The Food and Feed Value Chain of Triticale in Belgium

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1. THE VALUE CHAIN OF TRITICALE IN BELGIUM

1.1 Triticale in Belgium

Triticale is a lesser-known cereal that is formed through a hybrid cross of wheat and rye species *(×Triticosecale)*. The development history of triticale has been traced to various plant breeding trials, and fertile man-made hybrid species which were first recorded in the latter part of the 19th century (Ammar et al., 2020). Today, modern triticale hybrids are best known for their tolerance in varying cultivation conditions, and this cereal also has a lower content of gluten than the other mainstream cereals (Zhu, 2018).

Triticale has been long produced in Belgium, and the evolution of production quantities in the country is presented in the figure below. In 2020, production averaged around 30,000 MT, while peak production value was recorded in 2015, registering around 50,000 MT for the whole country. Despite the steep decrease in production quantity of triticale afterwards, production has remained relatively stable in the last few years (2016-2020) as is shown in Figure 1 (FAOSTAT, 2020)

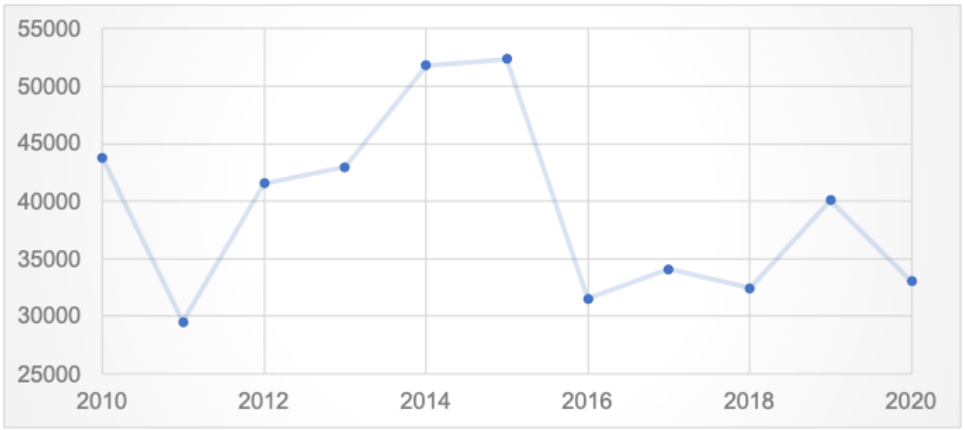

Figure 1: Production value of triticale from Belgium, in MT (FAOSTAT, 2020)

In terms of regional production by land area, triticale is mostly produced in Wallonia, with around 3,000 ha of land sown for the crop, and this is approximately 60% of the total triticale production area in Belgium in 2017. However, in terms of regional production by the number of farm exploitations, there are more unique triticale producers in Flanders, albeit in smaller land areas (FilAgri, 2019). Moreover, producers in Belgium are considering farm conversion to be eligible for organic product certifications. As of 2016, around 125 ha of triticale farmland are certified organic in Flanders, and around 995 ha in Wallonia are certified organic for the crop (FilAgri, 2019; DLV, n.d.). Experimental trials are also being conducted by Belgian researchers to identify highly viable candidates of triticale varieties for organic production (Faux, 2020).

More often than not, harvests of triticale are designated to be used for livestock feed, and human consumption or even distribution in retail is not predominant (Zhu, 2018). In some cases, triticale is also used for the production of biofuels, similar to other grains (McGoverin et al., 2011). Despite this, some scientific studies have attempted to shed light on the feasibility of using triticale (and its flour derivative) for human consumption. Triticale flour has been used in experiments to create bread products, and some have even used the crop to create spirits, yogurts, and other bakery products, although commercial scaling of these products is still nonexistent (Zhu, 2018). Undeniably, triticale is a cereal

that offers a huge amount of potential for both food and feed streams, in addition to its established resilience and resistance to environmental shocks.

