Feedimpex BV.
The world leading Full Service Supplier of Sugar Beet Pulp Pellets

Feedimpex was founded in the early eighties as a Marketing and Logistical company for the newly created USA sugar co-products industry, which needed a marketing arm for their Sugar Beet Pulp Pellets. For many years Feedimpex (based in Oosterhout - The Netherlands) has been the world leader in Marketing and Logistics of Sugar Beet Pulp Pellets (BPP) from any origin to any destination.

Working around the globe, Feedimpex is a preferred partner for the beet sugar industry in (greater) Europe, USA and the Middle East Region. Having been the exclusive agent for a major US beet sugar supplier for nearly 25 years, Feedimpex now covers the sales regions of Europe, North Africa and the Middle-East. At the same time it has transformed itself into the main supplier of any origin Sugar Beet Pulp Pellets towards the compound feed industry. Feedimpex acts as a full service supplier for all major compound feed industries in the newly enlarged E.U. and is currently developing new areas of operation, such as the Middle East and Turkey.

Over the years Feedimpex has built strong partnerships with selected fleet-owners, brokers, agents, stevedores and surveyors to secure a year-round supply of Sugar Beet Pulp Pellets of any available origin. Feedimpex is not only specialized in all main ports in Europe, but has also developed its knowledge in serving any smaller ports by using coasters.

The Feedimpex team is customer-oriented, flexible and always available for the customer needs. They want to be regarded as YOUR specialists in Sugar Beet Pulp Pellets.

Feedimpex has been granted the GMP+ code for animal feedstuffs and delivers under HACCP-conditions. It normally trades under the GAFTA trade conditions. In case of additional requirements due to country specific rules and laws, these can be incorporated into the terms of trade.

Background of Processing of Sugar Beet and its Feed Products

Growing of Sugar Beet

Sugar beet (Beta vulgaris L.ssp. vulgaris var. Altissima Doell) is cultivated world-wide, but primarily in moderate to temperate climates with sufficient rainfall. In the Northern hemisphere the growers are Europe (including Russia), USA, Canada, China, and Japan. In the Southern hemisphere the only grower is Chile. Today's sugar beets have a sucrose content of approx. 15 - 20 % depending on climate, soil type, variety and cultivation methods.
The worldwide growing area for sugar beet is about 7.5 million hectares and the annual production of sugar beets is about 225 million tons. The leading producing European countries are France, Germany, Poland, Ukraine, Italy and United Kingdom.
Only about 20-22% of all sugar produced worldwide is from sugar beets, with the majority originating from sugar cane.

