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THE AUTHORS

PROF. DR. FRIEDRICH LONGIN

I started baking bread while living in France with my family. At some point I just didn't want to eat baguette anymore. My first attempts had rather unfortunate results. Today I realise that it wasn't my fault. Many of the recipes in well-known baking books simply lead to "dry bricks" instead of delicious fresh bread. Over time, however, things got better and it became a true passion, partly because I have been working intensively with bread cereals since 2010. This was also the year, I took over the scientific lead of the wheat research team at the State Plant Breeding Institute at the University of Hohenheim. As a university professor for plant breeding, I have been working on the preservation



(Photo: Friedrich Longin)

and breeding of ancient wheat species such as spelt, emmer and einkorn, and on improving the quality and ingredients of wheat.

The idea, followed by the first pages for this booklet, came to my mind during the COVID-19

lockdown, when I started baking online with friends. As many good baking books and blogs show relatively complex recipes, my objective in this present book is to demonstrate how simple bread baking can actually be. As a wheat researcher, I have long been confronted with the myths that the world's most important bread grain supposedly makes people very sick. And in many internet forums and baking books advice is given to use 100% wholemeal flour if wheat is to be used at all. That is why I wanted to provide scientifically profound facts & figures on a healthy approach to wheat and wholemeal. If you want to stay up-to-date, just follow me on Facebook, Instagram, Twitter or LinkedIn.

CHARLOTTE GRILL

After finishing my university degrees in translation and conference interpreting at the University of Heidelberg and the University of Saarbrücken, followed by the accreditation as a translator at the OSCE and the European Union, I worked in the language services of the European Central Bank as well as the United Nations headquarters in New York. For more than 14 years, I have been working as a language expert for international organizations, ministries and research institutions, whereas editing, content writing and proofreading of all kinds of texts, books, scientific papers and



websites has become one of my specialties. Apart from finances and politics, seed breeding, agriculture and development aid have

resulted to be my main working areas. Also, it has been an honor to have been chosen as translator of the reference book "Neglected crops – from ancient grains to superfood", written by Prof. Dr. Thomas Miedaner and Prof. Dr. Friedrich Longin from the University of Hohenheim.

Until 2016 I additionally served as editor in chief of the Austrian Interpreters' and Translators' Association Universitas Austria's journal, in the context of which 19 own publications have been produced. My contribution to this book project was language editing of the German version and the translation, revision and postediting of the English version.

DR. AXEL ENNINGER

Back in the 1980s my eco-conscious shared student apartment in Freiburg im Breisgau was already equipped with a grain mill. The bread we made was always healthy, usually very dense and rarely tasty. We ate it more out of conviction than for enjoyment. Over the years, I lost interest in baking, mainly because the bread I purchased in a store simply tasted better. I am now working as medical director at the paediatric clinic “Olga Hospital” in Stuttgart. As a paediatric gastroenterologist, I specialised in diseases of the gastrointestinal tract and have always been asked about intolerances to numerous foods in recent years. Lately, questions about the health



(Photo: Alexander Beck)

risks of wheat consumption have become more frequent and the question whether wheat is a trigger for numerous complaints has become increasingly common. This varied between the question

– often justified – about the presence of celiac disease and the supposed health effects of cutting out wheat, e.g. by switching to spelt, which I find difficult to understand. One remark in advance: the problem was obviously not the gluten. In the course of my research, I came across the topic of wheat processing and the bread production process. This is a topic that doctors often don’t deal with. Not only did I like the ‘do-it-yourself’ approach and the long dough fermentation times for bread making, I also found the explanatory models behind it plausible, which led to Friedrich and I getting to know each other. Over time, the idea arose that I could participate in this book project, especially by adding medical aspects.

OUR MOTIVATION

Beside maize and rice, wheat is by far the most widely cultivated and therefore consumed type of grain in the world. Roughly speaking, over 700 billion kilograms of wheat are produced every year. Around 40% of it is consumed by us humans in the form of bread, while the rest is used as animal feed and, to a lesser extent, for starch industry, energy production, etc. However,

this also means that wheat is a central pillar of the human diet, as it has been for thousands of years.

As a result, an enormous variety of baked goods made from wheat has developed worldwide. Our home country of Germany is one of the countries maintaining a remarkable diversity of bread. There are said to be over 3,200 different types of bread. Unfortunately, in

many countries around the world, anyone who is as enthusiastic about this bread diversity as we are is annoyed by the constant consumption of “standard bread”. As it is often difficult to find bakers who offer real alternatives, we want to show you in this book how easy it is to make sure, you enjoy a great and healthy diversity of German bread yourself. We aim for simple



recipes with just a few ingredients and guaranteed success.

Despite the importance of wheat and bread, wheat-bashing has become quite common in recent years, especially in industrialized countries that are well supplied with food. According to nutrition guides and numerous internet sources, wheat consumption is said to be responsible for almost every disease, to be addictive and to make people fat, and the only true form of therapy is to give up wheat for life. Interestingly, closely related subspecies of wheat such as spelt, emmer or Kamut® are often recommended as curative alternatives. This has been leading to millions of confused consumers and, even worse, too many worried parents who only want the best for their children. It is true though, wheat can cause illnesses, but this is only true for an estimated 1-6% of the world's population, and for everyone else, as numerous independent research studies and nutrition societies have confirmed, the daily consumption

of (wholemeal) products made from wheat and other grains is a central part of a healthy diet.

But the issue with wholemeal is a whole other story. Although we have all known since school that wholemeal products are even healthier than their white flour alternatives, we still eat very little of them; in Germany, only approximately 11% of baked goods are made from wholemeal. The reason for it is not the industry, which doesn't want to produce more of them, but it is us, the consumers, who demand so little of it. Some of the prejudices are: wholemeal doesn't taste good, looks disgusting and can make your stomach hurt. The latter mainly occurs if you are not (or no longer) used to eating it. Then there is also the fear of the ever worsening agricultural production with increasing pesticide residues and a food industry that provides us with poor food for profit reasons. Interestingly, however, the reality is that the vast majority of food is cleaner today than it has

ever been, mainly thanks to the latest technology, numerous regulations and strict controls.

When it comes to food, we believe that dogmatism and fear are no good advisors. We would therefore like to use this booklet to dispel the numerous and sometimes strange ideas about unhealthy wheat and bread consumption, as well as about "bad" farming and food production. We would like to present to you the positive properties that wheat and other types of grain have and also provide you with undogmatic ways of combining enjoyment and "whole grain" in order to convince even stoic "whole grain deniers" within your close circle. We will also teach you how to bake your own tasty bread and rolls. By the way, Friedrich and Axel are both employees of public institutions and therefore completely independent. As scientists, they are subject to a high professional ethos and many controls. Not to mention that this book has been written without any external funding.

YOUR START IS EASIER THAN EXPECTED



(Foto: BeckaBeck)

Baking bread that looks and tastes as good as your favourite baker's is easier than you think! There are a few things to bear in mind, which we would like to explain to you step by step. The first and most important thing is that you don't need much to bake bread. Apart from the four main ingredients (flour, water, salt and yeast) you only really need one thing – time. Strictly speaking, it's not you who needs time but the dough in order to develop its flavour and, above all, its baking volume. Another important information: Many recipes that we found in classic recipe books and on the internet cannot deliver good bread results, because two things are usually described incorrectly: first, the time it takes for the yeast to multiply sufficiently so that the dough rises properly. The time commonly indicated in many recipes is far too short. Second, often dough is made with far too little water. The result is therefo-

re inevitable: You end up with a bone-dry brick and not a moist and fluffy bread.

But how can you make it better?

THE MOST IMPORTANT PART

The key is to develop a feeling for the two essential factors when baking bread. First, how much water to use for the dough/bread? If in doubt, it's better to use too much than too little! And second, to reach the right moment for the dough to have risen sufficiently so that the yeast has multiplied enough for a loose baking volume. The rule is here: it is better to let the dough rise a little too long than too short; the dough volume should definitely double. And if this is not the case after 30 minutes, as described in the recipe, then just wait until it is ready, even for a few hours if necessary. You don't have to stand next to it and watch it...

THE BASIC RECIPE – ONLY 4 INGREDIENTS

You only need FOUR ingredients to bake bread; the rest is "decorative accessories". These are flour (usually wheat), water (more is better than less), salt (the less, the healthier), and yeast (professionals can also use sourdough). How much to use of each ingredient is a matter of taste. It is important to us to keep it simple, which is why we start all our recipes with this basic recipe. You can extend them at any time. It is like your basic building block, which you can always use as a guide and which alone already leads to a great result. All other recipes in the back of the book are small or larger extensions of this basic recipe.

“BASIC RECIPE”: QUICK COUNTRY BREAD



INGREDIENTS

1000g wheat flour Type 1050

650g water

15g salt

20g fresh yeast or
1 package dry yeast (7g)

PREPARATION

Mix everything (low speed on the kneading machine, approx. 3-4 minutes), knead intensively (higher speed on the kneading machine, approx. 3-4 minutes) and then leave the dough to rest until it has at least doubled in size (or longer). If you use fresh yeast this should be the case in approx. 2-3 hours, with dry yeast it will take a little longer.

Take the finished dough and perform a “stretch and fold”- exercise on a floured work surface to stabilize the dough (you can find numerous videos on YouTube). Roughly speaking, you pull the dough far apart so that the dough surface becomes wide (like a baking tray) without it tearing. Then fold the dough inwards from all four sides, partially overlapping, and turn the dough piece over so that the folds are facing down on the work surface. Then take the dough again and knead and shape it into a round or oval loaf and leave the bread to rise until it has noticeably increased in size (professionals call it final proofing or piece proofing). Only then cut into it, moisten the surface of the bread by spraying a little water on it (a water sprayer is ideal like for flowers), and place the bread in the oven preheated to 230°C. Baking time is approx. 45-50 minutes, but lower the temperature to 200°C after 10 minutes and briefly allow the moist air to exit the oven. You can tell whether the bread is ready by the knock test rather than by the clock: If you knock on the bread from above and below and it sounds hollow it’s ready.

Please note, the recipes in that book lead to dough amounts of $\geq 1700\text{g}$. It is your decision what size your final bread should be. On the basis of your decision divide your dough into 1-5 parts before finally shaping it to a bread loaf, or even into smaller parts if you are making bread rolls.

THE FOUR BASIC INGREDIENTS AND THEIR MAIN FUNCTION IN BREAD

If you want to bake your own bread more often and want to achieve perfect results, it is important to know a few things about the four basic ingredients.

FLOUR

Let's first take a look at the main ingredient, flour, and in particular wheat. Around 12% of the wheat grain consists of protein, 80% of which is gluten. Gluten can cause diseases such as celiac disease and other intolerances in 1-6% of the population (see later chapters). For everyone else, however, it is the central substance that makes it possible to bake fluffy rolls, bread, and make pasta al dente.

During mixing and kneading, the components of the gluten form a stable network into which the starch grains can then be incorporated, which is the basis for bread with a crispy crust and moist crumb. This is why the dough must

be well kneaded. You can test this by taking some of the dough and carefully pulling it apart with your hands. This "window test" should lead to a thin film of dough almost transparent without it tearing.

By the way, the composition of gluten has important consequences for the dough processing. Wheat gluten contains a lot of glutenin, imagine the nib of a ball-point, and little gliadin, imagine chewed chewing gum. The dough structure therefore requires intensive kneading. Spelt, einkorn and emmer have less glutenin and more gliadin, so you shouldn't knead too intensively here, because "a little feather has to lift a lot of chewed chewing gum" (see details in later chapters).



Dough test. (Photo: BeckaBeck)



Water binding of wheat starch with cold (photo left) and hot water (photo right).

Starch is particularly important for binding water. At a temperature of up to 60°C, wheat starch can only bind a little water (picture left with cold water) but many times more with hot water (picture right). This is called gelatinization of the starch. When baking, this only happens in the oven, so only the water that the other ingredients in the dough were able to bind is available. These are, in particular, seeds or gluten, which can bind up to twice their weight in water. If you want to specifically increase the water absorption you must ensure that the starch has gelatinized before preparing the dough, e.g. in a soaker, which we will explain later.

THE LITTLE ABC OF FLOUR

Most laymen don't realize it, but the quality of the flour is the decisive factor when baking bread. As with all other things in life, the same applies here – "you get what you pay for". The super-cheap flour is usually a flour that has poor baking properties and you will never bake bread that looks like in a picture book. This is mainly due to the composition of the gluten and the fact that a good gluten composition for baking bread comes at the expense of the farmer's yield in the field. Flour with good baking properties must therefore be somewhat more expensive. Thus, it's better to go for the second or third cheapest flour in the supermarket, or even better to buy it directly from the miller. However, super-expensive organic flour from the farmer next door doesn't necessarily have to be better than flour from the supermarket! Unfortunately, you and even experts can't tell just by looking at the flour. The best solution is to buy it directly at the mill.

