

## Regional focus

# At Meneba grains end up as many different flours

*Processing a grain kernel into its basic forms is simple: grind it, separate the inside and outside and you have flour and bran. However, Meneba in The Netherlands has developed this process to its limits and can now offer their clients numerous types of flours and just as many variations in bran, shorts and middlings.*

By Dick Ziggers



**T**he difference between animal feed and food for human consumption is difficult to distinguish at grain specialist Meneba in The Netherlands. The company has production facilities at Rotterdam, Wormerveer and Weert. The latter is equipped with special processing techniques, tightly secured to avoid unauthorized visitors and hygiene is a number one issue. This can be seen outside as well as inside the facilities; clean premises, no pigeons, and almost dust free processing areas. “We have a special hygiene team that continuously cleans the mill and its surroundings,” says Peter van Gemert, commercial manager non-food at Meneba. “It is a prerequisite if you want to comply to the hygienic standards that come with all the ISO, HACCP and GMP certifications.”

Almost a hundred years ago Meneba started off as a miller of grains for the baking industry and successfully continued doing this until the seventies. From then the company started to realise that if it wanted to grow in the milling industry it had to change its strategy to develop forms of grain processing that would offer extra functionalities and thus give the company a competitive advantage.

This early vision has paid back the investments, because Meneba is now one of the largest processor of grains in Europe with a milling capacity of 1.3 million tonnes per year of which 500,000 tonnes are sold within the animal feed industry. Currently owned by private equity investor Bencis Capital Partners the miller employs around 460 people and has an annual turnover of €260 million.

### Feed ingredients

Meneba Feed Ingredients (M/fi) is one of the sales divisions of Meneba, responsible for products to the animal feed industry and has three sales offices in Rotterdam, Weert and Greven (Germany). Some 510,000 tonnes of processed cereals generate an annual turnover of €66 million. The majority of this volume consists of bran based products, but the turnover of speciality ingredients for tailor-made applications contributes the necessary added value. The processed cereals find their way into a diverse range of products: piglet feed, milk replacers, (feed) additives, special diets, fish feed, compound feed, canned feed, snacks (for dogs), mueslis and even paper and briquettes for burning.

Sale of the products is mainly within Europe in countries like France, UK, Italy, Spain, Germany, Poland and Sweden. Only a small part is sold in the Benelux.

The products are made from wheat, rye, maize, barley, soybeans and rice. Raw materials are mainly purchased in France and Germany (except for soybeans and rice, which are imported from outside the EU).

“The grains we purchase are always of [human] food quality,” says Van Gemert. “We want cereals with low mycotoxin content, so we select our sources from areas where mycotoxin pressure is low. We also never buy fresh harvested produce, but let the grains rest for a while.”

To understand why these processed cereals end up in so many products one has to explain the composition of a grain kernel. *Figure 1* illustrates how a grain

## Regional focus



After the grains pass the roller mill the grinded product passes several vibrating sieves to separate the different fractions. The flour is redirected to the roller mill several times depending on the products required. (Photos: Dick Ziggers)

kernel is built up. Here you can see that the hull alone is built up of three inner pericarp and three outer pericarp (fibre) layers, which through several techniques can be harvested individually. The starch and protein inside have also several different properties, which can be used individually and altered through processes such as extrusion, expansion or using pressure and steam.

### Multi purpose plant

In March, 2004 Meneba opened a new plant at the site in Weert. This plant is equipped with unique technology to produce many different types of grain specialties. Named a Multi Purpose Plant (MPP), it enables Meneba to modify the characteristics of wheat flour on specific properties such as particle-size, digestibility, solubility, mixing ability, moisture content as well as microbiological and binding characteristics. The Multi Purpose Plant is employable on a multi-functional level, as its name suggests. Three machines are key in the whole process: extruder, dryer and mill.

