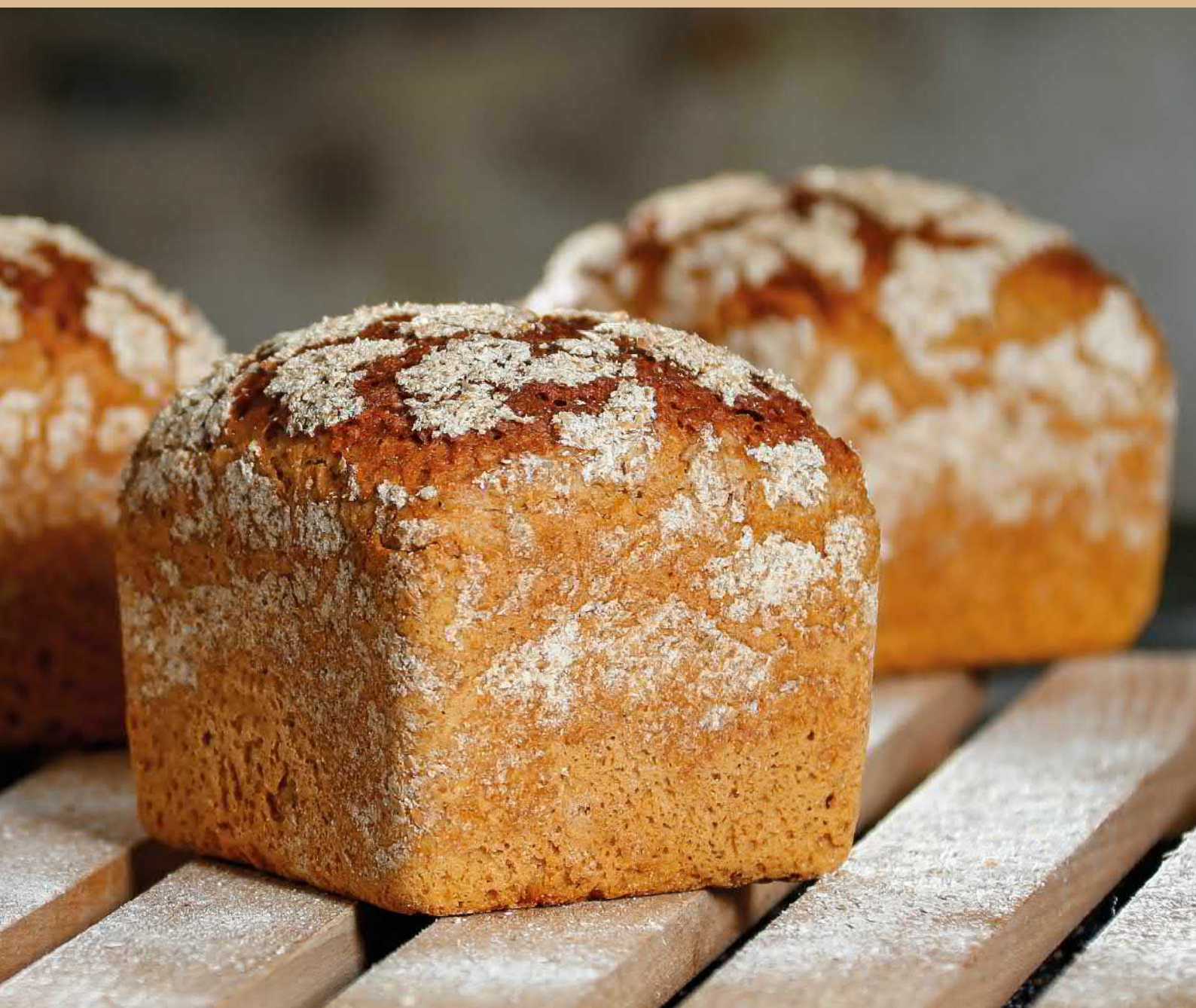


# All about unripe spelt



## History

Traditional foodstuffs of vegetable origin are fully in trend at the present time because they fulfil the yearning of the consumers for authenticity and naturalness and convey a feeling of having a bond to where they come from. For this reason, unripe spelt is also increasingly in demand. With its normal use as a whole-meal product, unripe spelt has favourable nutrition values and, over and above, stands out due to its unique hearty and smoky aroma. As an ingredient, it provides many foodstuffs with a quite particular taste and is therefore a true trend ingredient with character. Especially in times in which individual products are requested more and more, unripe spelt is appealing to rising numbers of consumers. Unripe spelt represents tradition and individuality – a raw material with an exceptional taste and aroma profile, special production method and an impressive history.