FLOUR QUALITY OFTEN VARIES CONSIDERABLY

Flour is a natural product. The grain grows in different locations and under different conditions every year. This means that grains from different farmers, and therefore their flour, always have slightly



f.l.t.r. wheat Type 405, wheat Type 1050, wheat wholemeal, rye Type 1150

different baking properties. The miller usually corrects this by mixing different grain origins in such a way that the flour quality remains as consistent as possible, but even he can't do magic. If the bread dough and bread don't turn out right, it's probably not your fault, but rather the flour! This is why the amount of water in the recipes listed here should be seen as a guideline, because the water absorption capacity of each batch of flour is different. And you don't have to be too precise with the quantities of ingredients: 10g either way won't change the baking result in most cases!

Organic flour generally has a slightly poorer baking quality than conventional flour, which is due to the reduced fertilization in organic farming – a welcomed development for the environment. For baking, however, this can usually

be remedied with longer dough proofing times and pre-dough or by accepting the fact that the bread volume will somewhat be smaller. If you are interested in more background information, take a look at Friedrich Longin's YouTube channel.

FLOUR TYPE

It should be noted that there are different types of flour, which unfortunately differ slightly in each country. Regarding wheat in Germany, there are the following types: 405, 550, 1050, 1600, baking flour 1700 and wholemeal (always without a type number). This number indicates the ash content (i.e. the mineral content) of the flour, not the fineness of the flour. And, of course, we don't eat ash, this number is only measured

Nutritional information per 100g wheat (simplified according to the LMIV guidelines of the VGMS)					
Nutritional value per 100g	Type 405	Type 550	Type 1050	Wholemeal	Bran
Energy, kj	1459	1474	1455	1373	1106
Carbohydrates, g	72,3	72,0	67,2	59,5	17,7
Fat, g	1,0	1,1	1,8	2,4	4,7
Dietary fibre, g	2,8	3,5	5,2	10,0	45,1
Protein, g	10,0	10,6	12,1	11,4	16,0

by ashing a flour sample. Roughly speaking, for all grains the higher the ash content the more of the grain has been milled and the higher is the content of minerals and fiber. A classic white wheat roll or white bread is made with Type 550 wheat flour. As described in detail in later chapters, we should mainly eat whole grains because only they contain all the beneficial ingredients. But let's take a quick look at the table (page 9) with the nutritional information. Type 1050 flour, which is still quite light, has twice as much fiber, 2% more protein and fewer carbohydrates than the Type 550 bread and bread roll flour that is typically used. During the production of light type flour, the germ and outer layers, i.e. the grain components with particularly healthy ingredients, are collected in the bran. Bran is therefore highly concentrated in beneficial ingredients, as you can see in the nutritional value table, containing for example 4 times the amount of fiber compared to wholemeal flour! We will make use of this knowledge later, on the way from very light bread to 100% wholemeal bread.

**FLOUR TYPES LABELED
DIFFERENTLY INTERNATIONALLY**

This is a book from Germany about German bread, so we have made the recipes with our flour designations. Unfortunately, these type numbers differ in every country. There are countries, where the type is designated in a similar way to that in Germany, e.g. in France, Austria, Switzerland, the Czech Republic and Poland. But there are also other countries where this exact designation does not even exist and where the flour is named according to its use, e.g. in the US and UK. **It is impossible for us to give a summary for all countries at this point, so you will have to consult the Internet or ask AI to find the information for your own country.** To simplify matters, however, we would like to provide a brief table of information for a few countries. For wheat, it is also very important to know that wheat with a high grain hardness is used for baking bread and rolls, so-called hard wheat, while wheat with a soft grain hardness is actually only used for cookies and

waffles. In Germany, we use only the so-called red wheat for baking in contrast to some countries like the US and New Zealand that use white wheat (see paragraph on wheat). There are also countries where flour is already enriched with vitamins, additives and sometimes even bleached. In our opinion, healthy baked goods do not need any additives. Ultimately, the varieties within wheat, rye and spelt also differ in the various countries with slightly different baking properties. **It is therefore possible that your baking result with our recipe will look slightly different because your flour is slightly different to ours. You can correct most of it by adjusting the amount of water and the kneading time in the recipe and with a little practice you'll soon get the hang of it.**

WATER

To slightly overstate, water is the cheapest ingredient when baking bread, so you should add as much as possible. The amount of

Flour types labeled differently internationally					
Germany	France	Italy	Spain	USA	UK
Wheat – 550	T55/ T65 (blé tendre)	Tipo 0 (grano tenero)	Harina (de trigo) fuerte	All purpose flour (wheat)	Plain flour (wheat)
Wheat – 1050	T110	Tipo 2	Harina integral	First clear flour	Very strong flour
Wheat – whole grain	T150 (farine intégrale)	Farina integrale		Whole wheat flour	Wholemeal flour
Spelt – 630	Épautre T65 (blanche)	Farina di farro tipo 0	Harina de espelta blanca	White spelt flour	White spelt flour
Spelt – whole grain	Épaute intégrale	Farina di farro integrale	Harina integral de espelta	Whole spelt flour	Wholemeal spelt flour
Rye – 1150	T130	Tipo 2	Harina de centeno semirrefinada	Medium flour rye	Dark rye flour
Rye – whole grain	T170 (farine intégrale)	Farina integrale	Harina integral de centeno	Whole grain rye	Wholemeal rye

water also ensures that the bread is moist and, above all, stays moist for a few days. Very coarse pores also have something to do with water evaporation during baking; this is known as physical loosening. As already mentioned, many recipes on the Internet and in classic baking books use too little water or the photos of the dough do not match the amount of water. In layman's terms, the dough should be a little too moist at the beginning, possibly even a little runny, rather than hanging firmly around the dough hook. When adding water, bear in mind that every dough swells. When the dough rises after mixing, the flour components (and seeds if used) continue to absorb water, so the dough dries (stiffens). The more seeds there are or the more wholemeal flour is used, the more the dough tends to dry out. It is therefore better to add a little too much water at the beginning and let the dough rise first. If it is still too runny at the end of the proofing process, you can quickly knead in some more flour. At this point, it is difficult to get water into the dough without making a mess.

The water temperature influences the speed of yeast fermentation and therefore the time the dough needs until it is ready to be used for bread baking. If you are in a hurry, you should use warm water (30-35°C). However, it should be noted that water that is too hot will destroy the yeast cells and the bread will no longer rise. If you have time to let the dough rise longer, the use of cold water is always recommended. On the one hand, this

improves the baking properties and on the other hand it allows the dough to rise over a longer period of time with the advantages that come with it (see later chapters).

YEAST

There are numerous yeast products, whether in dry or fresh form, with widely ranging prices. There are also differences in quality, but contrary to the importance of flour quality, we did not notice them ourselves when baking at home.

It is much more important that you are aware of the function of yeast. Yeast is a living organism and feeds on sugar, which it ferments into alcohol and CO₂. The resulting gas causes the dough to rise as long as the dough can hold the gas in form of bubbles. The yeast multiplies and works fastest at around 25-30°C and when there is a lot of sugar present. In bread, this sugar is contained in the flour, or more precisely in the starch of the flour, which is broken down into sugar during the resting time of the dough. If you want the dough to rise quickly, you should choose a dough temperature of 25-30°C, use warm water and add a little sugar or honey to the dough. If, however, you want to achieve a long dough proofing, you have to reduce the yeast fermentation using less yeast, cool water and, of course, no sugar.

SALT

We are used to our bakers using rather more than less salt (this applies to many other foods

we eat). As this is very unhealthy, we advise to reduce the amount of salt to a minimum. But make sure it still tastes good. It is not advisable to eliminate the salt altogether, as even small amounts of salt in bread dough help to improve the shelf life and dough. By the way, professionals only add salt at the very end of the kneading process. Salt also affects the growth of yeast and sourdough, slowing both down.

OTHER INGREDIENTS

There are no limits to your imagination; use whatever you like (at least at home). In addition to flour from other cereals (rye, spelt, emmer, einkorn), various seeds are commonly used (sunflower seeds, pumpkin seeds, linseed, sesame seeds, poppy seeds, millet, chia, oat flakes, ...). This results in interesting changes in taste and a significant increase in healthy nutrients, but unfortunately also changes the baking properties. The use of seeds generally always impairs the baking quality, so you should not use too much. We will explain the best approach to it in the wholemeal bread recipes.

OVEN

A baker's oven is always better than your own one and it has two main advantages. First, bread has to be baked very hot, at $\geq 200^{\circ}\text{C}$, and the baker's oven runs almost around the clock, so it has always the perfect temperature. Second, if the baker's oven is turned on, it deliberately introduces humidity into the oven with puffs of steam.



This moistens the surface of the bread, which ensures that the bread can expand without cracking.

You can still bake properly with most household ovens. It is important to use a baking temperature as hot as possible, so preheat the oven to 230°C and then bake the bread at 200-220°C. If possible, you should also avoid baking with circulating air. This tends to make the bread dry; combined top and bottom heat is better. It would also be good to have some moisture in the oven as soon as the bread is put into it. There are various options and philosophies on how to create the same kind of moisture in your oven as you find in the baker's oven. They vary from simple and cheap to complex and expensive.

A simple variant is as follows: Place a metal tray during preheating into the oven. Just before you bake the bread, spray a little bit of water on it. Then put it into the oven, pour about 2 espresso cups full of water into the heated metal bowl and close the oven immediately. The water will then evaporate



fast and prevents the surface of the bread from drying out. Briefly open the oven after 10 minutes to let the moisture escape. Alternatively, you can use a cast iron roasting pan with a lid for baking. Heat this during preheating and then place your bread in it using baking paper, and close the lid. This pot ensures that the heat is high and the humid-

ity remains in the pot so that the bread can rise flawlessly. Remove the lid 10-15 minutes before the end to make sure that the moisture can escape and the crust becomes crispy. You can also use baking stones, but you have to heat them up in a hot oven for a long time to ensure that they work properly during baking.

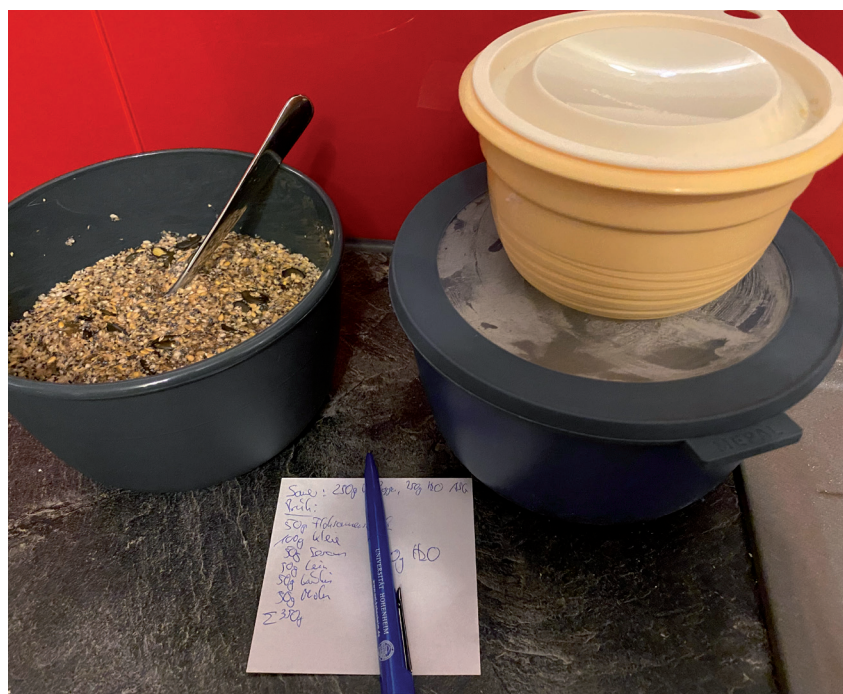


LONG DOUGH PROOFING: MORE FLAVOR, BETTER FRESHNESS, MORE NUTRIENTS

Dough proofing time has a major influence on the dough properties and therefore the baking result but also on the nutrients, which is currently the topic of several research projects. A long dough fermentation means that the dough has a significantly longer proofing time after mixing, i.e. it does not rise immediately at room temperature and is baked within 1-3 hours. During a long dough proofing time yeasts, sourdough bacteria and the grain's own enzymes work intensively in the dough. The yeast can propagate and enzymatic processes in the dough create more flavor. However, as excessive yeast propagation leads to the yeast degrading the gluten network, the amount of

yeast is reduced if a longer dough fermentation is planned and the dough is placed in the fridge for most of the rising time. Before baking, however, the dough should adjust to room temperature for at least one hour before the bread is shaped. The cooler you have stored the dough (up to 1°C is possible, normally 5-10°C), the longer this acclimatisation period should be so that the yeast has the power to loosen the bread properly because yeast dies relatively quickly in the oven. As the flour and grain components bind more water the longer the dough fermentation lasts, you should add more water to recipes with a long dough fermentation, which naturally improves the freshness.