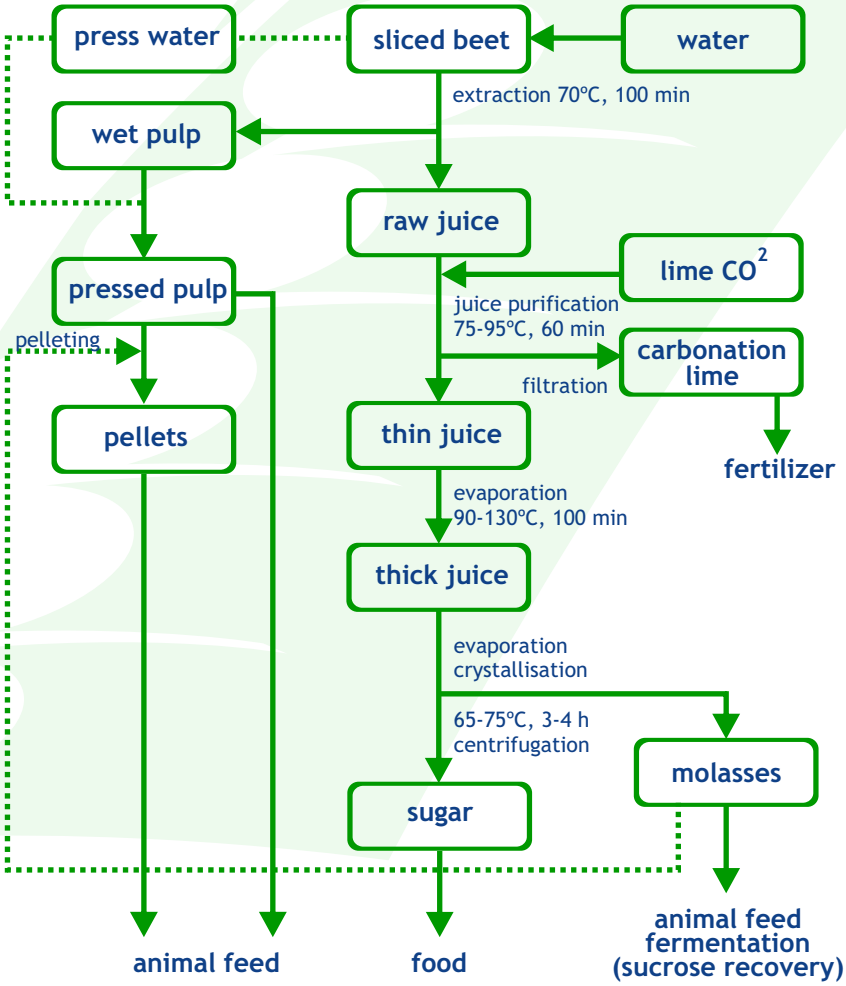
Processing of Sugar Beet

In order to guarantee a continuous beet supply for processing, beets are usually stored in field clamps and/or in factory yards. Maximum storage and thus the possible processing period depend on climate conditions, from a few weeks up to several months. Generally, the harvested beet metabolises some of the stored sugar, so that sugar losses are unavoidable. Frost damage also results in irreversible effects.

A typical processing line from beet to sugar including the treatment of the by-products is described in Figure 1. For processing, the beets are first washed with water to remove dirt and other large debris, and then they are sliced into cossettes. The cossettes are extracted with water at temperatures around 70°C for about 100 minutes. The raw juice obtained is purified by a treatment with milk of lime and carbon dioxide. The resulting material, the carbonation sludge, is

removed by filtration and pressed as carbonation lime. The resulting juice is called “thin juice”. The “thin juice” is concentrated by evaporation to thick juice. The evaporation is carried out in multi-stage evaporators working at a temperature range of 98-130°C at different pressures. The resulting “thick juice” is further concentrated to crystal magma from which crystalline sugar is recovered by centrifugation. During the centrifugation process, the crystals are separated from the syrup. The crystals are dried, cooled and stored for further use. The remaining syrup, the so-called molasses, is mainly used as animal feed or as fermentation substrate. The recovery of residual sucrose from molasses is done in some regions, but not extensively. The material remaining from the treated cossettes is referred to as wet pulp. This pulp is pressed and dried to remove water and is commonly pelleted with added molasses. Carbonation lime is used as fertiliser.

Table 1: Principle process of sugar beet processing and common products



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Uses of Sugar Beet and Derived Products

The main purpose of sugar beet processing is sugar (sucrose) recovery. The world wide production of sugar from sugar beet is about 36 million metric tons per annum, the world sugar consumption is about 145 million metric tons per annum and the supply per capita varies between 10 and 50 kilograms per annum. Sugar is mainly used as food ingredient.
The sugar beet crop provides a number of by-products after harvest and processing which are
valuable feedstuffs (see Figure 1). Feed products from sugar beet are high in fibre and energy. Therefore, they are primarily used in feeding ruminants (dairy cows, beef cattle, sheep), but can also be fed to non-ruminants. To meet the animals' requirements, feed rations containing sugar beets or their by-products are usually combined with other feed products.
Sugar beet tops are usually ploughed under. In rare cases tops are made into silage or directly used in ruminant feeding.
Wet pulp is typically pressed (22-30 % dry matter) and dried (85-90 % dry matter). To increase the ease of handling and storage, dried pulp (95%) is usually pelletized with molasses added. Pressed or dried pulp is also directly used for feeding purposes. In some regions mixtures of pulp and molasses are used for animal feed.
Molasses is mainly used in animal feeding (about 60 % of total molasses) as feed ingredient,
pelleting aid or ensiling agent. Another major use, and growing due to the steep growth of bio-fermentation (15 % plus), is as raw material in fermentation (yeast, citric acid, alcohol, etc.) Special applications of molasses, e.g. as source for single substances (e.g. betaine) are of minor economic importance. The recovery of remaining sucrose from molasses through ion exchange or other technologies is rarely performed nowadays with exception for some regions in the USA where the Steffen process is applied (i.e. removal of sucrose from molasses as calcium saccharate precipitate). To a minor extent molasses are used for various industrial purposes such as fuels, rubber, printing, chemical and construction industries.
Vinasses are produced from fermentation of molasses and are used as soil conditioner or animal feed. Another by-product of sugar production is **carbonation lime** (produced during beet juice purification). Lime is used as a fertiliser in agriculture, after mechanical conditioning providing calcium and increasing the pH of the soil and thus improving its structure. It contains a certain amount of plant nutrients such as Nitrogen and Phosphorous and can therefore also be used as a fertiliser for agricultural application, as well as an ingredient in potting soils used in mushroom production, and as a binder for briquetting and/or pelletizing dry materials.

