



Dairy Briefs

The Latest Information
on Dairy Cattle Nutrition



The use of Wet Beet Pulp in Dairy Cow Diets

By Pedro Nogueira

This time of the year it's common to hear dairy farmers asking about the use of wet beet pulp in the diets of their animals. Beet pulp is a by-product of the sugar industry and sugar beet is harvested in the fall. Statistics Canada tells us that approximately one-quarter of the world's production comes from sugar beets, a crop that is the result of the selective breeding of extra-sweet beets. Out of the world's top 10 sugar beet-producing countries in 2006, eight were European (Table 1). Canada's production of sugar beets is ranked 31st in the world. In 2006, 3,785 hectares were planted to sugar beets in Ontario, mostly for export to Michigan for processing.

Table 1 - The world's top 10 sugar beet-producing countries, by quantity, and Canada's production, 2006.

Rank	Country	Production (1 000 tonnes)
1	Russian Federation	30,861
2	France	29,879
3	United States of America	28,880
4	Ukraine	22,421
5	Germany	20,647
6	Turkey	14,452
7	Poland	11,475
8	Italy	10,641
9	China	10,536
10	United Kingdom	7,150
31	Canada	1,229

Sources: Rogers Sugar; Michigan Sugar Company; United Nations Food and Agriculture Organization, FAOStat, 2006.
Sarah Morrison, Statistics Canada, 2009

Inside this Issue...

THE USE OF WET BEET PULP IN DAIRY COW DIETS

By: Pedro Nogueira



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Russ & Gary Woolley
Woolley Farms Inc.
Springfield, Ontario



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Volume 2, Issue 9
October, 2009

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How is Beet Pulp obtained?

Wet beet pulp is obtained during the production of sugar from sugar beet. The process is summarized here:

- Preparation of the beets: receiving, storage, washing (beets come from the ground so they are much dirtier than sugar cane and have to be thoroughly washed and separated from any remaining beet leaves, stones and other trash material before processing), slicing of the beets in thin chips to increase the surface area of the beet to make it easier to extract the sugar;
- Diffusion: the thin chips are moved to a diffuser. Here the slices of beet are kept in contact with hot water and the sugars are extracted by osmosis. In the end of this procedure we obtain from one side the beet pulp and on the other side a juice containing about 13 to 14 % sugars and about 2 to 3 % of impurities;
- Filtration: the juice is filtered of the impurities by a process known as carbonatation and filtration. Once this is done the sugar liquor is ready for sugar production except that it is very diluted;
- Evaporation and crystallisation: the juice is progressively concentrated in syrup until conditions are right for sugar crystals to grow. Once the crystals have grown the resulting mixture of crystals and mother liquor is spun in centrifuges to separate the two. The crystals are then given a final dry with hot air before being packed and/or stored ready for despatch.

The beet slices leaving the diffuser are very wet. Because the water still contains some sugars they are pressed in screw presses. The pressed beet is what is known as beet pulp. This wet pulp is stored at the plant but its transport must be well organized so as to avoid accumulation for several days and spoilage. The wet beet pulp must stay a very limited time in the storage area, because the development of lactic and butyric fermentations is very fast. Delivery must also be fast and in clean trucks, to avoid contaminations with soil (increased risk of butyric fermentations). Another reason for a rapid delivery is the need to keep the pulp warm. This will help the future fermentations to occur in the farm bunk.

Chemical composition of the Beet Pulp

Pressed beet pulp contains about 20 - 25% dry matter, limiting the distance it can be transported economically. Nevertheless, pressed beet pulp is a valuable feed—relatively high in energy, and low in protein (7 – 10% crude protein). Pressed beet pulp is considered a nonforage fibre source and may be used to partially replace forage in dairy cattle rations at a rate of 10 to 20% of the ration dry matter. One interesting aspect of beet pulp is the fact that it's chemically very similar to corn silage. When we formulate diets that have a short supply of corn silage, beet pulp can be used to “extend” the quantity of corn silage. Table 2 shows the average composition of beet pulp, average corn silage and average dry corn.