Some of the minerals in wholemeal flour, e.g. iron and zinc, cannot be absorbed by humans, as they are bound to phytate. They need to be released, which happens through the grain's own enzymes and enzymes from the yeast and sourdough during a long dough fermentation process. By the way, rye contains up to 5 times as much of the enzyme phytase, which is needed to degrade phytates and release iron and zinc. This is why the use of rye flour in wholemeal bread is so interesting and a good option if you like the taste. A long dough fermentation time also reduces the FODMAP content, which consists of sugar compounds that can lead to flatulence and intestinal complaints for some people (see later chapters), and the acrylamide content, which is a potential carcinogenic substance that is found wherever carbohydrates are processed hot, i.e. in potato chips, French fries, coffee, and in small quantities also in some types of bread, especially in the crust of very dark baked products. Finally, long dough fermentation times produce more aromatic bread. Also, the bread stays fresh for longer. In this respect, bread and especially wholemeal bread should always be baked with a long dough fermentation time. Therefore, many of the recipes you will find in this book make use of it – either on the basis of yeast or sourdough.



BASIC RECIPE: LONG PROOFING – COUNTRY BREAD



INGREDIENTS:

Dough – basic recipe with reduced amount of yeast and slightly more water

1000g wheat flour
Type 1050

750g water

10g fresh yeast or
½ package dry yeast (4g)

15g salt

PREPARATION:

The yeast can multiply for a long time if the dough is left to ferment for a long time. Enzymatic processes in the dough create more flavor. In addition, the flour can bind more water, which leads to increased freshness of the bread. This is why we reduce the amount of yeast and increase the amount of water, which is the opposite of what we do in our basic recipe, where we have a short dough fermentation time.

Put together all the ingredients, knead well and put the dough in the fridge overnight. Remove the dough from the fridge the next morning, stretch and fold once on the work surface and leave to acclimate for two hours. Then stretch and fold again and shape into a nice loaf. Leave to rise until the dough has increased significantly in size. Make two deep cuts and bake the loaf in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. Note: The picture shows one of two bread loaves made from the dough amount of the recipe!

BAKING WITH PROOFING BASKETS LEADS TO EVEN MORE AND LARGER PORES

Do you want even more and larger pores in your crumb? That's no problem either. In this case, you should use proofing baskets. They are usually made of cane and are available in different shapes with and without a cloth. It doesn't really matter what you use, but one thing is important: Flour the mold well before you pour the dough into it, otherwise it will stick and your beautifully shaped loaf will tear apart. Baskets with linen cloths should also be slightly floured.

The idea behind the baskets is that the finished dough, shaped into a loaf, is put into the basket for rising. Afterwards, you just tip the loaf very carefully onto the tray. This preserves the large air bubbles that have formed during the fermentation process. This also happens to some extent with any bread that you leave to rise for 30-60 minutes after shaping. But with the proofing baskets, you prolong this process. The baskets ensure that your bread does not

spread and can rise stably. Try it out, use the recipe with the long dough proofing, but take the dough out of the bowl directly after kneading, shape it and place it in the proofing basket with the seam upwards. The seam is where the different layers from folding a dough were put together. With the proofing baskets shown and our recipe, you have to divide the dough between two to three baskets. Place them in the fridge overnight and leave the dough to rise again at room temperature for at least an hour the following day. Then carefully tip the bread onto the baking tray and bake in a hot oven for 45-50 minutes as described above.

If you want a rustic risen bread, make sure that the loaf is placed into the proofing basket with the dough seam facing downwards. When you tip the bread onto the tray, the dough seam will be on top and will tear open a little at the "folding ends" during baking.



POTATO BREAD: THE BREAD RECIPE FOR BEGINNERS WITH AHA EFFECT



INGREDIENTS:

250g cooked, peeled and cooled potatoes

900g wheat flour
Type 1050

500g water

10g fresh yeast or
½ package dry yeast (4g)

25g salt

PREPARATION:

First turn the potatoes into mash using a hand mixer, then put together all the ingredients and knead well. Then leave to rise in the fridge overnight. Remove the dough from the fridge, stretch and fold once on the work surface and leave to acclimate for two hours. Repeat the stretch and fold and shape into a nice loaf. Leave to rise until the dough has increased significantly in size. Make a deep cut in the middle and bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. The result is remarkable, a bread loaf with large pores and super freshness, resulting from the bound water in the cooked potatoes.

Note: The picture shows one of two bread loaves made from the dough amount of the recipe!

RECIPE: "GENETZTES": FRESH SPELT BREAD WITH A GREAT CRUST



INGREDIENTS:

1000g spelt flour Type 630

750g water

10g fresh yeast or
½ package dry yeast (4g)

15g salt

PREPARATION:

Put together all the ingredients, knead well and leave the dough to rise in the fridge overnight. Remove the dough from the fridge, stretch and fold once on the work surface and leave to acclimate for 1-2 hours. Preheat the oven. Wet your hands and add a little more water to the dough, then take the dough and stretch and fold it again in the air. Then place directly on the baking tray and bake immediately in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. If the dough sticks to your hands, wet your hands even more. The wet bread surface causes the dough to rise. The spelt also causes the bread to be slightly more coarse-pored. We will explain that on a later stage in our chapter "grain science".

Note: The picture shows one of two bread loaves made from the dough amount of the recipe!



BREAD ROLLS – ALMOST LIKE AT THE BAKER'S

This is undoubtedly the supreme discipline in baking and it must be admitted right up front: It is very difficult to get bread rolls and baguettes to look like they do at the bakery. One of the reasons is the fact that we naturally never use the same quality machines and ovens as a baker. But it's also because some bakers use additives and sometimes artificial enzymes to ensure that the rolls always look perfect and have a large volume. But with a little knowledge, you can get pretty close.

First of all, we want to achieve a large, fluffy baking volume. This

means that the dough should have a good oven rise. Therefore, we support the yeast fermentation either by using a pre-dough or by using a little more yeast. For the time being, we don't use a long dough fermentation and simply shape the rolls when the dough has risen properly. You should also let them rise again (second rising) before putting them in the oven. You use a small but intensive "stretch and fold" technique here as well so that the rolls are round shaped. You can find many good videos about this on YouTube.

You can add a little sugar to the recipe to make sure that the

yeast fermentation works as it should and the crust browns nicely. Using active malt flour, which is the basic ingredient of beer, namely dried and ground barley sprouts, also improves the shape, color and taste. By germinating the barley grains the enzymes that break down the starch are activated, which in turn quickly leads to a breaking down of the wheat starch into sugar in the bread roll dough. This phenomenon promotes yeast propagation. In addition, sugar and heat in the oven lead to brownish surfaces on the baked goods. This is known as the Maillard reaction.



VOLUME AND FLAVOR THROUGH PRE-DOUGH

As the name suggests, pre-dough is a dough that is prepared before the main dough, which is also called preferment. It has several functions. Historically, in times when yeast was expensive, the main purpose was to propagate the expensive yeast. Today, this is no longer necessary. But you can still use yeast propagation to give your bread, and especially your rolls, more baking volume and larger pores. Pre-dough also improves the structure of the

dough and, depending on how you prepare the pre-dough, you can also increase the water absorption. The long proofing time also enhances the taste. There are numerous variations when it comes to the amount of flour and water. We ourselves often use moist pre-dough, i.e. with just as much water as flour, and like to use this method for baked goods with large pores (baguette, ciabatta) or for water absorption with spelt. We recommend work-

ing with pre-dough, especially for rolls and baguette, where you want to achieve a large baking volume as well as large and soft pores. The more volume and pores you want, the more of the flour you should process already in the pre-dough. In concrete terms, this means 30% for bread rolls, which corresponds to 300g flour in our recipes.



RECIPE: BREAD ROLLS

PREPARATION:

Put together all the ingredients, knead thoroughly and then leave to rise for 2-3 hours at room temperature. The dough should have at least doubled in size. Divide the dough into portions of approx. 100g on a well-floured work surface. Now take a dough portion with both hands and pull the dough slightly to both sides, then fold the ends downwards. Now turn the dough 90° and repeat the process described 2-3 more times (“mini stretch and fold”). Now roll the dough pieces on the work surface into a long shape and leave them to rise on a well-floured work surface, covered with a cloth, until the volume has doubled. As a next step make a deep cut lengthwise and place the dough roll on the cut. Leave it to rise again.

Finally turn the rolls over and place them on a baking tray, carefully open the cut again if necessary, and bake in a hot oven at 220°C for approx. 20 minutes. The rolls also look very nice if you moisten them before you cut them and roll them in poppy seeds or other grains.



INGREDIENTS:

**1000g wheat flour
Type 550**

600g warm water

**15g active malt flour
or 20g sugar**

30g fresh yeast

15g salt

Alternatively, you can leave out the malt flour and work with a pre-dough. To do this, take 30% of the flour and water, i.e. 300g each, mix the pre-dough the evening before and leave it to proof at room temperature for at least 12 hours. Then continue by pouring the pre-dough and the remaining ingredients together and follow the instructions above.

RECIPE: PRETZEL ROLLS



PREPARATION:

Put together all the ingredients and knead thoroughly, then leave to rise for 2-4 hours at room temperature. The dough should have at least doubled in size. Divide the dough into portions of approx. 100g on a well-floured work surface. Now take a dough portion with both hands and pull the dough slightly to both sides, then fold the ends downwards. Now turn the dough 90° and repeat the process 2-3 times in total ("mini stretch and fold"). Then place the dough piece with the seam on the work surface, round it and place it on the baking paper or shape it into a long roll.

Baking pretzels itself is difficult to describe in words, but search on YouTube or Facebook for short videos.

When the dough pieces have risen well on the baking paper, i.e. have almost doubled in size, brush them with lye (please note the precautions, lye is strongly corrosive), cut and bake immediately in a hot oven at 220°C for approx. 20 minutes.

INGREDIENTS:

1000g wheat flour
Type 550

600g warm water

15g active malt flour
or 20g sugar

30g fresh yeast

15g salt

50g butter or pork lard

Alternatively, you can leave out the malt flour and work with a pre-dough. To do so, take 30% of the flour and water, i.e. 300g each, mix the pre-dough the evening before and leave it to proof at room temperature for at least 12 hours. Then continue by pouring the pre-dough and the remaining ingredients together and follow the instructions above.

RECIPE: RUSTIC SPELT ROOT



PREPARATION:

For the soaker, mix the spelt flour with the boiling water by hand and leave to cool for a few hours. This is used to increase water uptake in spelt products. You find a detailed explanation on this in later chapters. Then pour everything together and knead well. Let the dough rise at room temperature until it has at least doubled, which needs about 2-3 hours. Apply „stretch and fold“ twice in between. Then carefully divide the dough into four portions and form it into a thin but long shape. As a next step, grasp at both ends and turn in opposite directions (as if you would wring out a cloth) 2-3 times. Put them on the baking paper and leave them to rise until their volume has considerably increased, then bake them in a preheated oven at 220°C for 25 min.

INGREDIENTS:

SOAKER

150g spelt flour type 630

300g boiling water

MAIN DOUGH

1000g spelt flour type 630

500g warm water

20g fresh yeast or
1 package dry yeast (7g)

20g salt

REZEPT: "DINKELSELEN"



(Photo: Carmen Tempel)

INGREDIENTS:

1000g spelt flour type 630

800g water

10g fresh yeast or
½ package dry yeast (4g)

15g salt

PREPARATION:

Put together all ingredients and knead. This dough is relatively runny and somewhat sticky. Put it in an oiled tub or bowl with enough space left so that the dough can at least double in size. Perform „stretch and fold“ while keeping the dough in the tub or bowl and leave it to rise in the refrigerator for at least 12h. After the first hour in the refrigerator, perform „stretch and fold“ again in the bowl. Take the dough out of the fridge but keep it in the bowl to acclimate 1-2 hours at room temperature. Moisten the work surface with water (no flour!) and carefully place the dough on it, preferably without destroying the pores of the risen dough. Divide the dough into long strips (5 cm wide and 15 to 20 cm long) by pressing into it with very wet fingers and place them on a baking sheet. Sprinkle coarse salt and caraway seeds on the dough strips and bake them immediately in a preheated oven at 230°C for about 20-25 minutes.

