



Saskatchewan Hay & Pasture Report

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Note from the Saskatchewan Forage Council

August finds producers across Saskatchewan haying, harvesting, managing livestock and generally keeping very busy! I hope you have had time to enjoy some summer sun and get outdoors this season. The start of August in Saskatchewan always makes me feel that fall is just around the corner!

The Saskatchewan Forage Council is excited to share Tara Mulhern Davidson's interviews with Dr. Alan Iwaasa and Dr. Eddie Sottie from the Agriculture and Agri-Food Canada (AAFC) Swift Current Research and Development Centre in this edition. It's always exciting to read about the excellent forage research being done right here in Saskatchewan!

As always, we welcome your feedback and encourage anyone interested in being placed on our email distribution list to contact the SFC at office@saskforage.ca. You may also want to visit our website www.saskforage.ca for regular news and information related to the forage industry.

Saskatchewan Agriculture Crop Report

(For the period ending August 1, 2016)

Harvest operations have just begun in parts of the province with some farmers combining peas, lentils and winter cereals, or swathing canola, according to Saskatchewan Agriculture's weekly Crop Report. It was another good week for hay progress, as producers now have 70 per cent of the hay crop baled or put into silage and another 15 per cent cut and ready for baling. The five-year average (2011 to 2015) is 73 per cent baled or put into silage.

Hay quality is rated as six per cent excellent, 69 per cent good, 23 per cent fair and two per cent poor. Very few hay acres have been through a second cut. Hay is slow to dry in swath due to high humidity and rain.

The majority of the precipitation was recorded in the west regions of the province, ranging from trace to 50 mm (Macklin area). A couple of other areas reported significant rain and severe weather, including the Yorkton and Melville area, where heavy downpours, large hail and confirmed tornadoes were reported. Lentils and peas in many areas of the province are suffering from season-long excess moisture. Diseases and hail have also caused crop damage.

Provincially, cropland topsoil moisture is rated as 12 per cent surplus, 81 per cent adequate, six per cent short and one per cent very short. Hay land and pasture topsoil

moisture is rated as seven per cent surplus, 83 per cent adequate, nine per cent short and one per cent very short. Sufficient rain throughout the growing season in most areas of the province has resulted in good pasture growth. Pasture conditions are rated as 20 per cent excellent, 64 per cent good, fourteen per cent fair and two per cent poor. In the northwest region, where precipitation was lacking, pasture conditions are rated as one per cent excellent, 43 per cent good, 43 per cent fair and 13 per cent poor.

Farmers are busy haying and getting ready for harvest.

To view the full Crop Report online, [click here](#).

AAFC Grazing Researcher Specializes in both Tame and Native Forage Species

By: Tara Mulhern Davidson, PAg

Alan Iwaasa is a research scientist at the Agriculture and Agri-Food Canada (AAFC) Swift Current Research and Development Centre and his interests are diverse in focus to say the least. Specializing in both introduced perennial grasses as well as native legumes, Iwaasa's work examines forages and their role in sustainable grazing management.

AC Saltlander is a tame grass, a variety of green wheatgrass that has major potential for marginal lands that otherwise go unused. Developed in Swift Current at AAFC, this species has unique possibilities for farmers trying to manage saline areas. "In the past, we've looked at saline tolerance and establishment of AC Saltlander," explained Iwaasa. "Now we're taking it a step further and are looking at development of best practices for producers seeding into marginal, saline areas," he said. Through Saskatchewan ADF and AAFC research projects, Iwaasa is evaluating timing of seeding, and whether spring seeded or fall seeded AC Saltlander demonstrates greater establishment success. "We will also look at the best method of seeding, so we will study direct seeding into existing stubble as well as cultivation followed by seeding," Iwaasa described, adding that they are using various drills in different land preparations similar to what producers would experience in field conditions.

Seeding rate is another aspect that Iwaasa and his team are trying to properly understand. "AC Saltlander has a recommended seeding rate of 10 lb/acre. Seed cost is high for producers right now, so we're looking at what happens if we cut seeding rates in half which would save producers substantial costs," Iwaasa said. "Earlier small plot studies were successful in reducing seeding rates and new field size research trials are assessing what happens using 5lb/acre and even 2.5 lb/acre," he added. Flood tolerance is also a variable that is being looked at. So far, preliminary results



Dr. Alan Iwaasa, a grazing research scientist with Agriculture and Agri-Food Canada, explains how he measures greenhouse gases emitted by grazing cattle.