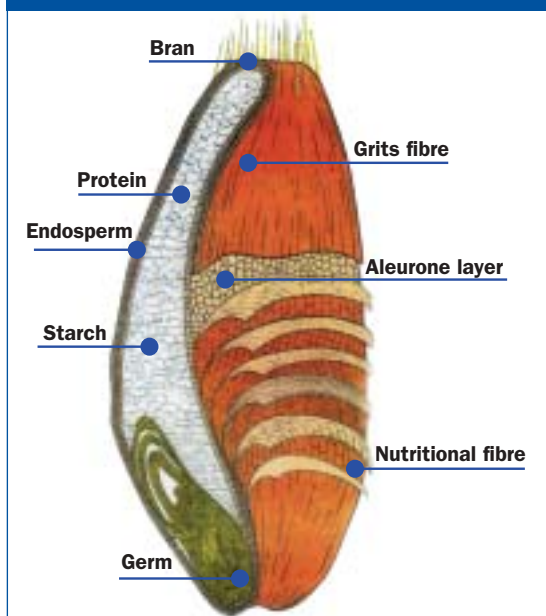
At first glance extruded wheat flour looks no different to normal flour, but subcutaneously the grain has attained a new structure as a result of the hydrothermal process. This results in better digestion of the wheat grain. It makes extruded cereals vital in feed for young animals that can't digest raw starch,



The expansion tank for the Presco system is enormous, compared to the small batches that are released.

which disturbs their stomach and intestines and poses great risks to their health. Heating during the extrusion process also ensures that the flour has a low content of bacteria, yeast and moulds. The process can manipulate viscosity by which extruded

Figure 1 – A grain kernel is more complex than assumed at first glance.





The pressure tank of the Presco system runs through a floor. Here pressure is elevated to 25 bar and temperatures rise to 300°C. At the bottom the exhaust pipe runs into the expansion tank.

flour can bind in cold water. Cold-binding flour can be used for sauces, batters and other products that rely on viscosity in cold-water conditions.

### Drying and milling

The dryer in the MPP can reduce the moisture level of the flour to a level between 7 and 10%. Dried flour has several benefits: the microbiological aspect of flour can be stabilised, which is important for clients because the flour is used in end products without additional processing. Secondly, it ensures a longer shelf life and thirdly dryer flour has better blending traits and thus is a better substrate for a stable and homogenous end product.

Normally flour has fineness between 100 and 200 microns, but flour in the MPP can be milled below the 75-micron level. Such finely milled flour is easily dissolved when mixed with liquid substances. This is another feature that ensures a more homogenous and digestible product. Fine milled flour, for example, is used in feed for young animals and in dairy products.

### Bran based products

Middlings, germs, bran and feed flour are common examples of bran based products that are released when milling wheat or maize into meal and flour. The technique to obtain these by-products is to firstly blend and moisten the wheat. After a rest period the

grains are fed through a roller mill with two pairs of rollers turning at different speeds. The depth of the grooves in the rollers determines how finely the wheat will be milled. The milled product is sieved and divided into various fractions. By repeating the milling and sieving procedures, wheat endosperm ultimately separates from the germ and bran and is reduced to flour.

The bran based products have specific physical and nutritional values and can undergo additional processing to make them suitable for many applications. For example, Meneba can control the specific sieve analysis and bulk weight for use in the premix industry or control the specific nutrients required in compound feed. Horse diets, for example, require very specific bran applications, and dog biscuits require feed flour as a binding ingredient.

Very specific are the Xylo-Gold™ wheat grain fibres. These fibres are obtained from the outer layers of the wheat pericarp and contain more than 80% dietary fibres, e.g. those edible parts of plants or carbohydrate analogues that are resistant against digestion and absorption and which are fermented partly or fully in the large intestine. Classic wheat bran has compared to Xylo-Gold undesired quantities of starch, glutinous proteins and phytic acids.

In pig feed dietary fibre keeps the feed in the stomach for longer and ensures a constant emptying of the stomach. The increased fibre content ensures a faster

## Regional focus

acidification, due to the fact that more acids are released. This results in improved digestion. The structure of the fibre also helps reduce the risk of damage to the stomach lining and the development of stomach ulcers.

