



FORAGE PRODUCTION AND EXPORT POTENTIAL IN BC'S CENTRAL INTERIOR: *REPORT SUMMARY*

BC Forage Council

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Introduction

In 2013 the BC Forage Council initiated a project to examine the forage production and export potential in BC's Central Interior.¹ The work was prompted in part by the large hay surplus in the area following a decade-long downturn in the beef industry. Also, the recent construction of two hay compression plants near Vanderhoof, has created an opportunity for increased export of hay to China, Japan and other countries.



Large-square bales are required for the hay compression plants in Vanderhoof

Project Objectives:

- Identify production potential, opportunities, and challenges related to hay production for the domestic and export markets in the Central Interior.
- Provide information to help support producer decision-making around hay production for the domestic and export markets.
- To assess the potential impacts of a Central Interior export hay industry on other agriculture sectors.

This summary provides an overview and some of the key findings from the final report for the project. Copies of the report can be requested from the BC Forage Council by emailing: bafc@bcforagecouncil.com

¹ This work was made possible with financial support from Agriculture and Agri-Food Canada, the BC Ministry of Agriculture, the Investment Agriculture Foundation of BC, the Nechako-Kitimaat Development Fund Society, the Omineca Beetle Action Coalition and the BC Forage Council.

Current Forage Production and Future Potential

There is substantial land used for forage production in the Central Interior. Over 88%, or 118,480 ha (292,767 acres) of the cropped area reported in the 2011 Statistics Canada Census of Agriculture in the Bulkley-Nechako, Fraser-Fort George and Cariboo Regional Districts was used for forage. There were 49,584 ha (122,524 acres) in forage production in the Bulkley-Nechako RD. Area F in the Bulkley-Nechako RD, with Vanderhoof at its centre, had 21,202 ha (52,390 acres) in forage production.

Additional Crown lands in the Central Interior have been designated for agriculture development (ADA). These lands are considered suitable for extensive agriculture, but they have to be developed (logged and/or cleared) before they can be put into production. It is uncertain whether these costs can be justified under current economic conditions. These lands are, for the most part, on the edges of the existing agriculture settlement area.

- Nearly 24,322 ha (60,076 acres) of ADA land is available in the Prince George planning area
- There are currently 10,519 ha (25,981 acres) of ADA land available in the Vanderhoof planning area



On-farm hay storage near Vanderhoof



There are sub-regional differences in forage production potential. The wetter climate and heavier soils around Prince George area are best suited to grasses, including brome grass, orchard grass and timothy, and clovers. Alfalfa cannot be grown successfully in many areas.

The climate and soils around Vanderhoof are conducive to alfalfa and a range of crops including barley, wheat and canola. Areas south of Quesnel along the Fraser River also produce alfalfa and other crops.

Forage Surplus

Using the livestock inventory and forage acres from the Statistics Canada Agriculture Census, and average hay yields from BC Production Insurance, a simple forage supply and demand model was developed to estimate the available forage surplus in the Central Interior. From 2001 to 2006, the livestock inventory was relatively stable. After 2006 cattle numbers declined substantially.

In 2011, record growing season precipitation and the combined reduction in livestock demand produced an estimated hay surplus of 122,566 tons in the Bulkley-Nechako RD alone. This surplus was carried over and was still being sold in 2012 and 2013. This was in contrast to conditions in 2006, when widespread drought and greater livestock numbers resulted in hay shortages throughout the Central Interior. Cattle numbers appear to have stabilized at a level that will result in a continued annual forage surplus being produced in the near-term provided the forage area under production also remains constant.

The forage supply is still relatively tight in the Cariboo RD, and this area will continue to be dependent on hay from the Central Interior (Bulkley-Nechako and Fraser-Fort George RDs).

Forage Yield and Quality

Forage yields and quality are highly variable throughout the Central Interior. The amount of growing season precipitation, and weather conditions during the harvest period are the main factors affecting both yield and quality. However, poor profitability in the beef sector has delayed stand renovation and reduced total yield. The majority of hay is harvested for on-farm feeding of

beef cattle, so quality is a secondary consideration in many operations. Some premium and standard quality hay is produced in the region and marketed to Lower Mainland dairies and the horse hay market. Unstable spring weather conditions limit the amount of high quality first-cut hay that can be produced, and this is a significant constraint for the development of the export market.

Forage Export

Most of the export markets require high quality hay. Alfalfa quality is based on laboratory tested nutrient values including crude protein, and Relative Feed Value (RFV). Timothy, the other major forage export crop, is used mostly for dietary fibre in Japan and Korea. Subjective criteria like leaf color and head length are used to determine timothy hay quality.