1.2 Results

1.2.1 Description of the triticale value chain

The Belgian value chain for triticale is mainly focussed on feed. Triticale for human consumption is not yet applied in Belgium. There are some processors looking for the potential of the application and testing milling applications, but this has not yet been commercialised. Seed suppliers and feed producers are largely dependent on the import of triticale, as the production of triticale in Belgium is limited. When triticale is sown in Belgium, it is mainly used for on-farm use such as ensiling or on-farm feed mixing. Feed producers apply it in feed mixes, which are sold directly to the farmer or go to a distributor first before being sold to the farmer. The value chain for triticale is listed in Figure 2.

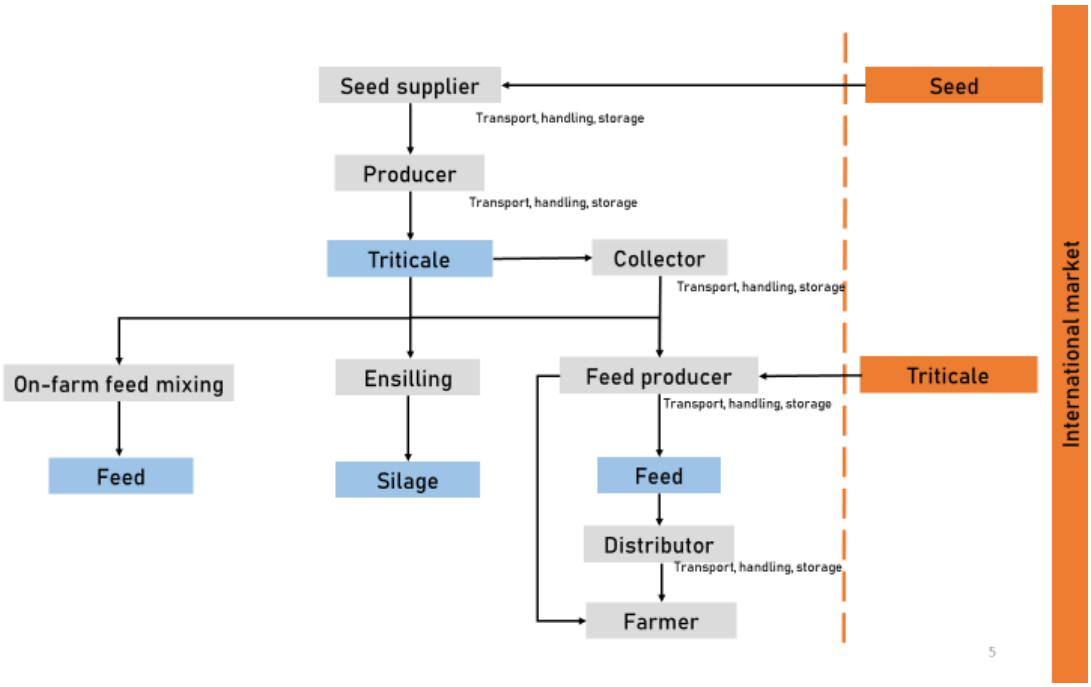

Figure 2: Triticale value chain in Belgium

1.2.2 Overview of the interviews completed

In total 11 interviews took place for the development of the value chain of triticale. Two companies were both seed suppliers and processors and are accounted for as both. Mainly feed processors were interviewed. One food processor was interviewed who is interested in the application of triticale in the future. Currently, there are no food processors in Belgium who use triticale in their products. The knowledge of the research institute and farmers association was used to support the information of the processors and input suppliers. The overview of the different interviews is listed in Table 1.

Table 1: Overview of the number of interviews for the triticale value chain analysis

VC actor	Input supplier	Farmer association	Research institute	Processor (feed)	Processor (food)
Number of interviews	2	1	1	6	1

1.2.3 Input suppliers and farmers

Farmers are decreasingly sowing their own feed-crops to feed their animals. Therefore, in general seeds that are only used for animal feed, such as triticale, are less sold. When farmers sow their own feed-crops in Belgium, usually wheat will be used. Triticale is a crop that hasn't seen many developments on crop innovation in the past decade and is therefore underdeveloped to be implemented in our current value chain. Triticale doesn't generate the yields that current crops are expected to produce, is prone to diseases and is not adapted to the current circumstances of our climate. Therefore, triticale is often excluded from use by farmers, compared to wheat.
When triticale is produced by farmers, it will usually be in the organic production. The early development stage of triticale minimizes the presence of weeds. Some farmers still implement triticale when they have sand-based soils and here triticale has an advantage over wheat. In general, triticale shows good resistance towards droughts. Triticale can be used by farmers both for ensilage or for on-farm feed mixing.

