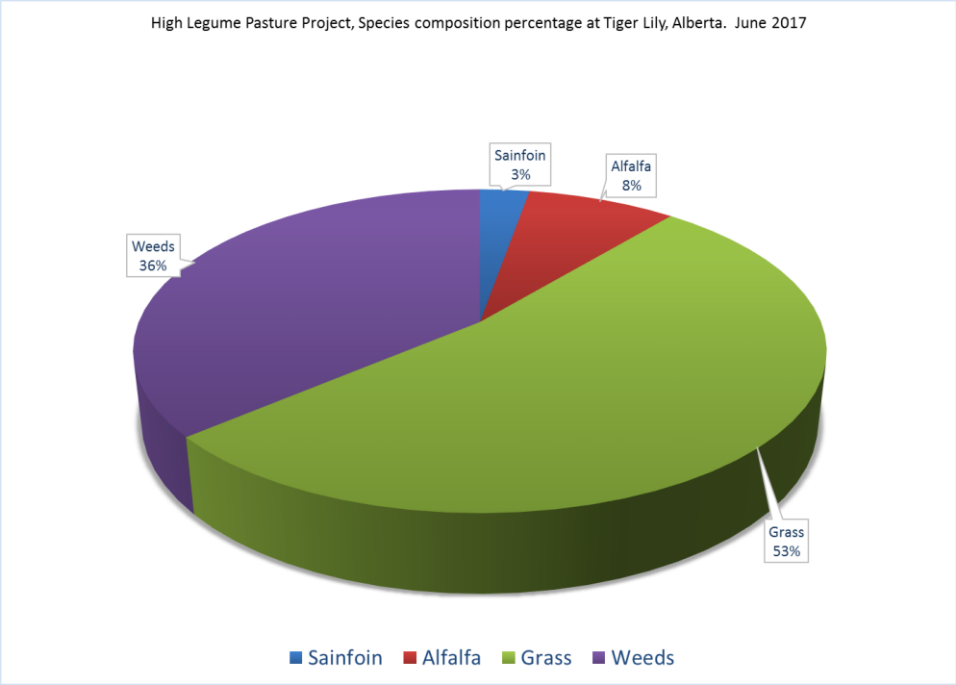
- ✓ More sainfoin plant present where grass was not seeded
- ✓ Sainfoin plants just starting to set seed
- ✓ On the lower parts of the field there were less sainfoin plants (Unsure if due to soil, moisture or both)
- ✓ Uneven distribution of the sainfoin plants, but zero cases of bloat reported during 2017
- ✓ Suspected that grass and clover suppressed the sainfoin population

September

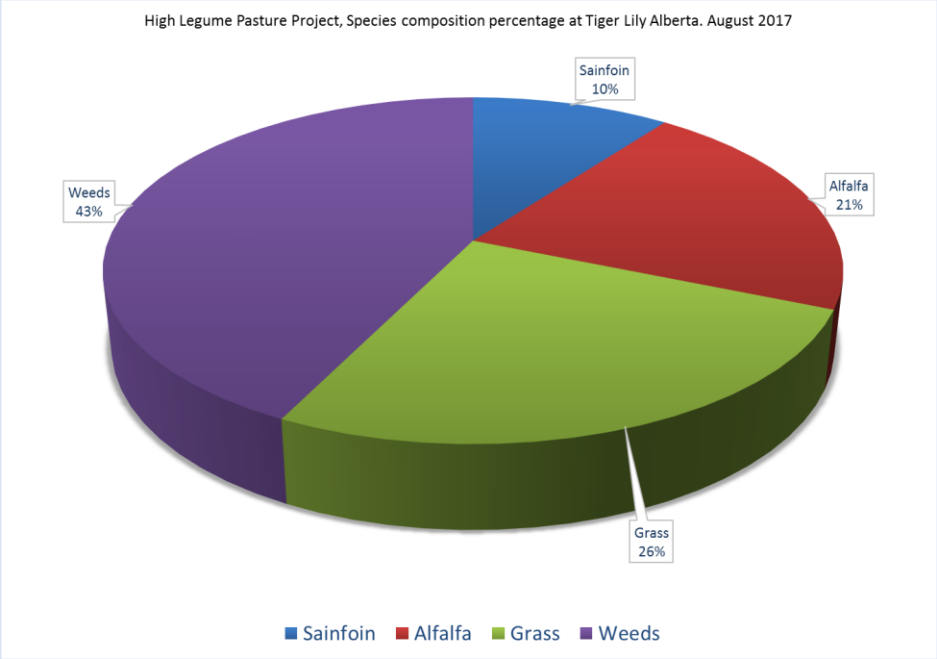
Late September clippings were collected. More Sainfoin plants were observed on the north and south sides of the test field where there was less pressure from grass and weeds. There was a great amount of volunteer clover, likely due to the extreme moisture during the growing season. *The weeds Identified were: White clover, Dandelion, Sow thistle, Canada thistle and Pigweed*