Sucrose is the main constituent of the sugar beet root dry matter.
The non-sucrose substances in sugar beet roots include other soluble saccharides, cell -wallcomponents, proteins, free amino acids, betaine, as well as organic and inorganic ions and other nitrogen-free acids. Inorganic anions include phosphates, chlorides, sulphates and nitrates. As cations sugar beet contains mainly potassium, sodium, calcium, magnesium and ammonia. During the long history of beet component usage there have never been any anti-nutritional or other adverse effects to human or animal health.

Sugar Beet Pulp

By-products from sugar beet processing e.g., beet pulp and molasses, are the main sugar beet products fed to animals. Sugar beet pulp is effectively used in ruminant feeding due to its high fibre content (up to 25 % in the dry matter). It has the potential to replace significant
quantities of cereals in concentrate mixtures for dairy cattle. Incorporation rates of 30 % in the dry matter of diets for dairy cows and 50 % for beef cattle are possible.
The limiting factors of the by-products from sugar processing are the low protein content and the
high content of fibres, which are known to have a low efficiency of energy utilisation in monogastrics like for example pigs. Additionally, a high concentration of highly fermentable substances (sugars) might negatively affect rumen fermentation. Effects of specific ingredients (undesired substances and anti-nutrients) on animal health or on meat and milk quality are not known.

Worldwide about 8,6 million metric tons of DRIED Sugar Beet Pulp (= pellets and shreds) is fed to mainly cattle either as a straight feed or as an ingredient in compound feed.
The main producing countries of Sugar Beet Pulp Pellets are Germany, USA, France, United Kingdom, Spain, Egypt, Russia, Ukraine, Japan, China and Chile.
More than 50% of the entire global supply of dried BPP (approximately 4,5 million metric tons) is produced in less than 100 sugar factories spread over Germany, USA, France and U.K. whereas the total number of sugar mills around the globe is close to 600.

Currently Japan and Morocco are the world's largest single importing countries of dried BPP, together they have about 1 million tons of import requirements.

The supply and demand situation is very much depending upon the "cattle-balance" of each individual country using BPP and the import/export balance is mainly influenced by domestic consumption patterns and the respective infrastructure as well as world market prices.
BPP has a very good reputation especially in cattle rations and there will be new countries importing it in the near future. Despite the most recent EU sugar reform (with a significant cut back on its beet sugar production during 2006-2012) we would expect that the global BPP supply will not be affected that much due to an increasing production in other countries such as Egypt, Russia and Ukraine.

As the sugar production is all under GMP (Good Manufacturing Practices), ISO and HACCP (Hazard Analysis and Critical Control Points) conditions, Sugar Beet Pulp Pellets are a safe and sound product.

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Usage of Sugar Beet Pulp Pellets in (dairy) Cattle Recipes

Sugar Beet Pulp Pellets are mainly used as or single component for direct feeding to cattle or as feed-ingredient in compound feed. Usage of Sugar Beet Pulp Pellets for pigs (sows), sheep, goats and pet food is also known, although limited since there is little supplemental feeding of sheep, goats, pet food and sow feeding. There are health and saturation issues for feeding Sugar Beet Pulp Pellets as they are monogastric.

Specific energy suppliers in animal feed stuffs are basically starch or sugar originated. The specific composition of the high amount of excellent digestible carbohydrates makes it perfectly suitable for (high yield) dairy cattle as well as beef cattle. Sugar Beet Pulp Pellets contain about 80% carbohydrates, of which 5-10% is saccharose, about 23% cellulose, about 24% hemi-cellulose, about 23% pectin and about 1-2% lignin. Beets, as root, contain very low percentages of undesired low digestible components such as lignin. The carbohydrates are very well digested by micro-organisms in the rumen, via fermentation resulting in a crude fibre digestibility of over 80% and a Nitro Free Extract (NFE) digestibility of over 90%. As a result the energy-value of Sugar Beet Pulp Pellets is very high.
For decades now Sugar Beet Pulp has been considered as a highly valued energy/carbohydrates component in cattle rations. The product is particularly widely in used in Europe, Morocco as well as in North America and Japan.
It is proven that Sugar Beet Pulp increases milk volume and protein, stimulated by a greater production of prop ionic acid in the rumen. The so called “structure value” provides a good balance in the rumen and supports health.
Although the protein content of sugar beet pulp is low it is an energy source and the quality of the beet protein is good. Besides, sugar beet pulp contains small amounts of good digestible amino acids. The mineral content is very low.

