

Agriculture and Agri-Food Canada

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Forage

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Profile

Canada's Forage Industry

Forages are plants consumed by livestock. They include pasture and browse plants, baled hay, silage, alfalfa pellets and cubes, immature cereals, and cereal straw. In addition to being the basis of Canada's livestock industry, forages are very important in soil conservation, as they are used in crop rotation to improve soil structure and add nitrogen to the soil.

Most forage species belong to the grass (*Graminae*) and legume (*Leguminosae*) families. The commonly grown grass species in Canada include timothy, brome grass, and the fescues, while the main legume species include alfalfa and red clover. Alfalfa (*Medicago sativa*) is considered the queen of forage and is the most widely grown forage legume in Canada. Recognized around the world as premium forage for dairy cattle and horses, alfalfa will grow under most conditions and depending on the variety, it can be adapted to a host of different climatic regions.

Forages include both annual and perennial crops. Annual crops such as cereals, peas, and corn are harvested from July to September, usually as silage. Perennial crops of grasses and legumes are normally harvested for four to eight years. These perennial crops are very helpful in soil conservation and improvement since they add more organic matter to the soil than most annual crops and provide a permanent ground cover which helps to reduce soil erosion.

The quality of the forage is dependent on several factors including: management of the soil, nutrient composition, seeding rates, the timing of cutting, raking and baling, and the storage of the product. One of the most important factors affecting quality is the state of maturity at the time of cutting. Young, vegetative forage is higher in protein and energy than older flowering material. Management experience is required to find the optimal harvesting time and to maximize both quality and quantity of forage stands.

Forage Processing Industries

Two forage processing industries, alfalfa dehydration and hay compaction, contribute to sustaining a dynamic and diverse forage sector in Canada that are highly export oriented. Processed products include dehydrated alfalfa meal and pellets, sun-cured alfalfa pellets, alfalfa cubes, and compressed bales of timothy, alfalfa, or mixed hay. The processing activities are concentrated in the Canadian Prairies, with some extending to Ontario, Quebec, and New Brunswick.

Processed Alfalfa

The Canadian alfalfa processing industry, also known as the dehydration industry, has gradually matured over the past four decades to rank in the world's top five largest exporters of alfalfa pellets and alfalfa cubes.

The alfalfa crop is cut at the early flowering stage to optimize yields and nutritional quality. The alfalfa is partially field dried, picked up, chopped, and rushed to a processing plant where it is dehydrated, ground into meal, and processed into pellets. Sun-cured alfalfa pellets are produced by similar methods except that the hay may be somewhat more mature when cut and either partly or fully field dried before processing. Alfalfa cubes are made from coarsely chopped alfalfa hay.

Canadian dehydrated and sun-cured pellet production was estimated by Alberta Agriculture, Food and Rural Development (AAFRD) at 240 thousand tonnes during the 2004-05 crop year while the estimated production for cubes was 103 thousand tonnes. This is well below the decade-high production levels recorded in 1994-95 crop year.

The Asian economic crisis of 1998 had a profound effect on the processed alfalfa industry, as the sector depends heavily on the Asian markets of Japan, Taiwan and South Korea. The industry consequently experienced a shrinking demand for their products and depressed commodity prices. Processing volume declined from 725 thousand tonnes in 1997-98 to 549 thousand tonnes in 1998-99. The markets partially recovered in 1999-00. The industry then experienced a period of consolidation and downsizing, due to drought conditions prevailing in western Canada and high energy and transportation costs eroding profitability of the industry.

Compressed Hay

The compressed hay industry, also called the double-compressed hay industry, was first established in the early 1980s. The bulk of the compressed hay industry is located in Alberta. Access to irrigation, climatic conditions at the foothills of the Canadian Rockies, and better access to the West Coast export terminals make Alberta a choice location for hay production and processing activities.

In the compressed hay industry, field bales are shipped to a processing plant for double-compression. In the plant, bales are untied and loaded into a compressing machine where they are reduced about two and a half times their original size by means of hydraulic pressure and retied using a banding material. The double-compressed bale weighs about 45 kilograms (kg) and measures approximately 45 centimetres (cm) × 45 cm × 60 cm in width, length, and height.

Based on the Alberta Agriculture, Food and Rural Development's Processed Forage Industry Survey, estimated production of compressed hay in Canada was almost 302 thousand tonnes during the 2004-05 crop year.

Nutritional Values

Energy, protein and fibre contents are three key nutritional value indicators of forage (refer to table 1). Alfalfa is recognized as an excellent source of protein, energy, and digestible fibre. Because of its nutritional content and yields, alfalfa is a preferred feed for dairymen in Canada and in the United States (U.S.) to feed lactating cows because of nutrient content and yields. However, in key Asian markets, timothy hay is a preferred feed ingredient purchased for its fibre content because it is used in combination with protein and energy rich feed ingredients available in these markets.

Table 1: Typical Nutrient Analysis (Dry Matter)

	Crude Protein (%)	Total Digestible Nutrients (TDN, %)	Net Energy avail. For Lactation (Mcal/kg)	Acid Detergent Fibre (ADF, %)	Crude Fibre (%)	Digestible Energy (Mcal/kg)
Dehy Alfalfa Pellets	18.85	66.6	-	34	26	2.91
Suncured Alfalfa Pellets	17	61.5	-	35	28	2.68
Alfalfa Cubes	17	61	-	35	28	2.68
Alfalfa Hay	18.3	-	1.34	39	-	2.64
Timothy Hay	9.3	-	1.37	36.2	-	2.67

Source: Canadian Dehydrators' Association
Canadian Hay Association

Products and Uses

Forage crops are generally fed in the form of hay or silage in Canada. For hay production, the crop is cut and allowed to field dry to about 15% moisture level under natural sunlight and wind conditions. The hay is baled for easier handling and storage. Forage crops can also be harvested with higher moisture content to be stored as silage or further processed.

A number of harvesting and storage systems have emerged in the past 20 years: small square bales (20-25 kg), large round bales (250-400 kg), large square bales (400-450 kg), haylage or silage stored in bunker silos or tower silos, and plastic wrapped round or square large bales.

Forage Statistics

[Forage Statistics](#)

For the latest market information and analysis available from Agriculture and Agri-Food Canada, please consult the following publications:

- [Canada: Outlook for Principal Field Crops](#)
- [Bi-weekly Bulletin](#)
- [Drought Watch](#)

Associations

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Links

[Forage](#)

British Columbia Ministry of Agriculture and Lands

[Forages and Range](#)

Alberta Agriculture, Food and Rural Development

[Forage Annual](#),

[Forage Native](#),

[Forage Perennial](#)

Saskatchewan Ministry of Agriculture

[Forage Production and Management](#)

Manitoba Agriculture, Food and Rural Initiatives

[Forages and Pastures](#)

Ontario Ministry of Agriculture, Food and Rural Affairs

[Info-fourrage \(available in French only\)](#)

Québec Ministère de l'agriculture, des pêcheries et de l'alimentation

[Forage Crops](#)

Prince Edward Island Agriculture, Fisheries and Aquaculture

[Forage](#)

Newfoundland and Labrador Natural Resources and Agrifoods

[United States Department of Agriculture – Roundup Ready® Alfalfa Documents](#)

[Canadian Seed Trade Association - Facilitating Choice Through Coexistence](#)

[Canadian Forage and Grassland Association Report - Assessing the Potential Impact of Roundup Ready® Alfalfa on Canada's Forage Industry \(PDF Version\)](#)

[Canadian Forage and Grassland Association](#)

Date modified: 2013-10-01