October

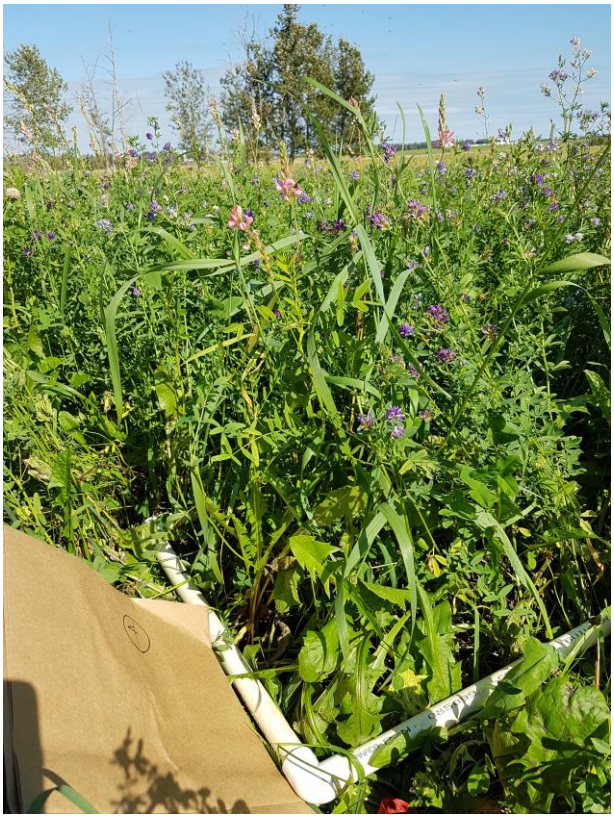
All the areas with sainfoin plants present were left standing to allow them to set seed for the next growing season. The remainder of the field was cut and baled.



Graph 1. High Legume Pasture Project, proportion of each variety collected on June 2017 by weight on the experimental field at Tiger Lily Alberta.



Graph 2. High Legume Pasture Project, proportion of each variety collected on August 2017 by weight on the experimental field at Tiger Lily Alberta.

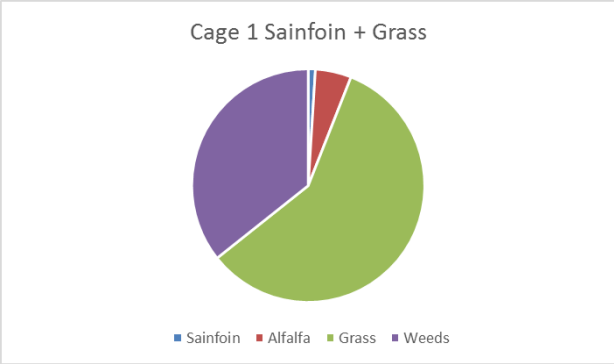


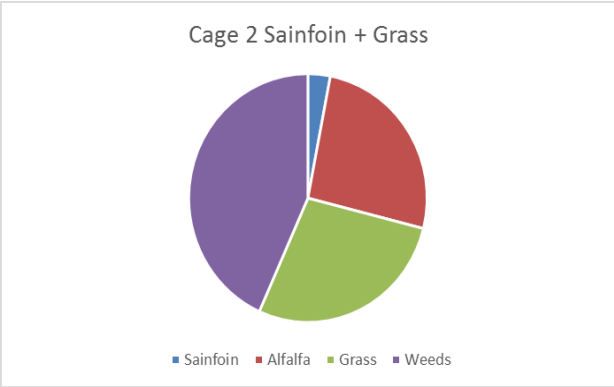
High Legume Pasture Project, picture taken on August 2017 at Tiger Lily Alberta.