Table 2 – Chemical composition, on a DM basis of wet beet pulp, corn silage and dry corn (from NRC, 2001).

	Wet Beet Pulp	Corn Silage	Dry Corn, ground
DM (%)	20 – 25	32	88.7
Enl (MCal/kg DM)	1.47	1.45	2.01
CP (%)	10.0	8.0	9.4
Fat (%)	1.1	3.2	4.2
NDF (%)	45.8	45.0	9.5
ADF (%)	23.1	28.1	3.4
Lignin (%)	1.6	2.6	0.9
Ca (%)	0.91	0.28	0.04
P (%)	0.09	0.26	0.30

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Another interesting aspect is that the fibre of the beet pulp is very digestible, due to its low lignification. This means that although it's a bulky feed in terms of rumen fill its fibre is digested to a greater extent than the one in corn silage, allowing for high producing cows to eat more.

Beet pulp also has a high content of pectins, compounds included in the soluble fraction of the fibre. Pectins are substances that ferment very fast in the rumen but don't produce lactic acid, reducing the risk of acidosis. Pectins also have a high Cation Exchange Capacity (CEC). This is a plant's ability to attract and bind hydrogen ions. When hydrogen ions are bound to plant matter rather than free in the rumen, the rumen is less acidic. Alfalfa also has a good CEC, better than corn silage. This is one of the reasons why corn silage diets may be more acidic than alfalfa based diets (starch is another important reason).

How should wet beet pulp be ensiled?

After mechanical processing, pressed beet pulp is warm. If stacked in piles, pressed beet pulp quickly begins to ferment unevenly, becoming unstable and unpalatable for livestock. However, pressed beet pulp can be successfully ensiled in silage bags or bunker silos. The rules to achieve a good silage are the same ones as for any other silage:

- Ensile with a DM content relatively high, at least with 20% DM;
- Ensile the fastest possible: it is recommended to ensile the product still warm and also with clean tractors and trucks;
- For best results, French researchers suggest ensiling should be completed within 24 hours of processing, and bunker silos should not be greater than 2 m (6.5 ft) in height and 8 m (26 ft) in width.
- Packing with a tractor is necessary, to remove the air from the mass. Packing should be done by layers, horizontal or diagonal.
- If possible use a double layer of plastic to keep air out of the ensiled mass.



NOTE: Although this is an image of corn silage, using a double layer of plastic works well on beet pulp to keep the air out.

- If possible the silo should not be opened before 6 weeks after ensiling. Normally it's not the low DM of the beet pulp that causes problems, but the early opening of the silo and the low daily feed out.
- Feed out should be at least 15 cm per day.
- To calculate the volume of the silos you can use 850 kg/m³ of wet beet pulp with 20 to 22 % DM.

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Conclusion

Wet beet pulp is a good feed for dairy cows or beef animals. It's inclusion in the diets will depend on its cost, on the distance from the plant, and on the composition and moisture of the other feeds in the diet. If the diet is based on corn silage and/or high levels of grain, beet pulp can be a great help in reducing starch levels and promoting better rumen health. Care must be exercised when ensiling wet beet pulp. If good management rules for silage are followed normally it's easy to ensile and there is very little spoilage.

References:

"That beet is sweet!". by Sarah Morrison, Statistics Canada, 2009.

"Cation Exchange Capacity". Mary Beth de Ondarza. Milk production.com

"Synthese sur la Pulpe Surpressee" Comite des sous-produits RNED Bovin – 1991.



Creating a positive environment at the Royal Winter Fair

To help control unpleasant odours, drySTART will be applied to the livestock areas at this year's Royal Winter Fair. Helping to reduce odours helps maintain a positive environment for the livestock, the people working with them, and guests at the show. Be sure to stop by the drySTART booth located in the livestock area.



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Adri & Alie Spruit
Spruit Dairy Farms
Woodstock, Ontario

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