Image Credit: Tara Mulhern Davidson

show that AC Saltlander is comparable to smooth brome in its ability to withstand flooding at different stages of growth.

AC Saltlander continues to demonstrate promise for producers. “With land prices increasing, it would be nice for farmers to recoup some of those landbases that were traditionally filled with foxtail barley or other less beneficial species,” Iwaasa acknowledged.



Purple prairie clover is legume species native to Saskatchewan’s prairie grassland.

Image Credit: Tara Mulhern Davidson

Switching gears, Iwaasa and his team also work with both purple and white prairie clovers, two legume species that are native to Saskatchewan prairie grasslands. “These natural legumes typically have a lot of growth occurring in July and August, which helps fill the gap of a mid-summer slump in other forage species,” Iwaasa described. He added that the vegetative leaves on the plant remain edible, and cattle continue to graze even after seed set and pod development, suggesting these species may be useful for extending the grazing season.

“There are also a lot of opportunities for both purple and white prairie clover on the environment and human health sides,” Iwaasa mentioned. The two native clovers contain some of the highest condensed tannins concentrations which provide these plants with interesting characteristics. Grazing research at Swift Current found grazing purple prairie clover at the flowering stage was able to reduce shedding of E coli 0157:H7. Because of the high tannin levels, animals grazing white or purple prairie clover in a mix of other forage species could reduce methane emissions and improved nitrogen use efficiency.

“We are trying to take a whole systems approach, where we look at the animal, the environment, the plant, and human health benefits, to graze native species more effectively,” Iwaasa explained. He added there are yet more directions they can take their research with respect to prairie clovers’ effects on pollinators and other biodiversity benchmarks, soil microbiology, and carbon sequestration.

Iwaasa and his team will continue their interesting and practical research at Swift Current, demonstrating the potential that tame and native forages have for producers and the environment.

Birdsfoot Trefoil as a Grazing or Hay Crop

Birdsfoot trefoil is known as a palatable legume that does not cause bloat in ruminants but is not as commonly-used as alfalfa and other legumes in Saskatchewan, in part because it is known to be more difficult to establish.

Dr Sid Bosworth of the University of Vermont Department of Plant and Soil Science is the author of the resource “[Birdsfoot Trefoil As a Grazing or Hay Crop](#)”. The following is an excerpt from the pdf:

Birdsfoot trefoil is a long-lived perennial legume that can provide excellent nutritional value to pasture and additional summer production when grasses often go into a growth slump. Trefoil’s branched, relatively shallow taproot makes it less drought tolerant than alfalfa, but it is tolerant of poorly drained and somewhat acid soils. This factor combined with high forage quality, zero bloat potential, excellent grazing tolerance, natural reseeding capability, and the potential for a long stand life, make

it an ideal pasture legume. In addition, birdsfoot trefoil can also be used as a legume companion crop with grasses either for pasture or hay. Regardless of use, it is important to consider variety selection, establishment, fertility needs, grazing management and, of course, costs.

Birdsfoot trefoil varieties can be categorized into three general types: 1) prostrate or low-growing types such as Empire, Leo, or Dawn, 2) erect or hay types such as Viking or Maitland, and 3) semi-erect such as Norcen. Generally, the prostrate or semi-erect types have been recommended for grazing because of their low profile and tolerance to prolonged grazing. However, the erect and semi-erect varieties can tolerate rotational grazing and would be best suited for mixed hay/grazing situation.

Seedling vigor is a major consideration when selecting trefoil varieties since trefoil is generally slow to establish. It is best to purchase certified seed to ensure that you are buying improved varieties. "Common" or non-certified seed may have unpredictable performance. Some varieties such as 'Leo', 'Maitland' or 'Norcen' have been selected for better seedling vigor as compared to older varieties like Empire and Viking. A newer variety, 'Pardee', released by Cornell in 1999, has a higher resistance to Fusarium wilt, a disease that caused a significant decline of trefoil in the Champlain Valley during the 1960's. It is an upright, hay-type variety that matures earlier than other varieties. It has also yielded better in New York variety trials.

To read the full pdf, [click here](#).

Additional Resources:

To view the SFC factsheet for Birdsfoot Trefoil, [click here](#).

The Saskatchewan Agriculture article "Soil Improvement with Legumes" discusses the use of Birdsfoot Trefoil and other perennial legumes. [Click here](#) to read the article.

The SFC ADOPT Project titled "Demonstration of Perennial Forage Crops" (completed in 2013) included Birdsfoot Trefoil as one of the many perennial forages demonstrated at four locations in Saskatchewan. To view the project report, [click here](#).