When in the years around 1660, as the result of periods of adverse weather, complete harvests failed, the region of the present-day “Bauland”, a “Gäu” landscape in the northeast of Baden-Württemberg, was struck by several consecutive famines. To avoid losing the complete grain harvest, the farmers began to harvest the cultivated spelt already before it was fully ripe. The half-ripe grain obtained in this way still had a high water content and could not be stored for a long time. Thus the farmers reduced the moisture in the grain and, over the years, developed increasingly effective drying techniques. Initially, the remaining heat from the bakehouses was used for the drying process, later, drying took place in the malt and flax kilns. It was only in 1870 that the first separate kiln for unripe spelt was built in Rosenberg, followed by others which were put into use in the small towns of the “Bauland”. Here, the unripe spelt was dried over beechwood smoke. In this way, the grain was given its typical smoky aroma as well as the olive-green colour which is where the name “Grünkern” (green kernel - unripe spelt) originates. As the grain kernels had not developed fully, unripe spelt flour had initially no baking ability. Instead, the unripe spelt was added to soup.

The traditional unripe spelt kilns were often built on a hillside over two levels. The fireplace was on the lower floor, the kiln pan, made from a perforated tin basin, on the upper. The unripe spelt was spread out on this kiln pan and heat and smoke from the fire below led via the smoke chimney through the drying grain. To achieve uniform drying, the spelt had to be turned continuously using shovels. After drying, the kernels



Outside view of an historic kiln for unripe spelt

were threshed out of the ears and the spelts removed in the mills of the surrounding areas by means of a special husking process. After cleaning, the unripe spelt was finally obtained.

By the installation of cooperatively-run large drying plants, the process of manufacturing unripe spelt, which involved a great deal of time and effort, was able to be simplified significantly. In modern methods, the half-ripe spelt is led slowly from the top to the bottom of drying towers. Here, a heated air-smoke mixture is constantly circulating around the grain and dries it in this way. Still today, the experience and the knowledge of the farmers in regard to this sophisticated process is of decisive importance for the production of high-quality unripe spelt.



Historic kiln for unripe spelt – continuous turning of the grain



Modern kiln for unripe spelt with drying tower



Dried unripe spelt

due to the formation of firm spelts and kernels as well as a below-average kernel size, which makes them especially suited for the demanding kiln-drying process. The latter is of advantage to obtain a uniform colour and texture after drying.

Harvesting of the unripe spelt takes place around two to four weeks before the actual spelt harvest. To catch the right moment exactly, the knowledge and the experience of the farmer is necessary which is based on a century-old tradition. At the time of harvesting, the unripe spelt is in transition from the milk ripening phase to dough maturity. The optimum moment in time is very dynamic and lasts between eight and twelve days. As a result of this very short window, the yield of the unripe spelt harvest depends very much on the weather, however. The seeds have an olive-green colour at this stage of maturity and have already reached their full size. The water content is still relatively high at 40 – 50 % which allows the inside of the kernel to be pressed out easily. In this phase, minerals are stored in the grain and endosperm formed from the carbohydrates contained. Over and above, the relevant proteins for the gluten have not yet developed completely. These differences between the stage of development at the time of the harvest and the fully ripe grain can also be seen in the analysis parameters:

Analysis parameters	Wholemeal unripe spelt flour per 100 g	Wholemeal spelt flour per 100 g
Energy <sup>1</sup>	1492 kJ / 353 kcal	1427 kJ / 338 kcal
Fat <sup>1</sup>	2.9	2.8
Carbohydrate <sup>1</sup>	64.3	58.8
Protein <sup>1</sup>	13.1	14.8
Fibre <sup>1</sup>	8.6	9.0
Minerals <sup>1</sup>	1.5	1.7
Moisture <sup>1</sup>	10.6	12.4
Gluten content [%] <sup>1</sup>	not applicable <sup>2</sup>	35.7
Sedimentation value [mL] <sup>1</sup>	12.0	15.0
Falling number [s] <sup>1</sup>	297.0	303.0
Amylogramm maximum [AMYLOGRAM UNITS] <sup>1</sup>	554.0	315.0
Temperature gelatinization maximum [°C] <sup>1</sup>	89.5	82.2

<sup>1</sup> Tests in the IREKS company laboratory for flour analysis

<sup>2</sup> Gluten cannot be washed out

## Cultivation and harvest

Already in 1960, the variety “Bauländer Spelz” was prescribed for the production of unripe spelt. This variety is characterized by its particularly high robustness and is therefore very well suited for cultivation on soils which are arid and poor in nutrients. Thus it also provides good yields in the traditional area of cultivation of unripe spelt, the so-called “Bauland”, even although many areas of this region are described as “naturally less-favoured areas” by Directive 75/268/EEC. For this reason, the cultivation of traditional wheat varieties is only possible with low yields here. In addition, “Bauländer Spelz” stands out

To do justice to the historic manufacturing process and the importance of unripe spelt as a product with a regional origin, 75 farmers of unripe spelt have joined forces as a protective association and have been able to achieve the recognition of "Fränkische Grünkern" as a protected designation of origin within the EU. Accordingly, only spelt of the variety "Bauländer Spelz" may be used for production. Moreover, all the necessary processes – i.e. sowing, harvest and kiln-drying – have to take place within a specifically defined area of five administrative districts of Baden-Württemberg and Bavaria.