Other Observations:

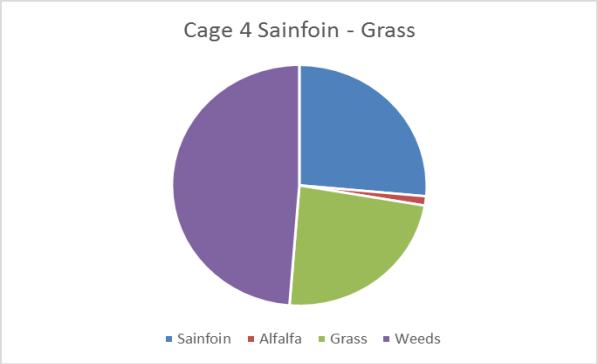
Fewer sainfoin plants were observed in the samples that were taken from where sainfoin and grass were seeded, and more sainfoin plants were observed in the samples were sainfoin and no grass were seeded.
Note: In the graphics below the blue colour represents the percentage of sainfoin.

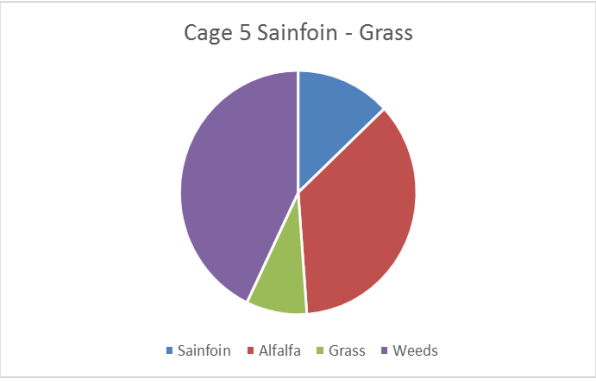
Sainfoin + Grass





Sainfoin – Grass

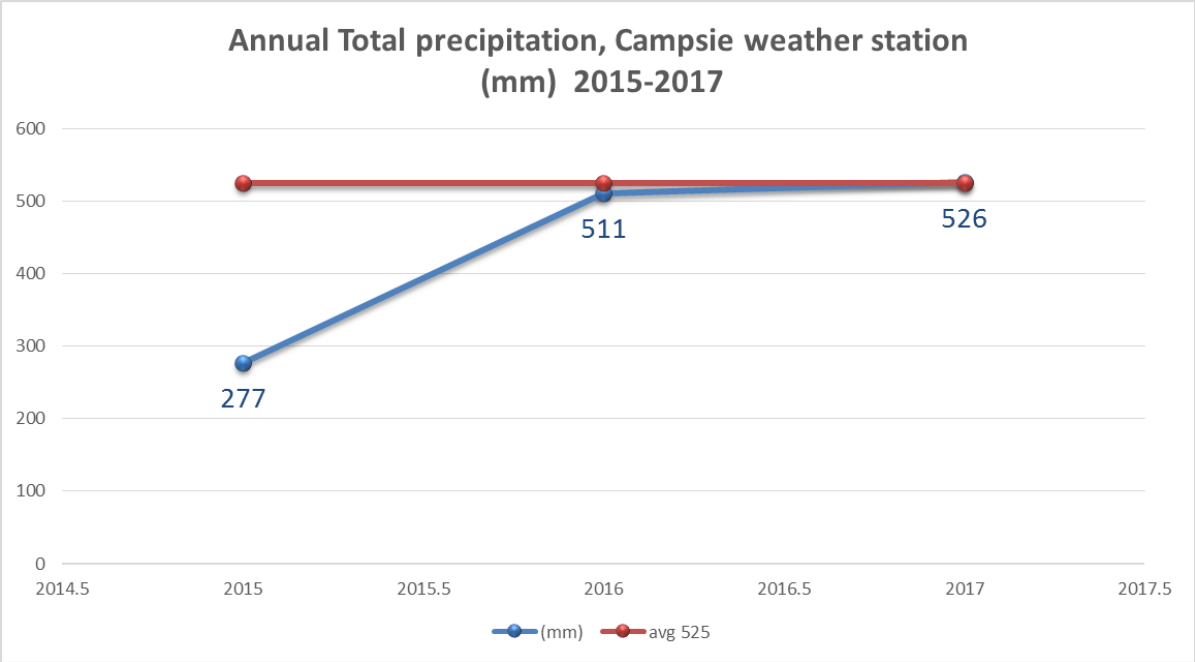




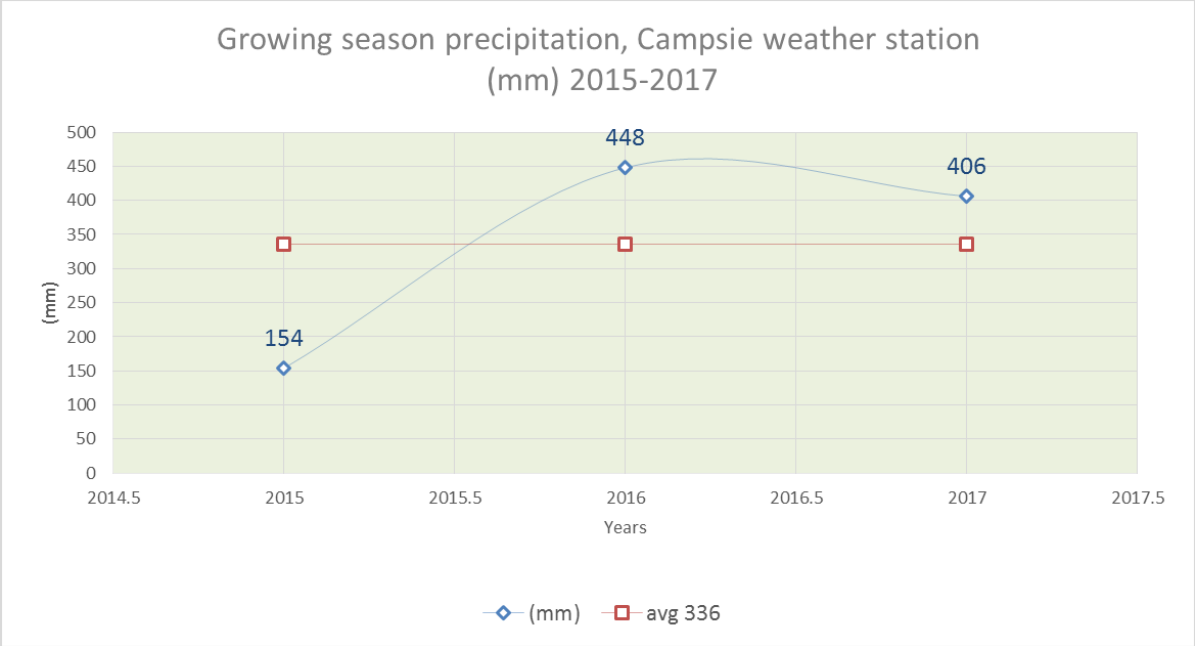
High Legume Pasture Project. The picture showed the difference between two of the five cages. Cage 2 was place on one of the parts of the field that was seeded sainfoin and mixed grasses and Cage 4 just sainfoin.

Environmental Conditions

Campsie Weather Station is the closest to the experimental field within the County of Barrhead, reported 525mm on average and the growing season precipitation May until October just (336mm) on average *"Alberta Weather Data Viewer, 2017"*. Graphic 1 shows the Historic annual precipitation for the Campsie weather station. Graphic 2 shows the accumulative precipitation for the growing season from the Campsie weather station.



Graphic 1. – Historic annual precipitation for the Campsie weather station from 2015 to 2017



Graphic 2. – Growing season precipitation in the Campsie weather station from 2015 to 2017

High Legume Pasture Project, 2016 fall grazing after killing frost at Tiger Lily, Alberta

High Legume Pasture Project, picture taken on September 2017 at Tiger Lily, Alberta.