One challenge that producers do encounter with sainfoin is maintaining longevity in a forage stand. This problem is something Sottie is attempting to understand and address through several different trials taking place over the next few years.

Sustaining Sainfoin is a Focus for one Researcher

By: Tara Mulhern Davidson, PAg

Dr. Eddie Sottie, a PDF researcher at Agriculture and Agri-Food Canada (AAFC) Swift Current Research and Development Centre (SCRDC) has a particular forage crop on his mind - sainfoin. Drs. Sottie and Alan Iwaasa are conducting several studies at the Swift Current-based research centre that feature sainfoin, a cool season perennial legume species.

Appreciated by producers for its' non-bloating properties, sainfoin is a pink-flowered legume that is not susceptible to alfalfa weevils and provides similar production benefits to alfalfa. One challenge that producers do encounter with the crop, however, is maintaining longevity of sainfoin in a forage stand. This problem is something Sottie is attempting to understand and address through several different trials taking place over the next few years.

"In one project, our aim is to reintroduce sainfoin into older stands of alfalfa," explained Sottie. "We realize that after four or five production years, sainfoin in an

alfalfa mix declines,” he said, adding that it is optimal to have a minimum of 20% sainfoin in a mix to provide bloat protection. Sottie will assess four different treatment methods of reintroducing sainfoin and rejuvenating forages. One treatment involves cultivating the existing stand and re-seeding the desired mix, with alfalfa and sainfoin drilled in alternate rows. Another treatment includes applying herbicide to the alfalfa to suppress growth and seeding directly into this stand. A third treatment will examine the effects of simulated grazing, through mowing the existing alfalfa, then seeding directly into this. A fourth “control” plot with no treatment applied will be assessed for a comparison. Productivity, longevity and the cost of various treatments will be evaluated over the next three seasons.



Sainfoin in bloom

Image Credit: Tara Mulhern
Davidson

“Producers are excited about alfalfa/sainfoin mixtures because of their ability to reduce potential impacts of bloat, and yet they provide relatively high daily performance, around 1-1.5 kg/day,” explained Sottie. “If we can get sainfoin to persist in the stand for another two or three years, that would be good,” he added. Sottie is also undertaking another project at AAFC that looks at seeding sainfoin into old crested wheatgrass pastures using similar treatments of cultivation and re-seeding, spraying and direct-seeding, and mowing and direct-seeding. Sottie is also collaborating on another project with the Western Beef Development Centre where sainfoin is included in a mix with four different tame grass species.

Sottie acknowledges that it is crucial to obtain feedback from producers before undertaking multi-year projects, and says he regularly runs ideas past a local forage association. This helps to address any producer concerns, such as requirements for specialized equipment, or other real-life situations that may impact producers’ ability to apply the researched practices on their farms.

In conversations with producers, Sottie noted a potential stumbling block for producers who are wanting to seed sainfoin. “There is a lack of commercially available inoculant for sainfoin in Canada,” Sottie explained, which prompted him to develop a research project to explore alternatives. Sottie and his team will be studying the effects of seeding sainfoin with no inoculant applied; seeding with fertilizer only; and seeding with both fertilizer and inoculant.

There is great potential to including non-bloating legumes, such as sainfoin, into forage crops. Ongoing research at SCRDC ensures that incorporating sainfoin into forage management can be a user-friendly and practical solution for producers across Saskatchewan.

Native Prairie: Manage it today to appreciate it tomorrow

A Saskatchewan Prairie Conservation Action Plan (SK PCAP) workbook

In association with Native Prairie Awareness Week (NPAW) and the NPAW planning committee, SK PCAP has developed a workbook titled *Native Prairie - Manage it Today to Appreciate it Tomorrow*. This document contains information and exercises

related to range management, range health, species at risk, invasive species and riparian areas.

This resource is **free** and available online. Check it out today! The link can be found on the SFC website's [resources page](#) or by [clicking here](#).

SK PCAP also has a [native prairie factsheet](#), which is a two-page document and an excellent resource for teachers.

Altering the Nutrient Profile of Alfalfa through Genetic Engineering

Dr. Peiqiang Yu, Saskatchewan Ministry of Agriculture Strategic Feed Research Chair, University of Saskatchewan

Introduction

Alfalfa is a widely used forage for herbivores as it has high nutritive content with an optimal structural to non-structural carbohydrates ratio. On the other hand, the digestibility and utilization of alfalfa is hampered due to its high lignin content. Lignin negatively affects the rumen microbial degradation and digestion of feed by intestinal enzymes. Lignin is the second most abundant component of secondary cell walls.