### Pressure cooking

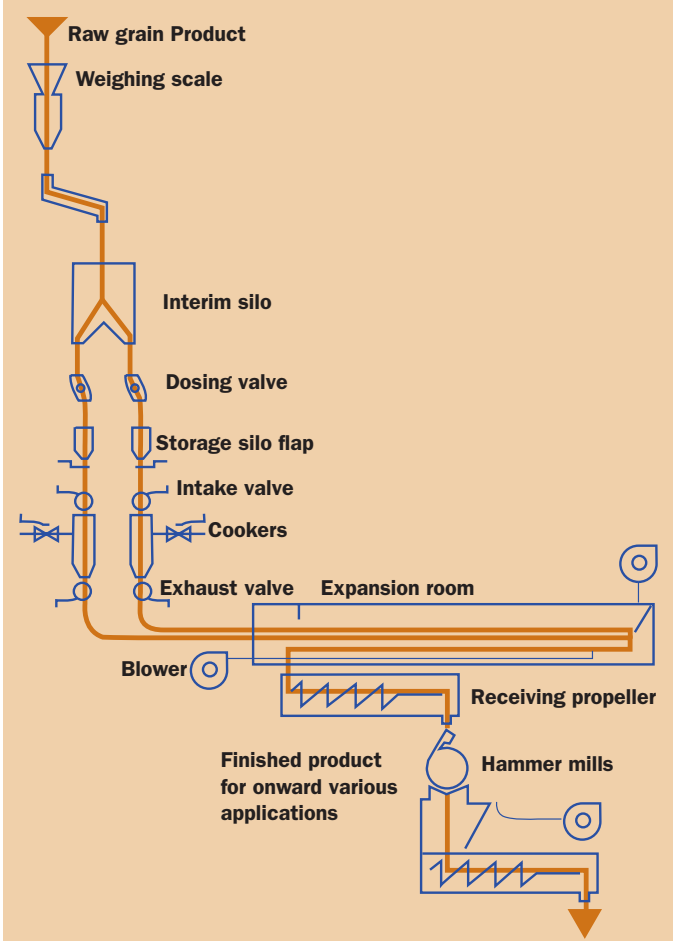
Another successful feature that has been around for some years now and is patented by Meneba is the Presco® process, which is an acronym for pressure cooking. Raw materials used in the Presco are first thoroughly cleaned, followed by 20 seconds of pressure of around 25 bars and ‘cooking’ at a temperature of 300°C. This process causes such an expansion of the starch content that the grains swell to up to eight times their original volume. The result is a puffed product which is suitable for many applications from milling and pressing to sieving, breaking and flaking. Although relative small batches of around 40 kg of raw material are pressure cooked, for expansion an enormous expansion room has been built to allow the compressed and heated grains to expand when they return to ambient pressure and temperature. The pressure is so high that part of the grains even ‘explode’ against the back wall of the vat.

The Presco processing stage ensures optimal processing of the starch whilst eliminating anti-nutritional factors without damaging proteins, losing amino acids or reducing the availability of the amino acids. The amyloglucosidase method showed that the level of processed starch in Presco processed grains was at least 80% and delivered a higher starch digestibility. The process is utilised for various grains (wheat, corn, barley) as well as soybeans, peas and rice.

### Unique heat treatment of soybeans

Soybeans processed by the Presco method provide better technical, nutritional and economic results than toasted beans. The most important advantages are the reduction of anti-nutritional factors combined with the greater amount of available amino acids and energy derived from the oil content. When soybeans are toasted, the steaming process used exposes the beans to high temperatures for long periods of time and, to achieve better effects through to the core, beans are broken up. Although this heating method reduces anti-nutritional factors, it also reduces the amount of available amino acids plus it causes the product to have high moisture content. This, combined with the oil that escapes during the breaking process, makes a product that has a shorter shelf life.

Figure 2 – Schematic build up of the Presco® system.



To prove the difference between toasted and pressure cooked soybeans several tests have been carried out. Pigs fed 15% of Presco soybeans in the diet consumed less feed than the control group with 15% toasted beans in the diet, but had a better daily growth and feed conversion ratio (1.5 for Presco and 1.67 for toasted). These results can be explained by the fact that during the Presco process the amount of amino acids and amino acid availability in soybeans remain high and ANFs are reduced effectively.

### Purchase criterion

Normally grains are purchased on the basis of their protein content, but with so many processing steps and hundreds of possible end products the protein criterion is of less importance, Van Gemert explains. “Most times we purchase on the basis of functionality of the cereals – what specifically do we need that grain for. To do this we have developed our own classification system.” ●