ONE RECIPE FOR FIVE BREAD TYPES: BAGUETTE, PAIN ÉPI, FOUGASSE, PANE GUSTO, FOCACCIA



PREPARATION:

Mix the ingredients of the pre-dough and leave to proof for at least 12 hours at room temperature. Then put together all the ingredients, knead intensively and leave to rise for 3-4 hours at room temperature. The dough should have at least doubled in size. Place the dough on a well-floured work surface and proceed according to the type of bread.

PANE GUSTO

Work the entire dough by stretching and folding and finally shaping it into an elongated angular form, leave to rise on baking paper until it has doubled in size. Cut the surface of the dough and bake it in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake another 35 minutes.

INGREDIENTS:

PRE-DOUGH

200g wheat flour Type 550

200g water

Very few yeast (0.5g)

MAIN DOUGH

Pre-dough

500g wheat flour Type 550

150g spelt flour Type 630

150g durum semolina

500g water

10g fresh yeast

15g salt

30g olive oil

You can also use this dough to bake pizza.



Divide the dough into four parts. Work each part as follows or alternatively work individual parts into baguettes or pain épi.

FOUGASSE

A fougasse looks like a leaf. In order to achieve that, carefully shape the dough into an oval form and use a pastry scraper to first cut the stalk at the bottom and then the leaf veins at the top. Open the cuts wide manually and place the dough on baking paper, then leave to rise again. Brush with oil immediately before baking, season with herbs and salt and/or cover with olives, tomatoes, cheese and anchovies.

FOCACCIA

To make a focaccia, place the dough directly on a greased baking tray and prick holes in it with oily fingers. You can also cover it with olives, feta, tomatoes, etc., depending on what you like. Bake at 220°C for approx. 20-30 minutes.



Divide the dough into four parts. Work each piece as follows or, alternatively, work individual pieces into fougasse or focaccia.

BAGUETTE

For baguettes and pain épi, stretch the dough pieces lengthways and then carefully fold the dough towards the centre from one end. Then repeat the same with the other end and fold the dough slightly over the end of the first side of the dough. Turn the dough roll onto the seam and roll lightly, then leave to rise again on a well-floured work surface until the dough has doubled in size. Make the usual three cuts into the dough surface and bake at 220°C for approx. 20-30 minutes.

PAIN ÉPI

With pain épi, or spikelet bread, you proceed in exactly the same way as with a baguette, except that you don't make any cuts, but instead you use a pair of scissors to cut into the dough from the top, and then pull the edges slightly apart to the alternating side. This creates the characteristic shape of the bread. To get an idea how to do it, watch a short video on the internet.



BAKING WITH YOUR OWN SOURDOUGH

Baking with sourdough is undoubtedly a little more demanding, which is why we use sourdough less often than yeast in this book. But here as well, many things are described in an overly complicated way. That's why we're giving you a short and simple overview of the benefits of sourdough and how to make it yourself.

Naturally occurring yeasts as well as lactic and acetic acid bacteria are active in sourdough. They loosen the dough, lower the pH and provide the typical sour flavour. Depending on the temperature, the different bacteria and yeasts multiply to a greater or lesser extent. The flavor and leavening power of a sourdough can therefore vary considerably, which makes handling sourdough a little more difficult. This is why professionals also add some yeast to most of the sourdough bread and start their sourdough with professionally prepared and purchased starters. Of course, you can do this too, but when buying sourdough, you really need to make sure that it is still active. This is no longer the case with dried sourdough powder, which only provides the flavor.

It is not that difficult to make your own sourdough, which you use as a starter for sourdough bread. All you need is flour, water and time. In theory, you can use any flour, but rye flour is the easiest.



Homemade sourdough on the first day (photo left) and after seven days (photo right).

BREED YOUR OWN SOURDOUGH

This takes about seven days and you have to do the same thing every day. Take 50g flour, 50g water and mix well by hand in a sealable bowl. Then leave the bowl to proof in a warm room (~28°C, e.g. near the heating) for about 24 hours. On the 2nd day, remove half of this mixture and add 50g flour and 50g water to the mixture and stir well again. Then leave the mixture next to the heater for another 24 hours and repeat exactly what you did on day 2 on day 3. After approx. 2-4 days, the mixture will start to produce bubbles, has a distinctly acidic odor and quickly increases in volume. Nevertheless, continue feeding for exactly a total of 6 days. Your sourdough does not yet have the vigor required to loosen a whole loaf. On the 7th day, your sourdough will be ready. You can use parts of it as leavening agent like yeast. This is what we call starter. You can

use it immediately. However, make sure you keep at least 100g in the fridge so that you always have your own starter in the future and don't have to breed a new one.

If you take out some of this starter, then feed your starter with the same amount that you have taken out, always half flour and half water. For example, if you take out 50g, add 25g flour and 25g water, mix well and leave at room temperature until it has doubled in size. Then put it back in the fridge, but 'feed' it with a little flour and water at least once a week.

Of course, you don't have to throw away the leftovers that you remove from your batch every day during the breeding process. Collect it in a sealable container, add two pinches of salt and store it in the fridge until you bake your next bread. If you want to know more about sourdough, take a look here: www.theperfectloaf.com or www.the-bread-code.io.



Amount of starter and flour.



Ready-mixed dough.



Increased volume after a night of rest.

BAKING WITH SOURDOUGH

There are many different ways to do this, some of which are very time-consuming. We would like to demonstrate you just one simple method. You take 20 - 50g of your starter and approx. 25% of the flour quantity for the bread you are planning to bake, in our recipes this is 250g. Add the same amount of lukewarm water. Stir well and leave it in a warm room until the dough has at least doubled in size. We usually just do this in the evening and continue baking the next morning. In the pictures you can see the amount of starter and flour at the top left, the finished dough in the center left and at the bottom left side after a night of resting with a clear increase in volume, bubbles and an aromatic sour odor.

When you start baking, you take the sourdough and mix it with the remaining ingredients, which we have always summarised in our recipes under the title main dough. All our recipes in this book are based on the basic recipe with 1000g flour, so we have simply subtracted the amount of flour and water used for the sourdough from the main dough. In principle, you can bake all types of bread and rolls with sourdough, there are no limits to your imagination. Your active sourdough should also be sufficient to loosen the baked goods, although we usually use a little yeast to be on the safe side. We recommend the following procedure to ensure that a long dough fermentation is realized for the entire dough. Prepare the sourdough the evening before, mix together all the ingredients the next day in the morning and lea-

ve at room temperature until the afternoon, then you will be able to bake an amazing bread with lots of bioavailable nutrients in the evening. Of course, you can also put the whole dough with sourdough in the fridge for several hours or overnight. However, in our experience, it doesn't get going again as quickly as yeast dough, so if it's in the fridge, it should be ready-moulded, for example in a proofing basket.

WHY USE SOURDOUGH?

Historically, sourdough was mainly prepared with rye. Due to the low pH, the enzymes in rye were inhibited from breaking down the starch too much, so it remained bakeable. For today's rye this is usually no longer necessary. Theoretically, you can bake a pure rye bread only using yeast.

However, sourdough does even more. Firstly, it provides an interesting flavor, that many people really like. You can also imitate this flavor by adding fruit vinegar to your recipes. But the sourdough bacteria also ensures that minerals from the grains are even more readily available to us humans than they would be if we had used yeast for a long time. Many people very much rely on sourdough bread because they tolerate it better than yeast bread. Theoretically this makes sense, but so far science is divided on the subject.

Sourdough can be used not only with rye; you could also prepare your starter with any other flour in the recipe. There are great spelt and wheat recipes with sourdough. However, we would always feed the starter culture in the fridge with the same flour.

RECIPE: THE CLASSIC SOURDOUGH BREAD – WHEAT RYE MIX BREAD



PREPARATION:

For the sourdough, mix the ingredients by hand and leave to proof at room temperature for a few hours (e.g. overnight). The sourdough must then have at least doubled in size. **The sourdough that you have bred yourself or that you have bought is called starter.**

Then put together all the ingredients, knead intensively and leave to rise for 3-4 hours at room temperature. The dough should have at least doubled in size. Then place the dough on a well-floured work surface and proceed as you like. We used the “stretch and fold” method, divided the dough into two, formed both parts to a round bread loaf and then put them in a proofing basket with the seam downwards for the final proofing of 60 minutes. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

INGREDIENTS:

SOURDOUGH

30-50g starter

250g rye flour Type 1150

250g water

MAIN DOUGH

sourdough

100g rye flour Type 1150

650g wheat flour
Type 1050

500g water

5g fresh yeast or
¼ package dry yeast
(1g; not needed but
guarantees dough rise)

15g salt

RECIPE: "SCHWEIZER RUCHMEHLBROT"



PREPARATION:

Ruchmehl is a speciality from Switzerland, which is produced in a special way so that more of the bran is in the flour, but with a very small particle size, leading to an incredibly tasty flavor and a bread that is considerably richer in minerals and fiber

For the sourdough, mix the ingredients by hand and leave to proof at room temperature for a few hours (e.g. overnight). Then put together all the ingredients, knead intensively and leave to rise for 3-4 hours at room temperature. The dough should have at least doubled in size. Then place the dough on a well-floured work surface and proceed as you like. We used the "stretch and fold" method, divided the dough into two, formed both parts to a round bread loaf and then put them in a proofing basket with the seam downwards for the final proofing of 60 minutes. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

INGREDIENTS:

SOURDOUGH

30g starter

200g rye flour Type 1150

200g water

MAIN DOUGH

sourdough

800g wheat "Ruchmehl"
(alternatively mix 400g
wheat flour Type 550 with
400g wholemeal wheat
flour)

500g water

5g fresh yeast, or
¼ package dry yeast
(1g; not needed but
warrants dough rise)

15g salt

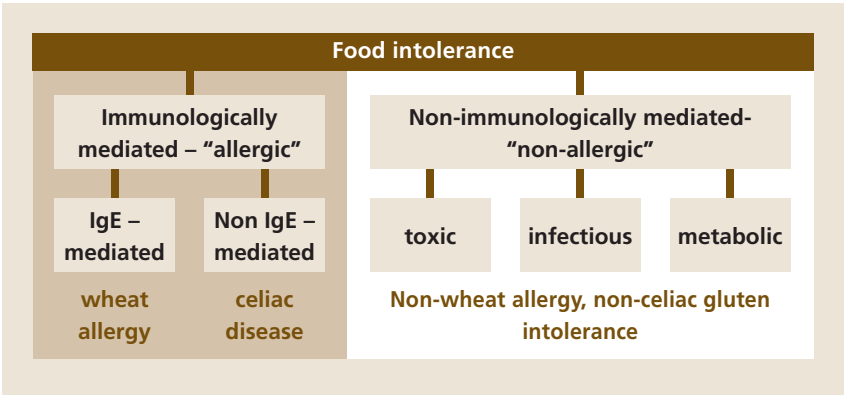
"I CANNOT TOLERATE WHEAT" – A MEDICAL PROBLEM OR A QUESTION OF MINDSET?

Quite a few people think they can't tolerate certain foods and relate symptoms to the consumption of food. The human desire to find a reason for incidents / symptoms / illnesses is completely understandable. We all feel a need for causality. When it comes to "food intolerance" however, it seems helpful to adopt a bit of a systematic approach.

A fundamental distinction must be made between 'immunologically' and 'non-immunologically' mediated food intolerances.

A typical example of a non-immunologically mediated food intolerance is lactose intolerance. In this case, due to reduced enzyme activity of the enzyme lactase the disaccharide lactose is not split up into the monosaccharides glucose and galactose. The disaccharide is not absorbed in the small intestine as it would usually be, but is transported onwards into the large intestine. The bacteria in the large intestine metabolise the lactose, resulting in flatulence and diarrhoea. Our immune system is not involved in this process. The group of non-immune-mediated food intolerances also includes so-called aversions, strong aversion reactions. There are people who feel sick when they see a glass of milk or smell cooked broccoli. This is neither a milk nor a broccoli allergy, but simply a very strong aversion.

Back to wheat. **Celiac disease – a typical example for an immunologically mediated food intolerance – is by far the most common disease in which**



Food intolerance can be classified as immune-mediated or non-immune mediated.

wheat is not tolerated, but not only wheat, all cereals containing gluten must be avoided by all celiac patients for the rest of their lives. **In Germany, it is estimated that around 1% of the population suffers from celiac disease.** But how do you get celiac disease? The details have not yet been conclusively clarified by science. It is however known that celiac disease only occurs in patients with a genetic predisposition. This can be determined by the so-called HLA characteristics. These are surface proteins on our white blood cells that are also important, for example, when considering a bone marrow donation. In order to develop celiac disease, you have to be HLA DQ2 and/or HLA DQ8 positive, which can be determined with a genetic test. This also explains the familial clustering of celiac disease. If you have a sibling with celiac disease, the risk of developing celiac disease yourself increases from 1% in the normal population to around 10%. This is why it is recommended that

siblings of celiac disease patients are tested regularly.