Thanks to genetic engineering, we can now regulate the lignin biosynthesis pathway by altering the composition and/or concentration of lignin. Recently there has been two genes discovered, TT8 (GT1) and HB12 (GT2), that were shown to have naturally low expression levels in low-lignin tissues of brassica napus and high levels in high-lignin tissues. The GT1 gene has been found to encode a specific protein that could potentially be interacting with other proteins involved in the regulation of lignin and flavonoid biosynthesis pathways. It is possible to use RNAi-mediated approaches to suppress single or multiple genes in secondary cell wall synthesis. By down-regulating GT2 and GT1, we affect the alfalfa inherent structure at a molecular level. The main purpose of this study is to see the effects of the transformation of alfalfa with GT1 and GT2 constructs to see if the inherent carbohydrate structure and the digestibility of alfalfa forage in ruminant livestock systems by depressing the biosynthesis of anti-quality cell wall metabolites.

Materials and Methods

Alfalfa clone N4.4.2 was used as the wild type control and as the recipient for transformation with GT2 and GT1 constructs. The alfalfa samples were analyzed for DM, ash, ether extract (EE), Neutral detergent fiber (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), non-fiber carbohydrate, total carbohydrate, hemicellulose, cellulose and rumen carbohydrate fractions. All samples were housed under greenhouse conditions and harvested at early-to-mid vegetative stage.

Results and Discussion

Nutrient Chemical Profiles

The chemical profiles of both GT2 and GT1 alfalfa populations had lower content of organic matter and NFC but substantially lower in starch compared with the non-transgenic control alfalfa. The GT1 alfalfa had lower CHO content compared with GT2 alfalfa and control populations (67.6 vs. 70.5 and 69.7 % DM, respectively). Both GT2 and GT1 alfalfa populations were higher in ash and NDF contents than the transgenic control alfalfa. Transformation with GT1 and GT2 constructs had no significant effect on ADF and ADL. In comparison with other studies, the alfalfa populations harvested at an early-to-mid vegetative stage in this study (GT2 and GT1 alfalfa populations and

control) had lower NDF, ADF and ADL contents compared to alfalfa harvested at commercial harvesting stage (late bud, early flowering). The ADL that was measured is very useful for feed and dairy industries and producers.

Digestibility in Alfalfa Populations

The 30 h in vitro digestibility of DM (ivDM30) was higher in the GT1 alfalfa population compared to non-transgenic control alfalfa and GT2 alfalfa. However, the 240 h DM digestibility (ivDM240) were higher in the non-transgenic alfalfa and GT1 alfalfa than the GT2 alfalfa. The 30 h in vitro digestibility of NDF (ivNDF30) was higher in GT1 alfalfa populations, and lowest in non-transgenic alfalfa populations. GT1 alfalfa also had higher 240 h in vitro digestibility of NDF (ivNDF240) compared to non-transgenic alfalfa and the GT2 alfalfa. These results indicate that the NDF in GT1 alfalfa populations would be more easily degraded in the rumen. The potentially digestible NDF can determine the availability of NDF in ruminants. This can influence animal performance such as milk yield or dry matter intake. A higher ivNDF240 in the GT1 alfalfa means that the transformation with GT1 constructs could be a way to increase the NDF availability in alfalfa. There is also more unavailable NDF content in the non-transgenic alfalfa and GT2 alfalfa populations because the 240 h undegradable NDF (iNDF240) was higher in the non-transgenic alfalfa and GT2 alfalfa than the GT1 alfalfa population. Therefore, changing the expression of GT1 gene could improve the forage quality by increasing the availability of NDF. Keep in mind that the new in vitro methods are different from the traditional in vitro method with a stimulation of a two-stage digestion in the rumen and the gut.

Carbohydrate Molecular Spectral Features

The results of this studied shown that the non-transgenic alfalfa populations tended to have higher structural carbohydrate than the GT2 alfalfa population and the GT1 alfalfa populations being intermediate.

Conclusion

Different CHO functional groups had different sensitivity and different responses to the transformation. The CHO molecular structure changes induced by the transformation were associated with predicted CHO availability. Compared with GT2, transformation with GT1 could improve forage quality by increasing the availability of both NDF and DM.

