

# GUIDING PRODUCTION to meet market needs



*Unlike for sugar or fat, humans cannot store proteins; they need to be replenished through a balanced intake at every meal.*

### **Bread wheat: protein content is a major criterion to access milling markets**

Importing countries need high protein wheat for technological reasons (types of bread manufactured), because of manufacturing conditions (potentially extreme temperatures) and for nutritional reasons (cereals account for a large part of the daily protein intake in some countries). Competitors tend to offer bread wheat with a higher protein content than French wheat (50% of which is exported).

In addition, the development of mass-produced bread also strengthens the demand for wheat with a higher protein content. The cross-professional “protein plan” is therefore aiming to increase the protein content of French wheat by one point. Success will depend on varietal choice, and appropriate fertilisation, supported by the use of management tools. Besides their quantity, protein quality also plays an important part. The nature or the quality of proteins depends on the variety (60%) and on their quantity and cropping conditions (40%).

**By 2030, global demand for protein food is expected to have risen by 40%. In addition to this challenge, consumers’ habits are changing, with ever more specific expectations. Meeting this demand represents an opportunity for French cereal producers.**

Proteins are composed of around twenty different amino acids, nine of which are considered as essential and must be provided by food. A balanced diet for humans should include 50% of plant proteins and 50% of animal proteins, to get the benefit of their nutritional complementarity. The extremely wide choice of cereals on offer is matched by an equally wide and constantly changing range of consumer, and therefore processor, expectations, both at local and international level. In France,

cereals cover a large number of species, from bread wheat, maize, barley, durum wheat and triticale for the main ones, to oats, rye, rice, sorghum and spelt. They have many uses, including food products (milling, starch manufacturing, malting, semolina production), animal feed (pigs, poultry, cattle, etc.), as well as non-food applications (energy, green chemistry, fermentation, cosmetics, paper and cardboard).

## Very different markets

French or European consumers' main expectation is to have access to healthy products, with optimised quality and at the best possible price, with particular attention to environmental issues.

National and international industrial customers expect a regular supply of cereals, as much in terms of volume as of high technological and safety quality. For food exports, including to third countries (outside the EU), public or private specifications are set in advance (moisture, proteins, specific weight, Hagberg, W, etc.). This ensures best value for money and trust between the operators. Every country's requirements are basically close to those of European markets, even in the absence of regulations. The diversification of supply worldwide, and competition between the different countries of origin have led buyers to strengthen their quality requirements.

For animal feed, expectations focus primarily on raw materials with well-defined nutritional and safety quality, at a low price, as well as a regular supply.

With such challenges to meet, Intercéréales started to overhaul the French cereal sector in December 2017. The industry adopted a sustainable approach, in the interest of food, consumers and citizens. This means guiding cereal production to make sure that supply meets market needs as closely as possible, based on the expectations of national, European and international customers, for example.



*French wheat, around 50% of which is exported, is pitching itself against competitors' wheat, that is often higher in protein.*

## More French plant-based proteins

There are different kinds of challenges associated with proteins. They concern as much their traditional markets (bread making, pasta, animal feed), and in that case are linked to improving the technological quality and economic value of cereals, as the emergence of new products utilising plant proteins. To meet those challenges, we need to better understand how to produce cereals with a greater protein content and matching the different market expectations. It also involves gaining a better understanding of the qualitative aspects and the role of the different protein fractions (glutenin, gliadin) in the processing.

New consumer expectations, biodiversity and farmland, impact of protein crops on the rotation, locally sourced protein, industrial

### **Durum wheat flour: pasta firmness and cooking strength**

Quality is crucial for durum wheat, because of the simple process involved in pasta manufacturing. The firmness and cooking strength that consumers expect from pasta require a 13% protein content (impact on firmness, viscosity and texture of cooked pasta). Two thirds of French durum wheat is exported. Importing countries' requirements are similar to those of the French food and feed sectors, who are facing very strong competition from Canada.

**« 0.8 g of protein per kg of body weight per day is the amount recommended for humans, with well-balanced amino acids and good digestibility. »**

projects (biorefineries, etc.) are creating potential opportunities for the animal feed and food sectors in the future.

Intercéréales put a protein plan in place in 2014, in order to increase bread wheat's protein content, by actioning several levers, such as genetic and agronomic research, fertilisation management and contractualisation. The overall objective is to preserve the position of French wheat on national and international markets. All the buyers, both in third countries and in Europe, as well as French millers, starch manufacturers and animal feed manufacturers are expressing a need for cereals with a high protein content. The protein challenge applies to all cereals, but according to different criteria: minimum protein content for durum wheat, linked to quality for pasta (firmness after cooking), required protein content range in barley to achieve optimum malting process, protein lift for cereals used as animal feed in order to reduce the need for nitrogen balancers, protein lift also for cereals used to manufacture food products in order to meet the technological requirements during processing, and conversely, lower protein content for biscuit wheat (see insert).



*Export markets predominantly require cereals with a high protein content, regardless of how the flour will be used, because of the "nutritional value" factor expected by consumers.*

## Innovative tools

The protein content partly depends on variety, weather conditions, and more directly, on nitrogen fertilisation management. One of the aspects of the cereal sector overhaul plan is therefore aiming, in five years' time, to involve 40% of the surface area fertilised using a decision support tool for bread wheat and durum wheat (against 23% at the moment). Upstream, grain storage organisations have a vantage point, and can guide varietal choice towards solutions that combine yield with protein content and quality, based on a qualitative market analysis. Their role also includes grain segmentation based on the protein content, in order to add value to the farmer's work.

To control the protein content of wheat, cropping techniques will need to be developed to combine variety, nitrogen rate, splitting and application conditions. Recent work by Arvalis is aiming to

define nitrogen fertilisation requirements, taking into account yield and protein content objectives for each variety. Nitrogen fertilisation management remains the best way of making adjustments during the season. In the future, a new modelling approach will help to drop the yield objective (fertilisation adjusted in real time depending on a yield trajectory). This will mark a real paradigm shift!

Christine Bar – [c.bar@arvalis.fr](mailto:c.bar@arvalis.fr)

**ARVALIS - Institut du végétal**

Benoît Moureaux - [b.moureaux@perspectives-agricoles.com](mailto:b.moureaux@perspectives-agricoles.com)

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**Animal feed: holding on to markets, and even strengthening them**

Protein content is an important criterion for animal feed. Increasing the protein content of wheat decreases reliance on imports (including of soya), improves technical and economic performance, and preserves the three internal markets (representing equal volumes) of animal feed, milling and starch manufacturing. For example, for poultry, a one-point drop in protein content means more soya to get back to 0.4 points of protein in the ration, and an associated cost of €5/t of feed (estimated figure at the end of 2013).

**Malting barley: ensuring protein consistency**

The protein content of malting barley must be between 9.5% and 11.5% (below or above which there are malting and/or brewing issues). So, the varieties used must utilise nitrogen inputs properly and produce consistent results, both in space and in time, regardless of weather conditions. However, the protein content has been found to be eroded by yield increases and nitrogen input constraints. This is why research work is focussing on developing our understanding of the influence varietal choice and agronomic parameters have on the quality of useful proteins.