Approximately 25% of all Germans have a genetic predisposition to develop celiac disease, but only 1% actually develop the disease. The reason therefore is scientifically unknown. But it is known that you have to eat gluten, otherwise celiac disease cannot break out. There is little that can be done to prevent it. Babies should not be given large amounts of gluten too early (not before the age of 4 months), but not too late either. It is recommended to introduce a normal complementary diet – including cereals – from the age of 5 months, ideally while still breastfeeding. No distinction is made between children from 'celiac families' and other children.

For celiac patients, contact with gluten leads to the formation of antibodies. These are called tissue transglutaminase antibodies and the binding of these antibodies to the gluten molecule results in an immune response of the body, which can vary greatly. In the

past, infants and young children who stopped gaining weight after the introduction of gluten typically developed diarrhea and deficiencies. Nowadays, the vast majority of patients present with all kinds of symptoms: abdominal pain, flatulence, diarrhoea, but also constipation, poor weight gain, delayed puberty, poor longitudinal growth and even concentration problems and depression. This is why it is often worth having simple laboratory diagnostics carried out: tests for total IgA and tissue transglutaminase IgA antibodies. It is important that the diagnosis is confirmed in line with the medical guidelines before an appropriate diet is started. This does not always require biopsies to be taken from the upper small intestine as part of an endoscopic investigation ('gastroscopy'). In some patients, two blood samples are sufficient to confirm the diagnosis ('biopsy-free diagnosis'). The gluten-free diet must then be followed for the rest of the patient's life without any exception. The absence of symptoms due to dietary errors should not be taken as a license to follow a less strict diet.

The second disease is a wheat allergy, which is also im-

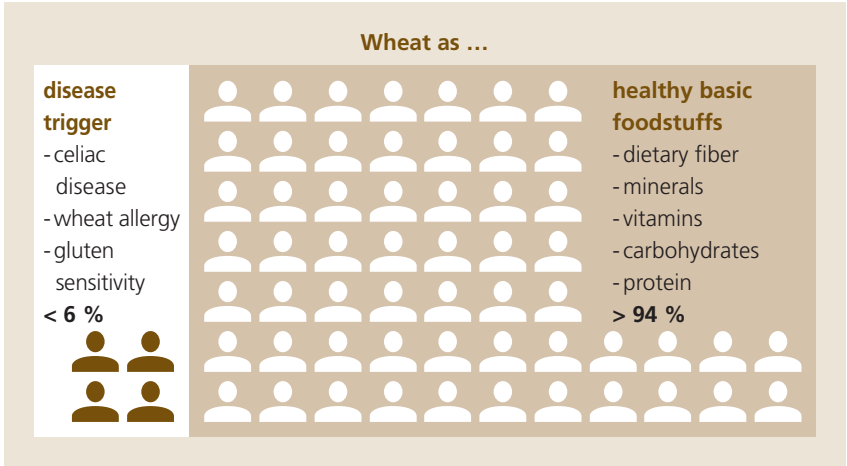
munologically caused. It is assumed that 0.1% of all people in Germany have a 'real' wheat allergy – 10 times rarer than celiac disease. In this case, the affected person forms IgE antibodies and the symptoms of an immediate-type allergy occur. These are well known: skin rash, reddening and swelling of the face, shortness of breath, etc. The diagnosis is made by testing for wheat-specific IgE antibodies in the blood and/or by appropriate skin tests. In recent years, an increasing number of people have also been described as having a non-IgE-mediated allergy to wheat. These people do not react immediately, but after a few minutes to hours with flatulence, diarrhea and sometimes also with skin rashes. However, as this type of intolerance cannot be detected by laboratory tests, targeted, time-limited and well controlled gluten avoidance is advised.

A scientifically controversial topic, that is much hyped by the media, is the so-called 'gluten sensitivity' or, in medical terms, 'non-wheat allergy, non-celiac gluten intolerance'. There has been speculation as to whether certain components of wheat trig-

ger an immune reaction in sensitive people, which can then lead to symptoms such as diarrhea, abdominal pain and flatulence. Two main components are being blamed to be the root cause. The so-called ATIs (amylase trypsin inhibitors) as inflammation-triggering proteins and FODMAPs (fermentable oligo-, di- and monosaccharides and polyols) as long-chain carbohydrate or sugar alcohol chains. In the case of the latter (similar to lactose and fructose, which also belong to the FODMAPs), it is assumed that an increased presence of these substances in the large intestine promotes the metabolic activity of the bacteria located there. The metabolites of these bacteria cause the symptoms described by the patients (flatulence, bloating, abdominal pain and diarrhea).

The extent to which these substances actually play a role is currently a matter of debate in the scientific world. We think that the effect is rather overestimated. In recent years, it has been scientifically proven several times that most of the bread in Germany contains little to almost no FODMAPs. This is because FODMAPs are almost completely broken down within 1-3 hours by the yeast and / or sourdough fermentation in the bread dough.

In addition, it is important to remember that both the placebo and the nocebo effect are huge, especially in food studies and self-awareness tests. 'If I expect a stomach ache after eating a food, I will probably get it' – this is the short form of the nocebo effect, a kind of self-fulfilling prophecy. I expect side effects from a medication because I have read the package

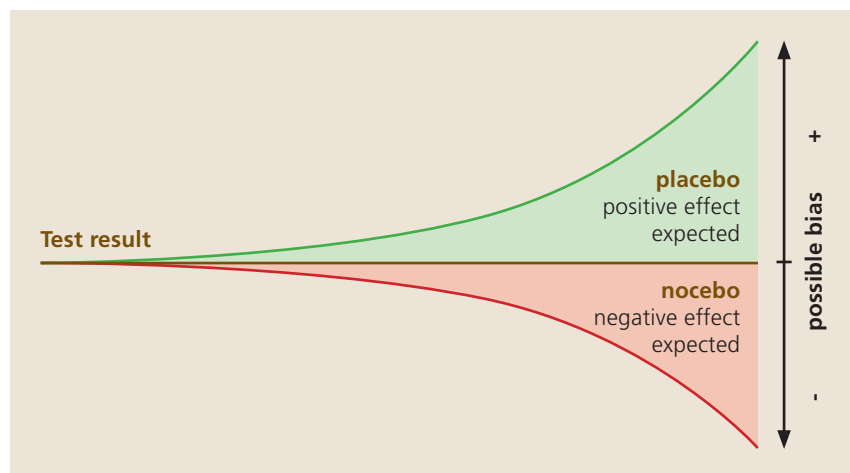


Percentage of humans with and without wheat intolerance.

leaflet, and in fact I experience symptoms I have read about beforehand. On the other hand, there are numerous studies where patients have been given pills without active ingredients (so-called placebos) and still experienced side effects afterwards.

The same applies to the consumption of wheat. The expectation that I will experience symptoms after eating a food increases the likelihood that I will do so. Conversely, there is a high probability that my symptoms will get better, as soon as I stop consuming a supposedly harmful food. This is a well-known phenomenon with many diets. According to numerous scientific studies, most of the recommended dietary changes – whether they make sense or not – have an initial probability of approximately 30% that my symptoms will improve. A typical example is the so-called “low-phosphate diet”, which was used to treat children with ADHD in the 1970s. A considerable number of children felt better on this diet. Afterwards, the phosphate content of the supposedly healthier diet was measured and it has been discovered that the food did not contain any less phosphate. The mere fact that I paid more attention to the children’s diet led to the diet responding.

One could argue: If a gluten-free or wheat-free diet helps me, why should I not do it – regardless of a diagnosis? There are medical and social counter-arguments to this. From a medical perspective: A diet without wheat and particularly an entirely gluten-free diet often leads to a reduced intake of wholegrain products. Wholegrain pro-



Bias of test studies due to placebo and nocebo effect.

ducts and the fiber serve, among other things, as ‘good food’ (“pre-biotic”) for our intestinal bacteria. We know that a large variety of bacteria is beneficial to our health. Gluten-free products are not healthier per se, but are often higher in calories as gluten is often replaced by fat. In addition, many gluten-free products are often highly processed foods, and contain many additives. A comprehensive long-term study among health-care professionals has shown that the consumption of wholegrain products protects against numerous diseases such as cardiovascular diseases. In summary, those who eat a gluten-free diet, even though they don’t actually have to, tend to eat a diet that is lower in fiber, higher in fat, and therefore significantly increase their risk of suffering from cardiovascular diseases, among other things.

Social component: Eating is highly social – at least most of the time. When we invite friends, we often have meals together. This becomes more difficult with unnecessary dietary restrictions. It is even more important for children and adolescents. To participate in social events is important and un-

necessary dietary restrictions can make a participation complicated.

In this respect, supposedly simple elimination diets have clearly negative effects both on our health and on our social life. Therefore, an attitude to simply cut it out of your diet should be reconsidered.

In addition to these medical issues, we would like to briefly dispel other popular prejudices about wheat. Wheat makes you fat is true insofar as wheat contains a lot of carbohydrates and excessive consumption of carbohydrates can lead to obesity. However, obesity is significantly lower in countries where a lot of wheat is eaten, such as Kazakhstan, Tunisia and Italy, than in the USA and Germany, for example, where only half as much wheat is consumed. **The reason for obesity is rather too much food, the increased consumption of processed foods and drinks, together with less exercise,** not only in the sense of less demanding sports activities, but also in everyday life.

Wheat is addictive because it contains an opiate-like substance. There is actually a molecule in



wheat called gliadorphin, but it is so large that it has to be broken down in the human intestine before we can absorb it. **The process of breaking it down in the intestine prevents it from having an opiate like effect.** Plant breeding has bred new toxic proteins into wheat. This idea is based on a misconception of the possibilities of plant breeding. Classical plant breeding can only enrich or reduce existing proteins. New proteins can only be introduced into wheat using genetic engineering, a very complex and expensive method that has only recently been authorised in large parts of the world. **In addition, we have carried out extensive protein analyses on new and old wheat varieties in recent years, with the result that**

proteins that could potentially trigger allergies are found in the same concentration in both old and new varieties (for more details see chapter plant breeding). **Modern wheat is said to contain more gluten than old wheat varieties or wheat types. Surprisingly, the exact opposite is the case:** Old wheat varieties or ancient wheat species such as spelt, emmer and einkorn contain even more gluten than modern wheat varieties. However, einkorn in particular appears to contain very few proteins that are considered to be potentially allergenic by scientists. If you have neither celiac disease nor a wheat allergy and still feel 'wheat-sensitive', you could try einkorn, although one should be aware of possible placebo or nocebo effects. We

therefore recommend that such attempts are only made under medical/nutritional supervision.

To summarize, only approx. 1-6% of the world's population suffer from a wheat-induced disease. However, for all other people, i.e. over 94% of the world's population, wholemeal wheat is a core component of a varied and healthy diet. Alongside rice and maize, wheat is one of the three major crops that feed people worldwide. Every year, over 700,000,000,000 kg of wheat is produced worldwide. And this needs to increase, as approximately one billion people are already suffering from hunger and two billion from malnutrition. In addition, the world's population is growing steadily. Wheat currently contributes approximately 20% of the carbohydrates and 20% of the protein to the world's diet and over >20% of the fiber and minerals. In this respect, wheat is indispensable in the human diet; it is even more important than ever. Nevertheless, we should eat more wholemeal products and ideally bread with a long fermentation process, so that the nutrients are bio-available for our body (see the following chapters). If you want to know more about this topic, take a look here:

<https://weizen.uni-hohenheim.de/en>.

WHOLEMEAL FLOUR – WHAT IS IT AND WHY IS IT SO HEALTHY?

Wholemeal flour means that the entire grain is used to make flour and not just parts of it. In the case of white flour, also known as flour with different type designations (see chapter: the little ABC of flour), only the inner part of the grain is milled whereas the outer layers and the germ are removed. As the following illustration shows, the inner part of the grain contains mainly starch and protein and a few minerals and fiber, while most of the minerals, fiber, amino acids, vitamins, fats and secondary ingredients lie in the outer layers and in the germ.