The export hay market has grown with the global increase in shipping container traffic, and government policies in some importing countries to increase milk production. In the Middle East changes in water policy have eliminated irrigated alfalfa production, so forage needs to be imported to sustain livestock industries. The U.S. is the largest exporter of forage in the world, and shipped 3,803,421 tonnes of Alfalfa and other hay in 2012. Australia, Spain and Canada are the other major exporters. Canadian exports were 507,879 tonnes in 2012. Japan is the largest importer of forage, at over 2.3 million tonnes per year. Korea, the UAE, China and Taiwan are the other major forage importers.



Newly installed Steffens Mfg. hay press at Top Hay in Vanderhoof



Transportation and logistics are key parts of the forage processing and export industry. The main objective of forage processing (densification) is to reduce transportation costs. Export volumes, prices – and profit margins to some extent – are linked to transportation costs. The Port of Prince Rupert serves as the main corridor for forage export out of the Central Interior. Truck transport is used to move compressed hay in containers from Vanderhoof to Prince George. From Prince George containers go by rail to the Fairview Container terminal at Prince Rupert, where they are loaded onto ships going to Asia and other parts of the world.

Although Prince Rupert is closer to China and other destinations in the Pacific, shipping rates are higher than other west coast ports, including Vancouver and Seattle. The Ports of Long Beach, CA and Los Angeles, CA have the lowest shipping rates on the west coast. The current cost of shipping a 40-foot container out of Prince Rupert



Containers being loaded at a hay pressing plant in Washington State

to Shanghai ranges from \$1200 - \$1325 USD, while the rate from Long Beach is around \$260 USD.² The cost to ship hay from

Vanderhoof to Shanghai via Prince George

and Prince Rupert ranges from \$102.22 - \$106.98 CAD per ton. This is roughly the same as the cost of truck freight from Vanderhoof to Abbotsford. It costs \$123.99 per ton to ship hay to Incheon, South Korea.

An estimated export budget reveals that on a per ton basis, when the costs of baling, processing, marketing and shipping are accounted for, there is a margin of about \$99 per ton on a shipment of alfalfa hay to a customer in Shanghai (Table 1). This suggests that a price of around \$99 could be paid for alfalfa near Vanderhoof for a shipment to China, if the processor assumes baling costs. The same analysis indicates that

² Shipping rates as of October 2013, quoted in USD.

around \$194 per ton could be paid for timothy destined for Japan. If the producer assumes baling costs, the suggested price for alfalfa at the field is \$119 per ton, and the price for timothy is \$214 per ton. These prices require hay that is 12% moisture or less, and meets the standards of the importing country and the customer.

SWOT Analysis

Verticillium wilt is one of a number of threats identified in a forage export SWOT (Strengths, Weaknesses, Opportunities and Threats) analysis. The phytosanitary requirements for alfalfa hay shipments to China are strict relative to those of other importing countries.³ They include a field inspection and a laboratory test for Verticillium wilt. If a test comes back positive, the hay lot cannot be shipped. Unfortunately, Verticillium wilt was detected in a test from a field near Vanderhoof in 2013, and this could limit the potential export supply.

There are opportunities identified in the SWOT analysis that could help overcome the main weakness in the area – which is the *undependable harvest weather* resulting in an inconsistent supply of quality forage for export. Processors in Alberta have adapted to similar weather conditions and become established forage exporters. At one operation in Northern Alberta, a hay dryer is used to bring hay from 16% moisture down to 12%, and this allows the field curing time to be shortened, reducing the risk of quality loss.

Some Alberta compression plants have also modified their processing lines to accept round bales in addition to the large-square bales (3x4x8'), which are the preferred input. This has broadened the supply because round balers are so widely used in these areas. Large-square balers are also expensive, so distributing baling capacity across many small-scale farms to get a timely organized harvest is also an issue in the Vanderhoof area, and other parts of the Central Interior.

To develop a sustainable hay export industry the region needs to capitalize on opportunities that minimize its weaknesses, and develop strategies to address the

³ The Canadian Hay Certification Program (CHCP) was established by the CFIA in 2004 to allow for the phytosanitary certification of compressed hay for export to countries that regulate specific quarantined pests.



threats. Taking advantage of opportunities will require co-operative adaptation on the part of producers, processors and the industry as a whole. Producers have already started to establish new stands of timothy and alfalfa in anticipation of the export market development. Some producers might also make adjustments that shift harvest times to allow a second-cut harvest during what is typically a better weather window later in the growing season. An increase in the area seeded to timothy may also improve quality of the export hay supply because its later maturity also puts harvest in a more desirable weather period.