1.2.4 Processing firm (Feed)

Several feed processing firms were contacted to discuss their application of triticale in feed. The application of triticale in feed in Belgium is limited. Feed producers don't receive triticale from the local farmers anymore since a couple of years. It used to be sown locally by smaller farmers who sold their surplus to processing firms, but most of these farmers are retired or shifted their production. Those who still sow it, often produce it in a limited amount for their own use. In the past triticale was sown more often, but in the current production climate the yield of the crop is too low and farmers tend to shift to producing wheat rather than triticale.
Most of the feed processors in Belgium only use triticale when they receive it as surplus from the farmers. In general, the application of triticale in feed-mixes for processors is similar to wheat. When customers request a special feeding mix of triticale, it is often imported due to a lack of a steady local supply. The processors in general don't have any knowledge of possible advantages triticale can offer in feed. Two out of six processors mentioned the perception of triticale as a healthy feed-crop, especially for cattle. The crop is less aggressive for the rumen and is easily absorbed without the need of additives. A limitation of the use of triticale doesn't provide enough energy in regards to dairy cows.

1.2.5 Processing firm (Food)

Triticale can be supplied by processing companies' general wheat suppliers on special demand. The processor implies certain qualitative and quantitative parameters for their suppliers such as moisture content, minimum protein content, zeleny-value, enzymatic activity,… When they would implement triticale, similar parameters will need to be set. The parameters are defined based on the application of triticale for a certain end product. The processor identifies a knowledge gap between the possibility of agricultural producers to grow crops according to these parameters and the processing industry and its applications. These knowledge gaps are already in place with wheat, which is a very commonly

produced crop. They fear that these knowledge gaps will only increase when they would implement triticale.
Regarding the milling process, only minimal adaptations will need to happen when they would want to include triticale. Triticale is a hybrid crop of wheat and rhye which both can be processed by the same type of rolling mill.

Triticale is currently not used in any bakery products in Belgium. It occurred in the past that it was added as a marketing stunt to advertise triticale bread. Using triticale for bread production is unfavorable as it doesn't have the right functional properties. A lot of baking soda needs to be used to attain the right rising qualities for bread if triticale want to be implemented. The producer identifies a market for this in Ireland where sodabread is a popular product. When triticale would be added in small concentrations to bread, it could fit the trend of the consumption of multiple grains bread. Triticale might rather be implemented in other types of bakery products such as tortillas or crackers.

The processing firm recognizes the opportunity of using triticale in regards of the sustainability trend where the consumers shows great sensitivity for at the current moment.

1.3 Discussion

1.3.1 Past challenges & successes of the value chain

Triticale was used by local farmers in the past to implement into the feed for their livestock. The surplus triticale was sold to local feed processors who implemented this in their mixes. Although it was more applied in the past, triticale was never a high valued crop for feed mixes in the past. The crop always remained a minority of the supply for feed. In regards of the application of triticale in food products, triticale has only been used for limited editions of bread mixes. High valued commercialisation of triticale-based food products has never happened in Belgium in the past.

1.3.2 Current and foreseen challenges and chances of the value chain

Triticale doesn't generate the yields that current crops are expected to produce, is prone to diseases and is not adapted to the current circumstances of our climate. The absence of adapted varieties with sufficient yields and resistance lowers the demand for triticale seeds. Therefore, triticale is excluded from use by farmers, compared to wheat. The crop has the potential to be applied on drought-sensitive soils when the production of maize is not applicable anymore. Triticale currently has only market potential in organic crop production.