Our body is not capable of producing minerals, vitamins, amino acids and fat itself; we have to absorb them from food, which is why they are also called essential nutrients. They play a role in various functions in our bodies. Vitamins fulfil a variety of functions

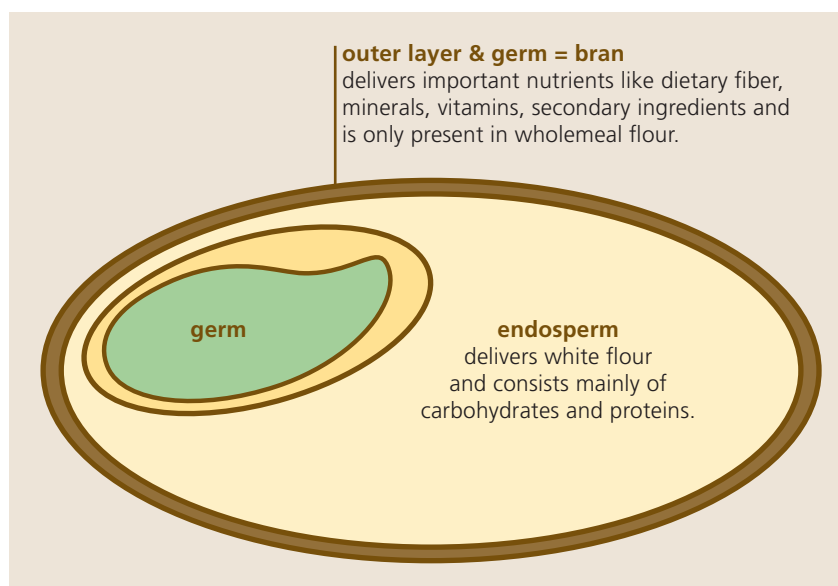
in our nervous system and our metabolism. Minerals include iron, which is important for the blood formation, zinc, which is particularly important for the immune system, and magnesium, which is important for our muscles, nerves and bones. Not to forget fiber, being available in soluble and insoluble form, that is 'the number one food for a healthy intestinal flora', i.e. the millions and millions of bacteria in our intestines. Dietary fiber therefore has a prebiotic effect.

Numerous scientific studies have clearly underpinned the importance of fiber and whole grains for human health. One example is a very comprehensive study by Harvard School of Public Health. In this study, almost 370,000 Americans were monitored medically and nutritionally. One group was given a diet, which was low

in whole grains and fiber, while the other group was given a diet correspondingly high in whole grains and fiber. Around 46,000 study participants died during the study, which ran over a period of 14 years. Mortality was reduced by around 30% in the group that regularly ate whole grain cereals and cereal fiber! Fiber significantly reduces the risk of cardiovascular disease, cancer, diabetes, etc. In this respect, you should not do without fiber from cereals, even if you can and should also consume fiber from other sources such as fruit and vegetables.

The lack of micronutrients such as folic acid, but also iron and zinc, is known as 'hidden hunger', which affects around two billion people worldwide, particularly in Sub-Saharan Africa and Asia. But even here in Europe and in the USA, up to 40% of women between the ages of 15-50 suffer from iron deficiency and up to 20% of the population from zinc deficiency. Women who want to become pregnant are immediately prescribed folic acid in tablet form by their gynaecologist and folic acid is even artificially added to white flour in the UK and USA. In this regard, it is also important for us to ensure an adequate supply of micronutrients such as folic acid, vitamins and minerals through a healthy diet. **Therefore, whole grain cereals and in particular wholemeal bread with a wide variety of seeds play a central role** (see also chapter: grain science).

Everybody should have learned this in school, but the share of



Longitudinal section through a wheat grain.



wholemeal flour in the total flour produced in German mills still lies at only around 3%. Even among baked goods, only 11% are wholemeal or brown bread in Germany. It's not the mills that are to blame, it is quite the contrary. During the production of white flour, approximately 15-20% is left over, namely the outer layers and the germ, which are referred to collectively as bran. This bran contains a high concentration of fiber (more than 4 times as much as in wholemeal flour, see table on page 9), minerals, vitamins, fats and secondary ingredients, which we humans do not want. We continue consuming large quantities of white flour instead. The bran ends up as waste and is sometimes sold cheaply as animal feed. Thus, our animals benefit from better food than we do! If we are to keep fewer animals in the future in order to be able to feed the

growing world population sustainably, we will have to consume the bran ourselves again. Consuming more wholemeal products is therefore also an important sustainability issue.

Of course, wholemeal bread is darker and more compact and also tastes different in comparison to white bread and rolls. But in this book, we would like to show you a few undogmatic ways to familiarize with wholemeal products. And it doesn't always have to be wholemeal flour; everyone seems to have their own individual needs and tolerance. Dietary fibers are, at least in part, substances that are difficult to digest. They are food for our intestinal bacteria, which also stimulates intestinal activity. We feel this, especially if we haven't eaten wholemeal products for a long time.

It is also important to note that not every bread that looks

dark or is sold as grain bread actually is made of wholemeal flour. A bread/roll is only a wholemeal product if it is labelled as such or if it is specifically stated on the packaging. According to the guidelines for bread in Germany, bread shall only be labelled as wholemeal bread, if at least 90% of the flour consists of wholemeal flour. If this is not stated on the packaging or the shop assistant says that it contains seeds but not wholemeal flour, then white flour has been used and seeds such as sesame, linseed etc. have been added. If it is still dark, then it has been colored with malt flour. You should tend to be sceptical if you are offered a 'wholemeal bread' that is just as fluffy soft and large-volumed as a white bread. As we will explain below, this is simply not possible with wholemeal flour.



Naturally rich in fiber: (clockwise) psyllium seeds, psyllium bran, oat bran, wheat germ, linseed, chia.

A BRIEF INTRODUCTION TO GRAIN SCIENCE

Nutrients in natural products, such as cereal grains, seeds, fruit and vegetables, depend very much on the agricultural cultivation method and the climatic conditions at the place of cultivation. In addition, there are dozens of different varieties in each species, with over 200 varieties of bread wheat grown in Europe alone. Flour and grains are natural products or, as a baker friend of us always emphasises, 'living material'. This also means that it is very difficult to give exact figures for nutrients, as these vary greatly depending on where they are grown, the variety used, etc. That is why we do not indicate figures at this point, but rather tendencies. And if you check the internet, please make sure, that representative samples were used or ideally measured in the batch of grains or flour you bought, which is most often not the case as this is too time consuming and too expensive.

CEREALS



Wheat, left with awns, right without.

Wheat, also named bread wheat (*Triticum aestivum* ssp. *aestivum*) is the most important type of bread grain worldwide, both in terms of the area under cultivation and the quantity processed. While there is a wide diversity of bread in Germany and rye and spelt are often used alongside wheat, most of the baked goods in other countries are made from wheat. A distinction is made between wheat with a high grain hardness, known as hard wheat, which is mainly used in bread and bread rolls, and wheat with a low grain hardness, known as soft wheat, which is mainly used for biscuits and waffles.

As already described above, wheat consists of plenty of carbohydrates, especially starch. It also contains approximately 12% protein, about 80% of which is gluten. The rest are enzymes,

amino acids and other substances. In addition, there is a high concentration of various minerals such as iron, zinc, magnesium and potassium, fiber, vitamins, fats and secondary ingredients, particularly in the outer layers of the grain and in the germ. Wheat germ or wheat germ oil is an extremely high-quality oil, rich in vitamin E. According to all renowned nutritional organisations such as FAO, EFSA, planetary health diet, etc., whole grain wheat products are therefore part of a healthy and sustainable daily diet.

In agricultural production, wheat is a high-performance crop with very high yields per unit area under a wide range of climatic conditions, but this also requires more intensive fertilisation and cultivation, often with the use of pesticides.

Spelt (*Triticum aestivum* ssp. *spelta*) is a close relative of wheat, which has a small cultivation area worldwide and is therefore grown almost exclusively in and around Germany. It is the traditional bread grain in the Alemannic region and is becoming increasingly popular, partly because it is said to be very healthy. Spelt is very similar to wheat in terms of its nutrients; it has slightly more protein and gluten, up to twice as many minerals as wheat, but slightly less fiber. Although many people think that they cannot tolerate wheat, but tolerate spelt, intensive scientific studies have not yet been able to explain this phenomenon. It is possible that the tolerance has more to do with the bread production process than with the grain itself.

The gluten composition of spelt is slightly different to that of wheat, which leads to a more flowing dough and drier baked goods.



Spelt.

When baking with spelt, care must therefore be taken to add more water to the dough (soaker and/or pre-dough) and to stabilize the dough by stretching and folding and/or baking with bread tins.

Spelt is more sustainable to grow than wheat, requires less fertilizer and can also be grown on poorer soils than wheat, but has only a maximum grain yield of

70% compared to wheat. When harvested, the grains remain firmly in the husks; the grains are only received in a further step in the mill, the so-called dehulling process. This natural protection of the grains could certainly have the effect that there are slightly fewer air pollutants or fungal residues on spelt grains than on wheat grains.

Emmer (*Triticum turgidum* ssp. *dicoccum*) is an ancient subspecies of wheat that had its heyday in Pharaonic Egypt and is currently a real rarity in cultivation. Emmer is a distant relative of wheat, which is very similar to spelt

in terms of its nutrients; it tends to have slightly more protein and gluten than spelt and also slightly less fiber than wheat. A special feature is the hard grain, which leads to more semolina when ground and to a lot of dam-

aged starch in the flour. As a result, emmer dough also absorbs 10-15% more water than wheat. The gluten composition of emmer is also slightly different to that of spelt, which means that when baking with emmer you have to intervene to stabilize the dough in the same way as with spelt. One dough-stabilizing trick is to use yoghurt or oil or to use pre-dough or sourdough.

Emmer is very sustainable in cultivation, it grows well on poor soils and requires little to no fertilizer, but has a maximum grain yield of 50% compared to wheat. Like spelt, it is a hulled wheat; in which the grains are only received in the dehulling process.



Emmer.

Einkorn (*Triticum monococcum*) is the oldest subspecies of wheat, which we humans have already been using when we turned from hunter-gatherers into farmers. It is currently a real rarity in cultivation. Einkorn is a very distant relative of wheat and is also the most distinct wheat in the large wheat family in terms of its nutrients. Einkorn has about 2-4 times as many minerals as wheat, almost twice as many secondary ingredients and vitamins and 8 times more carotenoids, especially lutein. These not only provide the uniquely fine and nutty flavor, but also give all einkorn products their attractive yellow color. Einkorn has

a similar amount of protein and gluten as emmer, but it appears to have significantly less proteins than wheat, which can trigger allergies in humans. Einkorn has a very soft grain, which is so small that it is not worth producing light-colored extract flour. Einkorn is somewhat more difficult to process than emmer; the dough is runny and very sticky, similar to rye. Bread with a high proportion of einkorn should therefore be baked in a bread tin. A trick to stabilize the dough is to use yoghurt or oil or to use a pre-dough or sourdough.

Einkorn is very sustainable in cultivation, it grows well on poor soils and requires little to no ferti-

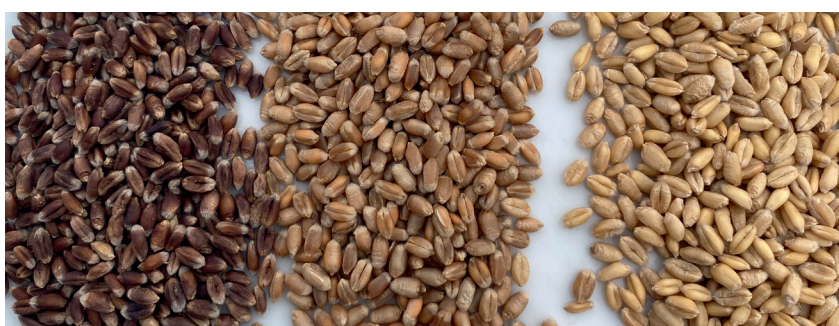


Einkorn.

zation and has so far been resistant to all field diseases. Unfortunately, it has only a grain yield of around 25% of that of wheat. Like spelt, it is a hulled wheat, thus the grains are only received through the dehulling process.

More wheat species and specialties

There are other subspecies of wheat, but they play a minor role in baking, especially baking with wholemeal flour. Pasta wheat, also known as durum wheat (*Triticum turgidum* ssp. *durum*), is used for 95% of the pasta production. Khorosan wheat, one variety of which is the legendary Kamut®, or Binkel are other true rarities. In the subspecies of bread wheat there are also special varieties: white wheat, purple wheat and yellow wheat. As the name already suggests, they are enriched with different natural coloring agents through natural crossing and selection. In white wheat, some catechins are lacking in the outer layer of the grain, making the grain and its wholemeal flour considerably lighter than normal red wheat. Additionally, the flavor of white wheat wholemeal bread is much milder than wholemeal bread



f.l.t.r. purple, red and white wheat.

made with normal red wheat. It might therefore be an interesting alternative to normal red wheat for the production of wholemeal products. In the USA, Australia and New Zealand, it is already partly on the market, but not yet in Germany. With regard to yellow wheat and einkorn, the color results from the luteins, that are supposed to be important for healthy eyes, and from anthocyanins with regard to purple wheat. Both are nutritionally interesting substances; the future will tell us whether these rarities will find their way into our

everyday lives. It is important to note that the anthocyanins in purple wheat are in the outer layers of the grain, so you only have them in the product if you use wholemeal flour, which you can easily recognise: these baked goods are intensely dark brown in color. The lutein in yellow wheat is evenly distributed throughout the grain, so there are also some of them in the extract flour of yellow wheat, which is immediately recognisable by the yellow color of the baked goods. White wheat has much lighter kernels.