Conclusions and Recommendations

Some of the adjustments that will occur in the region over the next year or two will result from a developing knowledge base among producers and the processor/exporters. Others will result from individual business decisions, and the economics related to the adoption of new practices. However, this adaptation can be supported with specific actions initiated by organizations like the BC Forage Council, the BC Ministry of Agriculture, research funders, the agricultural services industry and other regional partners interested in economic development. Some specific recommendations follow from this work:

Business Development

1. Develop a hay export strategy for the Central Interior to capitalize on opportunities, minimize weaknesses and develop strategies to deal with threats.
2. Support value chain development and facilitate information transfer between processors and producers.
3. Provide support for co-operative adaptation – create access to low interest loans, or pursue rental/lease arrangements for large-square balers.
4. Create export marketing seminars to increase producer and processor knowledge of the industry.
5. Support development of simple but robust decision support tools for business and production planning.

Production and Research Development

1. Develop and support forage production seminars on fertility, pests and diseases and variety selection; promote a “clean equipment” message among

producers and processors to minimize the spread of Verticillium wilt, and other pests and diseases.

2. Summarize current research on harvest practices that maximize quality – e.g., in cutting, swath manipulation, baling and storage – and produce a series of information materials to support producers.

3. Support development of local grade standards, e.g., Premium, No. 1, Standard etc. for the main forage crops, alfalfa, timothy and oats.

4. Find support for local production research and variety trials to:

- Assess plant nutrient characteristics in variety testing
- Evaluate alfalfa leaf to stem ratios and correlate with plant nutrient characteristics
- Evaluate timothy plant characteristics – stem, leaf and head length – by variety
- Evaluate oat varieties for production, stem characteristics and lodging risk
- Determine variation in maturity rates of different alfalfa, timothy, and oat varieties
- Investigate *Rhizobium spp.* issues potentially related to soil temperature, acidity, and soil nutrient relationships
- Determine the effects of soil acidity and lime application on production, and yield relationships – economics
- Evaluate Growing Degree Day (GDD) and other methods to predict plant growth stages, and plan harvest to maximize quality, yield and winter hardiness
- Evaluate various harvest operations, equipment and timing and effects on quality

5. Find support to put current and historic BC forage research in an easy to use, accessible web-based content management system, and integrate with decision support tools.

6. Promote and support local weather station installation on farms and at research trial sites, and improvement of local weather forecast capabilities.



Impact on other Sectors

The development of the forage export industry could have positive impacts on livestock sectors. If the export industry can develop to fill current processing capacity with forage of sufficient quality, there should also be an increase in overall yield as a result of improved production practices. As these practices are adopted, there will be increases in the regional hay supply. Only a portion of the total yield in any given year will make export quality, and the remainder will be directed to the domestic market. The volume of forage needed to meet current plant processing capacity (40,000 tons) is

available within the existing annual forage surplus currently produced in the region.

A greater emphasis on hay quality and grade should lead to a more developed domestic market. This will help buyers from different livestock sectors find the quality/price points that meet their needs. This should make the market more efficient, and reduce the amount of low quality hay that gets sold at prices that would otherwise indicate a higher quality. Overall the domestic forage market should be strengthened and enhanced with the development of export hay markets.

Table 1. Estimated export budget for hay compressed in Vanderhoof and shipped out of Prince George via the Port of Prince Rupert (per short ton, based on a 5 FCL booking, CAD)

Processor/Exporter Costs	Alfalfa (China)	Timothy (Japan)
Baling costs (custom by processor)	\$20.00	\$20.00
Field, stack inspection, lab	\$1.00	\$0.50
In-bound freight	\$10.00	\$10.00
Pressing charge	\$50.00	\$50.00
1/2 cut	\$0.00	\$5.00
Shrink wrap	\$0.00	\$10.00
Hay shrink	\$6.00	\$6.00
Broker/freight forwarder	\$0.37	\$0.37
Insurance	\$2.00	\$0.00
Outbound freight	\$21.00	\$21.00
Ocean freight (incl. rail)	\$81.22	\$87.74
Bill of lading	\$0.44	\$0.44
Letter of credit (LC)	\$4.00	\$4.00
Sales margin (exporter's 10%)	\$32.00	\$45.00
Total Export Costs	(\$228.03)	(\$260.05)
Landed Price	\$326.88	\$453.59
Margin (Hay cost at field)	\$98.86	\$193.55

Notes: Costs and prices are on per ton basis, and based on a shipment booking of 5 full 40-foot container loads (FCL), with 27 tons (24.5 tonnes) of hay, based on exporter estimates and rates provided by shipping companies.



Large-square bale input on Hunterwood press (above) and processed hay (below) ready for shipping at Nechako Valley Agri-Enterprises in Vanderhoof

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