In the region of its cultivation, unripe spelt has been used traditionally for many years in the most diverse recipes, the oldest documented recipe is from the year 1821. As a rediscovered trend ingredient, unripe spelt has, in the meantime, been increasingly finding its way into different sectors of gastronomy due to its sensory properties and is being used more and more frequently in baked goods as well. Here, the nutty and smoky aroma and the moist crumb give the baked goods an unmistakable character.

## Baking technology

Due to the early harvest and, as a result, the ingredients such as starch or gluten proteins which are not fully developed, pure unripe spelt flour has no baking ability. The water absorption is very high so that with a 100 % addition of water based on flour, dry and firm doughs still develop. At the same time, these are inelastic and short, however, and are therefore difficult to process. During baking, the bread has only a very small volume. In addition, the aeration is not adequate and, as the high amount of water in the baked goods cannot be bound completely, water streaks form.

Percentage unripe spelt flour [%]	Water absorption with 500 farinogram units <sup>a</sup> [%]	Stability <sup>a</sup> [min]	Energy <sup>b</sup> [cm <sup>2</sup> ]	Extensibility <sup>b</sup> [mm]
0	55.5	4.4	112	137
5	57.5	4.1	106	124
10	59.4	3.9	89	112
20	63.2	3.8	57	88

<sup>a</sup> Farinogram | <sup>b</sup> Extensogram after 135 min of resting time



Left: bread using 100 % spelt flour type 630;  
Right: bread using 100 % unripe spelt flour

But to be able to produce stable baked goods using unripe spelt, the centuries-old tradition has been united with the know-how and the most modern technology of the IREKS Company. For such a product, balanced mixes and flours with baking ability such as spelt flour, for example, are required. With an increasing percentage of unripe spelt flour, the water absorption capacity of the doughs, the extensibility and the stability decrease significantly, however. Above all, the latter has to be observed for regulating the mixing parameters.

The changes to the dough properties by the adjustments of the flour composition (spelt flour type 630/unripe spelt flour), can also be seen with the help of farinogram and extensogram readings.

The changed dough properties have, in turn, an effect on the baked goods made from this.

Spelt bread with a rising amount of unripe spelt flour from left to right:  
0 %, 5 %, 10 %, 20 %



With an increasing percentage of unripe spelt flour, the loaves become significantly smaller. The crumb becomes firmer and loses the elastic properties which are typical for bread. This can be counter-acted by the use of carefully selected raw materials.

For example, included here is the enhancement of the baked goods with a high-quality unripe spelt sourdough made by IREKS itself. The production of the sourdough takes place according to the most modern technological and ecological standards. Initially, wholemeal unripe spelt flour is refined by the addition of specially chosen starter cultures. As the result of a several-stage fermentation, the product is given the necessary time to develop into an extremely aromatic and unique sourdough. For stabilization, this is finally dried gently, whereby the particularly grassy-fermented aroma is maintained at the same time. In addition, the sourdough manufactured in this way is also characterized by its mild acid of around 35 degrees of acidity. With this special composition, the taste of the unripe spelt baked goods is further rounded off, resulting in baked goods full of character.



Bread from a mixture with spelt flour and unripe spelt flour

## Summary

Due to its exciting story and the manufacturing process as well as its unmistakable properties, unripe spelt is enjoying increasing popularity and is also being used more and more often as an ingredient in baked goods. As the spelt is still within the dynamic phase of growth when harvested, not all the

ingredients have been fully formed. This mainly applies to the carbohydrates and the proteins which form gluten, the reason why pure unripe spelt has no baking ability. For processing into baked goods, which only contain one percentage of unripe spelt flour, technological peculiarities, such as an increased water absorption and adjusted mixing parameters, have to be considered. In combination with other ingredients, aromatic and unique baked goods can be made using unripe spelt which correspond to the current zeitgeist and which meet the high expectations of the final consumers.

### Literature

Europäische Kommission. (7. August 2013). Verordnung (EG) Nr. 510/2006 des Rates zum Schutz von geografischen Angaben und Ursprungsbezeichnungen für Agrarerzeugnisse und Lebensmittel. Fränkischer Grünkern (EG-Nr.: DE-PDO-0005-01144).

Gemeinde Rosenberg. Grünkernanbau.

Accessed on 27 January 2020 at <http://www.rosenberg-baden.de/leben-in-rosenberg/gruenkernanbau>

Lebensmittel-Warenkunde. Grünkern.

Accessed on 27 January 2020 at <https://lebensmittelwarenkunde.de/lebensmittel/getreideprodukte/getreide-mehl/gruenkern.html>

Vereinigung fränkischer Grünkernerzeuger. Grünkern. Accessed on 27 January 2020 at <http://www.fraenkischer-gruenkern.de/>