The feed value of Sugar Beet Pulp is tested and proven in several university and field trials. Both the EU- and the USA compound feed-industry are using the following generic data for Sugar Beet Pulp Pellets as far as composition, digestibility, mineral-contents and protein contents are concerned. (See table 2). The trade conditions and warranties given are depending on the country of origin and country of delivery.

Recipes of cattle feed are normally made using Least Costing Programs. If all ingredients (and digestabilities) of the available feed stuffs are known, the end-recipe for cattle, depending on the nutritional demand (life-phase, production target) is matched with the available feed stuffs in the Least Costing Program. The economical price per ingredient leads to a proper calculation of the optimal recipe and it will finally result in the required nutritional value for the minimum price.

Sugar Beet Pulp Pellets have the following qualities:

- very high digestible nutritional values;
- low mineral contents;
- provides the right balance between:

a) “fast digesting energy” for the rumen, giving dairy cattle the opportunity to produce enough intestine digestible protein,
b) the “slow digesting, rumen by-passed carbo-hydrates”, needed for an optimal intake of rumen by-pass protein in the small intestine;
- and produce milk and milk-protein.

This all means that especially in high yield dairy cattle, recipes BPP is irreplaceable.
In addition to these nutritional values, Sugar Beet Pulp Pellets also give a nice sweet taste to the compound feed (very important for high feed intake during milking), compared with, for example Citrus Pulp which gives the compound feed a “bitter” taste blocking high feed intakes.
Depending on availability and price, a recipe for dairy cows always contains a minimum 5% of Sugar Beet Pulp Pellets. It's possible to increase to a maximum inclusion rate of 30% up to 40% and may happen if the Least Costing Program allows when, for example, the availability of other feed ingredients is limited or prices of those are too high.

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Table 2: Generic composition of Sugar Beet Pulp Pellets (average nutritional values)

Sugar Beet Pulp Pellets Generic analysis: only for nutricional puroses	Sugar			
	<10%	10-15%	15-20%	>20%
Dry Matter	901	903	915	915
Crude Ash	67	69	82	78
Crude Protein	91	89	105	109
Crude Fat	9	9	8	7
Crude Fibre	179	167	137	126
NFE	555	569	583	595
Starch	1	1	1	1
Sugars	72	119	183	226
Calcium	8,2	7,1	8,7	8,1
Phosphate	0,9	1	0,8	0,7
Magnesium	2,7	2,1	2,3	1,6
Potassium	4,6	7,3	17,0	17,2
Sodium	1,2	1,8	1,6	2,4
Chloride	1,1	1,1	1,1	1,1
Iron	0,5	0,5	0,5	0,4
degestibility (in %)				
Protein	62	62	67	67
Fat	40	40	34	27
Crude fiebre	82	82	82	82
NFE	92	92	92	92
by pass protein	53	45	35	28
ileal by pass protein	89	89	89	89
amino acids in g/16gN				
Lysine	5,6	4,9	4,1	3,6
Methionin	1,6	1,4	1,3	1,1
Cystin	1,4	1,2	1	0,9
Thereonin	5	4,4	3,8	3,5
Tryptophan	1	0,9	0,7	0,6

The above table (2) is divided into 2 types of Sugar Beet Pulp Pellets, Unmolassed and Molassed. Below 10% sugar usually means Unmolassed; when between 10 and 15% it is regarded as Semi-molassed (from a nutritional point of view) and above 15% sugar content it's regarded as Molassed Sugar Beet Pulp Pellets. As described in Chapter 1, during the drying and pelletizing step of BPP, the factories have the choice to add only steam and/or molasses.
Adding molasses to the pelletizing process results in a higher sugar content of the Sugar Beet Pulp Pellets, giving a slightly different composition. The difference between Molassed and Unmolassed Sugar Beet Pulp Pellets only matters if it is fed as a single feed directly to cattle.
Molassed BPP are normally of a larger size (mainly 10-12 mm) and are therefore less well suited for feeding machines as they have less swelling capacity. They are more compressed than Unmolassed Sugar Beet Pulp Pellets. The molassed variety is also more difficult to chew.

In feed mills where all single feed stuffs is ground before they are mixed and pelletized again into compound feed, the hardness and the diameter is not important.
Unmolassed BPP normally have a range between 8 and 10 mm diameter size of pellets (some countries or areas produce pellets as small as 6mm, some as large as 12-14mm), are less hard than Molassed Sugar Beet Pulp Pellets and have excellent swelling capacities.