Rye (*Secale cereale*) is a completely different species to wheat and of great importance as a bread grain in Germany and Northern Europe. In terms of nutrients, rye is comparable to wheat with a similar amount of minerals, but contains up to 20% more fiber. Rye has around 5 times the amount of the natural enzyme phytase than wheat, which means that minerals, such as iron and zinc, are more readily available in rye bread, a property that we will discuss in more detail below and of course make use of in some recipes.

Rye does have gluten, but less than wheat; the baking properties of rye result from the pentosans, which are carbohydrate-like structures. The baking properties of rye are therefore different to those of wheat; rye binds significantly more water, which means that the bread stays fresh for a longer period, but has less volume and a greyer color in comparison to wheat



Rye.

bread. Dough with a higher proportion of rye becomes stickier and can tolerate more water; with 500g of rye you can easily add 50 - 100g more water than with 500g of wheat. Traditionally, rye is baked with sourdough, which is no longer necessary in terms of baking technology, but is still

carried out that way for reasons of tradition and flavor.

Rye is an undemanding crop that can grow on very poor soils. It also requires significantly less fertilizer and pesticides than wheat, so its consumption is definitely desirable, even if the color of the bread turns a little greyish.

Barley (*Hordeum vulgare*) and oat (*Avena sativa*)

These are other cereals that are mainly used as animal feed or for special applications, such as beer brewing (barley) and muesli (oats). In the baking sector, they are used at best as a minor addition to products. Compared to wheat

and rye, they are not 'bakeable', i.e. they do not produce voluminous loaves when used in a high concentration in bread. The high content of high-quality fiber, especially beta-glucan, is particularly noteworthy for both crops. Beta-glucan has a proven effect on lowering cholesterol

levels in humans. In this regard, it does no harm to add some of it to wholemeal baked goods from time to time.

Both are widely cultivated crops. Oats in particular are said to have a very positive effect on agricultural crop rotations.

HEALTHY SEEDS

Linseed (*Linum usitatissimum*) is a very old, cultivated plant that was once widely grown in Germany but is now mainly cultivated in Eastern Europe, countries of the former Soviet Union and China. There are several subspecies, with linseed being obtained from oil flax. As the name suggests, linseed oil is also extracted from it, which is very healthy due to its high content of polyunsaturated fatty acids. Linseed is available in brown, golden and rarely in white color. Linseed is very interesting in terms of its nutrients. Compared to wheat, linseed has >2 times as much protein, 2 times as much fiber, 2 times as much iron and zinc and a lot of folic acid. It also has a high swelling capacity with water, whereby it then forms a real



Linseed.

transparent mucilage around the grains, the so-called hydrocolloids. Together with the high fiber content, these hydrocolloids stimulate intestinal activity. Linseed should therefore be soaked in at least the same amount of warm water before using them in any recipe.

Linseed requires little fertilization, but must be kept free of weeds and protected from insect pests if necessary. Linseed flowers beautifully in blue or white and attracts numerous insects with nectar and pollen.

Chia (*Salvia hispanica*) is a sage plant that originates from Mexico and Central America, but can now also be grown in Europe thanks to the efforts of the University of Hohenheim. Chia is similar to linseed in terms of its nutrients, it has slightly more fiber and a lot of vitamin C, but less protein. Chia swells just like linseed and should therefore be soaked in at least the same amount of warm water before using it in any recipe.

Thanks to the development of a local chia variety (called Juana) at the University of Hohenheim, chia can now be grown in Europe without any problems. It is sown at the end of April, harvested at the end of August or the beginning of September, and thanks to its strong growth the farmer does not have to do anything else. The plant grows up to 1.5 metres high and feeds masses of insects with its numerous blue flowers.

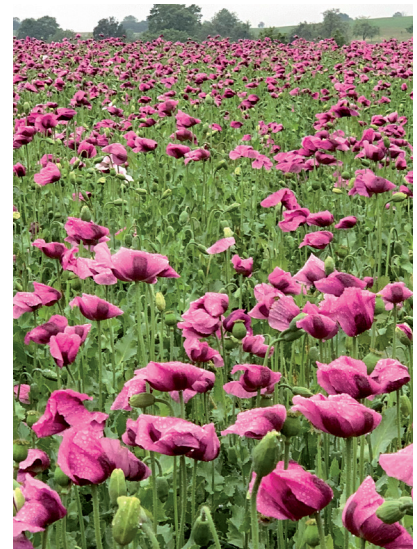


Chia (Photo: Volker Hahn).

Poppy seeds (*Papaver soniferum*) is an old cultivated species with very small grains that comes in many colors. However, we are only familiar with the grey or blue poppy seeds. Like linseed, poppy seeds contain a lot of high-quality oils. Compared to wheat, poppy seeds also contain around 2 times as much protein, 1.5 times as much fiber, a lot of minerals (up to 4 times as much iron and zinc) and a lot of vitamin C, vitamin E and folic acid.

Poppy seeds can be grown in Europe, but you have to choose

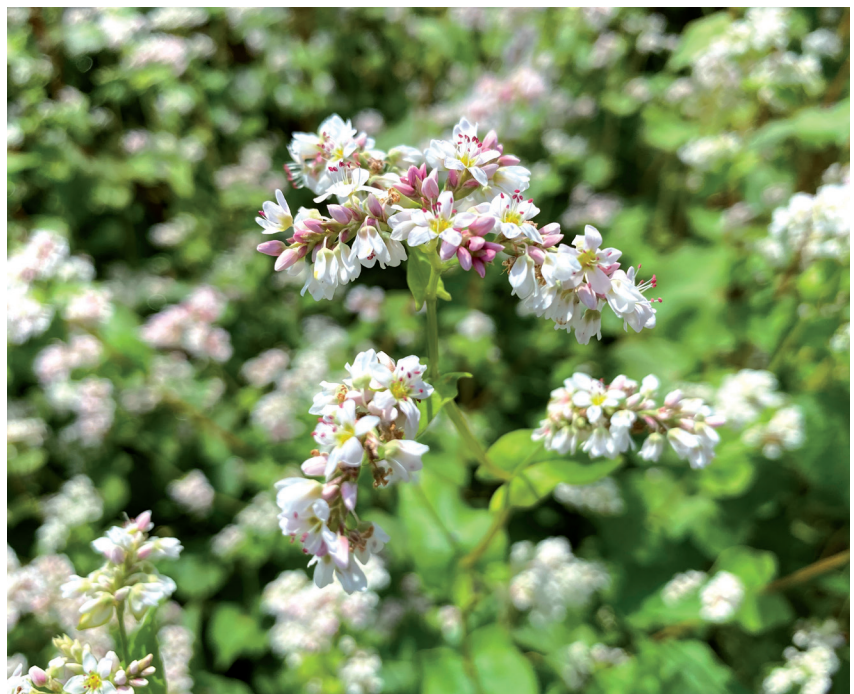
varieties with a low opiate content and need to have the cultivation authorised. In addition, the farmer must expect regular police inspections of the fields due to 'concerned neighbors'. Poppy seeds are a relatively undemanding crop, but at the beginning of the growing season they are weakly competitive against weeds. The beautiful pink flowers attract masses of insects and photographers.



Poppy seeds (Photo: BeckaBeck).

Buckwheat (*Fagopyrum esculentum*) is neither wheat nor beech, but a knotweed plant. Its name originates from the fact that the fruits look like beechnuts and the dehulled grain resembles wheat in color and shape. In terms of its nutrients, buckwheat is similar to wheat with the major exception that buckwheat is gluten-free and therefore cannot be baked in the traditional way. It also contains some resistant starch, which we can only digest slowly, but which is expected to have some positive effects on intestinal bacteria. This means that you stay saturated for longer after eating buckwheat and your blood sugar level does not rise as quickly as after eating wheat.

Buckwheat is very simple to crop. All the farmer has to do is sow it in mid-May and harvest it at the end of August; it requires



Buckwheat.

no fertilizer or pesticides, at least in Germany. It also flowers continuously from June to mid-August, making it a very interesting crop

for all kinds of insects and beetles. It is currently mainly grown in Russia or China.

Sunflower (*Helianthus annuus*)

Sunflowers originate from North and Central America and the current form of the sunflower with a large flowerhead (formed like a basket) was probably selected and utilised by the Incas. Today, the sunflower is one of the most important oil plants in the world and the most important growing countries are Russia and Ukraine. Sunflower seeds contain up to 50% oil. This is why most sunflowers are used as an oil crop, i.e. the oil is pressed out. In addition to the oil, which mainly consists of unsaturated

fatty acids, sunflower seeds contain about twice as much protein as wheat. Sunflower seeds also score highly in terms of iron, calcium and magnesium and they are top of the league when it comes to folic acid: 100g contain around 100 micrograms of this B vitamin.

The yields of sunflowers, which are mainly grown in Europe as hybrid varieties, vary between 2-3.5 tonnes per hectare. They are well suited for cultivation in Germany, but with our climatic conditions they tend to being affected by numerous diseases, especially when the summer is cool and wet.



Sunflower (Photo: Volker Hahn).

Hemp seeds (*Cannabis sativa*)

Hemp is one of the oldest and most versatile crop plants of mankind. It has been cultivated for many centuries as a raw material plant in almost all European countries for fiber, food, oil production and as a medicinal product. Hemp owes its historical importance in particular to its suitability as a fiber plant, as the fibers are characterised by their high tensile strength.

Hemp seeds are rich in valuable fats (mostly unsaturated

fatty acids), vitamins and minerals. They have about twice as much protein as wheat and up to 50% more dietary fiber. Hemp seeds remain hard even after soaking in water, so hemp seeds in bread are not a favorite with everyone.

Hemp is very easy to grow and is a very interesting crop in organic farming due to its high weed suppression capacity, but only if the regulation and control of the cultivation of low-THC hemp is finally simplified.



Hemp (Photo: Forough Khajehei).

Sesame (*Sesamum indicum*)

Sesame is one of the oldest oil plants known to mankind and is mainly produced in the warm regions of Africa and Asia. In addition to many high-quality oils, sesame contains about twice as much protein, four times as many minerals, such as iron and zinc, and a lot of folic acid compared to wheat. So far, sesame cannot be grown in Germany due to its high demands for warm temperatures, but possibly in southern Europe.



Sesame.

THREE STEPS TO ACHIEVE THE BEST SEED AND WHOLEMEAL BREAD

You only need to bear the following in mind: the more seeds or wholemeal you use, the more the dough and baking properties change.

Firstly, the dough tends to be runny and sticky, which results rapidly in a flat bread if you are a beginner. However, if using a loaf tin, your dough can't run away and the loaf will keep its shape. With a little experience, you can also easily make free-formed wholemeal bread.

Secondly, the dough is heavier and the resulting loaves can never reach the baking volume of a white bread. If you buy a dark bread with huge pores that is soft and fluffy like a white toast, then probably white flour has been used and the color results from natural colorings such as malt extract.

Thirdly, seeds (especially chia, linseed and oats) and wholemeal flour bind more water than white flour. Thus, if you stick to the exact amount of water in the basic recipe, your bread will quickly become dry. The amount of water must therefore be adjusted by increasing it, which works best with the so-called soaker.

SOAKER

Take the seeds you want to use for your bread and pour at least the same amount of boiling water over them and leave to stand for a few hours (even overnight if you prefer) after stirring thoroughly by hand. The grains swell and bind the water. This leads to several positive effects at once. The seeds are soft and have absorbed a lot of water, which improves the freshness of the bread and the development of the flavor enhances significantly this way, too.

For wholemeal flour, take about 20% of the flour and pour at least the same amount of boiling water over it and leave it to stand for a few hours (overnight if you prefer) after stirring it thoroughly by hand. The mixture must be cooled to at least 30°C so that the yeast is not damaged. As we already described above, we are making use of the property of starch, which can bind plenty of water at temperatures above 60°C, a process called gelatinisation (see page 8).

In the basic recipe, you should then increase the total amount of water by around 100g, so in-



Grain broth.



Swollen grains.

stead of 650g you use at least 750g in total. This means that when making the dough you only add the following amount of water: 750g minus the amount of water you used for the soaker. If you use seeds and wholemeal flour, you can also add more water. Linseed, chia, oats and psyllium in particular bind a lot of water, thus you might even need to add more.