In regards of implementation for food products and the milling of triticale, future opportunities can arise as the adaption of the milling process for triticale should be minimal when processing firms are capable of milling wheat and rhye. The application of triticale in bread will always be limited, as it doesn't have the right functional properties for this purpose. Other bakery products, such as tortillas or crackers might offer more implementation opportunities.

When triticale is used for feed, it is mostly used as silage by farmers or for on-farm feed mixing. Belgian processors mainly receive it as surplus from farmers. When their customers require specialty feed mixes based on triticale, they often import triticale to produce these feeds as the local supply is very limited.

Knowledge on the advantages of triticale in feed is limited, which blocks the development of this market segment.

Table 1: Main challenges of the Belgian triticale value chain

VC actor	3-5 main challenges (order: most important first)	Strategies undertaken/to undertake	Potential & benefits for the actor in the VC chain
Input supplier	1. Absence of adapted varieties 2. Prone to diseases	1. Investing in R&D for crop development 2. Investing in R&D for pest management	1. Possibility to have more diverse crop rotation 2. Possibility to offer drought resistant crops for sand-based soils
Feed processor	1. Knowledge gap on the possible advantages 2. Lack of local supply	1. Organizing training sessions for processors 2. Investing in R&D for crop development	1. Possibility to create more efficient feeds 2. Possibility to build a strong local market
Food processor	1. Not suitable for bread products 2. Unknown by consumers	1. Investing in R&D for other bakery products 2. Creating marketing strategies for consumer awareness	1. Innovative bakery products, based on local alternative grains 2. Creating a new market segment

1.3.3 Limitations

Farmers were not interviewed as triticale is in general not produced on a commercialized scale by them. The interviewed food processing firm stated that their conventional wheat suppliers' could supply them with triticale on special demand. No interview could happen with triticale suppliers for human consumption because they couldn't elaborate on their use of triticale as they don't supply it on a regular basis. The lack of (recognized) commercialization of triticale based food and feed eliminates the possibility to interview retailers.

1.4 Synthesis

Triticale is a crop which is barely grown for commercial purposes in Belgium. Farmers growing triticale use the crop for ensilage or on-farm feed mixes. Triticale is mainly grown by organic producers and has been abandoned by the general production. The underdevelopment of triticale regarding the R&D potential resulted in the decrease of implementation of triticale on poor soils as other crops nowadays achieve higher yields and have a higher pest resistance. A limited amount of the local triticale production ends up in the feed processing sector. Feed processors have limited feed-mixes containing triticale, often not marketed for the presence of the crop. Triticale is implemented in feed with a similar purpose to wheat. Belgian processors don't see an added value of including triticale in their mixes, which might be related to a knowledge gap on the use of this crop. In regards of food production, no triticale is used in Belgium to develop food products.

REFERENCES

Ammar K., Mergoum M., Rajaram S. (2004). The History and Evolution of Tiriticale. In Triticale improvement and production – FAO Plant Protection and Production Paper: Rome.

DLV. (n.d.) *Areaal voor plantaardige productie, Vlaanderen, 2016.* https://lv.vlaanderen.be/sites/default/files/attachments/bio_1.xlsx

FAOSTAT. (2020). Food and Agriculture Organization Statistical Database: Rome

Faux, A. (2020). *Point sur les essais variétaux de céréales en agriculture biologique.* https://www.cra.wallonie.be/fr/point-sur-les-essais-varietaux-de-cereales-en-agriculture-biologique

FilAgri. (2019). *Plan de développement stratégique Céréales Alimentaires 2019 – 2028.* https://filagri.be/plan-de-developpement-cereales-alimentaires/

McGoverin, C. M., Snyders, F., Muller, N., Botes, W., Fox, G., & Manley, M. (2011). A review of triticale uses and the effect of growth environment on grain quality. *Journal of the Science of Food and Agriculture*, 91(7), 1155–1165. https://doi.org/10.1002/jsfa.4338

Zhu, F. (2018). Triticale: Nutritional composition and food uses. *Food Chemistry*, 241, 468–479. https://doi.org/10.1016/j.foodchem.2017.09.009