Saskatchewan Hay Market Report

Saskatchewan Ministry of Agriculture

www.agriculture.gov.sk.ca/FeedForageListing

For the week ending August 5, 2016, there were five listings for feed or forage for sale on the Ministry of Agriculture Feed and Forage listing. Available forage included brome-alfalfa hay bales, rye bales, feed barley (asking \$3.95/bu), standing oats for greenfeed (asking \$35/ton) and standing alfalfa/brome hay. A review of Kijiji, and the Western Producer indicated that there is mixed hay for sale in Saskatchewan in early August, as well as limited alfalfa and grass hay. Alfalfa/brome hay (large rounds) asking prices ranged from \$81-\$175/metric tonne and \$60-\$80/bale for those with no bale weight indicated (total of 19 ads). Grass hay asking prices were \$85-\$120/metric tonne and alfalfa ads were \$60-\$80/bale or had no price listed. Small square bale

asking prices averaged \$5/bale with varying weights and quality. Two advertisers had small pastures available to rent.

USDA Market News Service Hay Report

For the week ending August 5, 2016

The United States Department of Agriculture (USDA) collects a wide variety of information from hay markets across the country. Presented below is information from those jurisdictions closest to Saskatchewan. For complete USDA hay market listings, please visit the [USDA Market News](http://www.usda.gov/marketnews) webpage.

USDA Hay Prices for the week ending August 5, 2016

	Eastern Wyoming	Western Nebraska	Western South Dakota	Montana
Alfalfa				
Supreme				\$200**
Premium	\$115-118			
Good	\$90-95	\$110-115*		\$120-135 \$110-120* \$150-180**
Fair	\$105*			\$100-115 \$100-115*
Utility				\$65-90*
Grass				
Premium				\$120*
Good			\$125 \$137.50*	\$110
Fair				\$90-110*
Timothy-Premium				\$110-120* \$210**
Alfalfa/Grass				
Premium	\$215**		\$110*	\$150* \$150-160**
Good				\$120-140*
Wheat Straw	\$65*			
Barley Straw				\$40

All prices in U.S. dollars per ton FOB stack in large square bales unless otherwise noted.
Most horse hay sold in small squares. * large rounds **small squares

Hay Quality Designations - Physical Descriptions:

Supreme: Very early maturity, pre bloom, soft fine stemmed, extra leafy - factors indicative of very high nutritive content. Hay is excellent colour and free of damage. Relative Feed Value (RFV): >185

Premium: Early maturity, i.e., pre-bloom in legumes and pre head in grass hays; extra leafy and fine stemmed - factors indicative of a high nutritive content. Hay is green and free of damage. RFV: 170-185

Good: Early to average maturity, i.e., early to mid-bloom in legumes and early head in grass hays; leafy, fine to medium stemmed, free of damage other than slight discoloration. RFV: 150-170

Fair: Late maturity, i.e., mid to late-bloom in legumes and headed in grass hays; moderate or below leaf content, and generally coarse stemmed. Hay may show light damage. RFV: 130-150

Utility: Hay in very late maturity, such as mature seed pods in legumes or mature head in grass hays, coarse stemmed. This category could include hay discounted due to excessive damage and heavy weed content or mould. RFV: <130

Weekly Montana Hay Report

Compared to last week: Alfalfa hay sold mostly steady to 5.00 higher this week. Demand for hay is mostly good to very good on mostly moderate offerings. Hay movement this week was mostly moderate to active as strong sales continue to be seen for hay moving into Southeastern Montana and Northeastern Wyoming. Drought conditions continue to spread as little to no rainfall has been seen in weeks in the Southeastern portion of the state. The highline, however, has seen ample rainfall and with good to very good pasture and range conditions many ranches have yet to purchase hay for the year. Dairy hay prices are slowly developing however, test values have been running on the low side for desired quality. All dairy quality hay sold this week was Good quality alfalfa with test values at the very top end of that quality spectrum. All prices are dollars per ton and FOB unless otherwise noted.

Wyoming, Western Nebraska, and Western South Dakota Hay Report

Compared to last week: All classes traded moderate with moderate demand. Drought pressure in western South Dakota and northeastern Wyoming is improving hay market prices. According to the U.S. Drought Beneficial moderate to locally heavy precipitation dampened much of the Black Hills and adjacent Wyoming, the northeastern quarter of Oklahoma, and scattered small areas in both Kansas and Texas. All prices dollars per ton FOB stack in large square bales and rounds, unless otherwise noted. Most horse hay sold in small squares. Prices are from the most recent reported sales.

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