RECIPE IDEAS: WHOLE GRAIN “LIGHT” TO MAKE EVEN WHOLE GRAIN HATERS LOVE IT

We know this from ourselves and even more so from our children: You have to get used to the taste and digestion of wholemeal flour, especially if you have only ever eaten white bread and white rolls. The color of wholemeal bread, ranging from grey to earth brown, also scares off many (young) eaters like the devil from holy water. Bread having been decorated with much care with seeds can certainly trigger ‘defence mechanisms’. We are convinced of the positive effects of whole grains and seeds, but food also has to be fun and has to boost your mood. In this respect, we are

banning all wholemeal cakes and similar baked goods from this book, because they usually contain very little flour anyway, as well as a lot of fat and sugar, so this extra small amount of wholemeal flour would do little to improve your health, but has a large negative effect on the flavor. Bread and rolls don’t always have to be made strictly with 100% wholemeal flour, sometimes it can also be a little less. In this chapter, we want to provide you with recipe ideas that are not made with wholemeal flour, but are ‘on the best way’ to a future wholemeal diet thanks to a skilful

choice of ingredients. We use our knowledge from the grain science chapter and supplement white flour for example with bran or lots of seeds, both having significantly more fiber, minerals and vitamins than wholemeal flour. And when it comes to white flour, we use Type 1050 flour. This delivers twice the fiber content of the flour normally used in white bread, which is Type 550. As rye and/or sourdough is not that popular in southern Germany, where we are living, we only use it for a few recipes.



RECIPE: FAST & LIGHT COLORED



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later pour together all the ingredients and knead them and then leave to rise overnight in the fridge. Take the dough out of the fridge the following morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, shape the dough into a bread loaf and put it into a proofing basket with the seam upwards for final proofing of 60 minutes. Then put carefully on a baking tray and bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use all or part of the same dough to make bread rolls of your choice (see the section on bread rolls). To do this, divide the dough into portions of approx. 100g on a well-floured work surface. Now take the dough piece with both hands and pull the dough slightly to both sides, then fold the ends downwards. Now turn the dough 90° and repeat the process as described 2-3 more times ("mini stretch and fold"). Then shape into a round loaf, sprinkle with seeds as you like and leave to rise until the buns have expanded considerably. This is important because it allows the yeast to cause the greater softness that you want to achieve in the rolls. Make a deep cut in the final bun and bake in a preheated oven at 220°C for approx. 20 minutes.

Using 150g of bran in this recipe allows us to achieve a fiber and mineral content of 500-600g of wholemeal wheat flour, so these are fairly light baked goods without 'disturbing grains' but surprisingly with many positive ingredients.

INGREDIENTS:

SOAKER

150g bran (oat, spelt, wheat, or similar)

300g boiling water

MAIN DOUGH

soaker

850g wheat flour
Type 1050

500g water

20g oil

10g fresh yeast or
½ package dry yeast (3g)

15g salt

RECIPE: WHITE MIRACLE



PREPARATION:

Prepare the soaker in the afternoon, add all ingredients in the evening and knead well. Place the dough in the fridge overnight. On baking day, leave to stand at room temperature until midday. Then work up with 'stretch and fold', shape and, if necessary, roll in a seed mixture, then leave to rise again. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. The bread is surprisingly light, but thanks to the selection of psyllium seeds and bran, it has about the same amount of fiber as a wholemeal wheat bread (picture: comparison of the color of the crumb with a wholemeal wheat bread).



INGREDIENTS:

SOAKER

50g bran of psyllium seeds

150g bran (oat, spelt, wheat, or similar)

400g boiling water

MAIN DOUGH

soaker

800g wheat flour
Type 1050

600g water

30g oil

10g fresh yeast or
½ package dry yeast (3g)

15g salt

RECIPE: LIGHT SEEDS



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later mix and knead all ingredients and then leave to rise overnight in the fridge. Take the dough out of the fridge in the morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, shape into a bread loaf. Leave to rise on the baking tray until the dough has increased significantly in size again. Make a cut into the dough and bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. You can also use all or part of the same dough to make bread rolls of your choice.

Using 300g of bran and seeds allows us to achieve a fiber and mineral content of 600-800g of wholemeal wheat flour.

INGREDIENTS:

SOAKER

100g bran (oat, spelt, wheat, or similar)

100g linseeds ground

50g sunflower seeds

50g sesame

400g boiling water

MAIN DOUGH

soaker

800g wheat flour
Type 1050

450g water

30g oil

10g fresh yeast or
½ package dry yeast (3g)

15g salt

RECIPE: HAPPY SEEDS



INGREDIENTS:

SOAKER

50g of each: sunflower seeds, pumpkin seeds, buckwheat, chia, sesame, poppy seeds

400g boiling water

MAIN DOUGH

soaker

800g spelt flour Type 1050

350g water

30g oil

10g fresh yeast or
½ package dry yeast (3g)

15g salt

PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later mix and knead all ingredients and then leave to rise overnight in the fridge. Take the dough out of the fridge in the morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, shape it into a long bread loaf. Leave to rise on the baking tray until the dough has increased significantly in size. Make cuts into the dough and bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes;

Alternatively, you can also make small baked goods, we made grain sticks because of the rather runny dough. To do this, stretch the dough into a rectangle on the work surface and cut into strips (approx. 5 cm wide). Roll them in a grain mixture on one side and place the side with the grains on the work surface. Then twist 2-4 times on both sides at the same time but in opposite directions and leave to rise again briefly on the baking tray. Bake in a hot oven at 200°C for about 20 minutes.

Using 300g of seeds results in a fiber and mineral content of over 500g of wholemeal wheat flour, making it surprisingly healthy but hearty.

RECIPE: ROASTED SPELT



PREPARATION:

Prepare the sourdough and soaker the evening before, mix all ingredients on the morning of the baking day and leave to rise at room temperature until midday. Then perform 'stretch and fold', shape and, if necessary, roll in a seed mixture and leave to rise for a further 2-3 hours in a proofing basket. Tip the dough onto a tray and bake it immediately in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also make small baked goods, but bear in mind that spelt tends to form somewhat flowing shapes, so make twists or rustic sticks.

INGREDIENTS:

SOURDOUGH

250g wholemeal spelt flour

250g water

50g starter

SOAKER

150g wholemeal spelt flour

200g boiling water

MAIN DOUGH

sourdough

soaker

600g spelt flour Type 1050

350g water

75g sunflower seeds and
75g sesame roasted in pan

5g fresh yeast or
¼ package dry yeast (1g)

15g salt

RECIPE: HALF - HALF



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later pour together all the ingredients, knead well and then leave to rise overnight in the fridge. Take the dough out of the fridge in the morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, form a bread loaf and sprinkle flour on it. Leave to rise on the baking tray until the dough has increased significantly in size again. Make cuts into the dough immediately before baking and bake it in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use all or part of the same dough to make bread rolls of your choice.

These baked goods are still relatively light, but at least they contain 50% wholemeal flour and sceptical eaters won't be put off by the seeds.

INGREDIENTS:

SOAKER

150g wholemeal
spelt flour

250g boiling water

MAIN DOUGH

soaker

350g wholemeal
spelt flour

500g wheat flour
Type 1050

500g water

10g fresh yeast or
½ package dry yeast (3g)

15g salt

RECIPE: RYE LIGHT



PREPARATION:

Prepare the sourdough the evening before, pour together all the ingredients the following morning and leave to stand at room temperature until the afternoon. Due to the high proportion of wholemeal rye flour, the dough is sticky, so work it up on a heavily floured work surface with 'stretch and fold', then shape into a long loaf and leave to rise again until the volume has increased considerably. Cut crosswise and bake in a pre-heated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use the dough for making small baked goods of your choice, rye semolina is ideal for decoration purposes.

INGREDIENTS:

SOURDOUGH

250g wholemeal rye flour

250g water

50g starter

MAIN DOUGH

sourdough

250g wholemeal rye flour

500g wheat flour
Type 1050

500g water

75g pumpkin seeds

5g fresh yeast or
¼ package dry yeast (3g)

15g salt

RECIPE: FINE & YELLOW



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later pour together all the ingredients, knead well and then leave to rise overnight in the fridge. Take it out of the fridge in the morning, place the dough on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, divide the dough into two parts, shape them into a round, roll them in durum semolina and place them close to each other as twin loaves. Leave to rise until the dough has increased significantly in size again. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use all or part of the same dough to make rolls of your choice. However, the high proportion of einkorn in this recipe means that the dough will be sticky and runny. Therefore, we performed 'stretch and fold' and then carefully rolled it out into a 4 cm thick rectangular shape, with the length of a roll. After the dough has risen, we cut it into pieces, roll them in durum wheat semolina and place them on the baking tray; put the tray immediately into the oven and bake at 200°C for 25 minutes.

Due to the high proportion of einkorn, we have almost as many minerals and secondary ingredients in these baked goods as when using 100% wholemeal wheat flour. The yellow color of einkorn, which is caused by the high proportion of carotenoids in einkorn flour, also provides a pleasantly light color in the bread. Alternatively, you can also use wholemeal flour from yellow wheat instead of einkorn.

INGREDIENTS:

SOAKER

150g wholemeal einkorn flour

250g boiling water

MAIN DOUGH

soaker

450g wholemeal einkorn flour

400g spelt flour Type 1050

550g water

10g fresh yeast or
½ package dry yeasts (3g)

15g salt

RECIPE: EINKORN & RYE



PREPARATION:

Prepare the sourdough the evening before, pour together all the ingredients the following morning and leave to stand at room temperature until the afternoon. Be careful, this dough is very sticky, therefore work on a heavily floured work surface performing 'stretch and fold', then shape it into a long bread loaf and put it into a loaf tin. Turn the bread in rye flour or 10g buckwheat groats beforehand. Leave to rise again until the volume has increased considerably. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

Due to the high proportion of einkorn, we have almost as many minerals and secondary ingredients in this bread as when using 100% wholemeal wheat flour. The yellow color of einkorn, which is caused by the high proportion of carotenoids in einkorn flour, provides a pleasantly light color. Alternatively, you can also use wholemeal flour of yellow wheat instead of einkorn.

INGREDIENTS:

SOURDOUGH

250g rye flour 1150

250g water

50g starter

MAIN DOUGH

sourdough

600g wholemeal
einkorn flour

150g rye flour Type 1150

600g water

90g buckwheat groats
(coarsely ground
buckwheat grains)

5g fresh yeast or
¼ package dry yeast (3g)

15g Salz

RECIPE: THE POWER OF SPELT



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later pour together all the ingredients, knead and then leave to rise overnight in the fridge. Take the dough out of the fridge in the morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, shape into a long loaf, moisten, then roll in oat flakes and place in a well-greased loaf tin. Leave to rise until the dough has increased significantly in size again. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

For a real flavour kick, you can also modify the recipe and replace the 500g wholemeal spelt in the main dough with wholemeal emmer and/or einkorn.

INGREDIENTS:

SOAKER

100g wholemeal
spelt flour

250g seed mix
(e.g. linseed, sunflower
seeds, pumpkin seeds,
oat flakes, hemp seeds)

500g boiling water

MAIN DOUGH

soaker

500g wholemeal
spelt flour

500g spelt flour Type 630

500g water

10g fresh yeast or
½ package dry yeast (3g)

20g salt

RECIPE: ANCIENT LOAF



PREPARATION:

Prepare the soaker, pour together all ingredients, knead 2-3 hours later and leave the dough in the fridge overnight. Add the oil and vinegar just before the end of kneading.

On the following day, stretch and fold the dough on a floured work surface, then leave to acclimate for an hour. Then stretch and fold again, shape into a round and roll in seeds. Leave to rise again and cut into the dough immediately before baking. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. Use the vinegar for a tart, fresh flavour, a kind of a simple sourdough substitute. Note: The picture shows one of two bread loafs made from the dough amount of the recipe!

INGREDIENTS:

SOAKER

200g wholemeal emmer flour

300g boiling water

MAIN DOUGH

soaker

300g wholemeal einkorn flour

100g wholemeal emmer flour

400g spelt flour Type 630

430g water

10g fresh yeast or
½ package dry yeast (3g)

15g salt

20g oil, 20g fruit vinegar

RECIPE IDEAS: WHOLE GRAIN AND MORE

Are you and your family ready for pure wholemeal bread? Then you've come to the right place. We start in the classic way with just a few ingredients and then get more and more substantial. You can also bake

most of the recipes as pure sourdough bread, but as we wanted to keep the recipes simple, we have included many bread types with yeast only.

RECIPE: WHOLE GRAIN ONLY



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later pour together all the ingredients, knead and then leave to rise overnight in the fridge. Take the dough out of the fridge in the morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, shape into a long loaf and sprinkle with flour or buckwheat groats if you want and put it in a tin loaf. Leave to rise until the dough has increased significantly in size again. Cut into it immediately before baking and bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use all or part of the same dough to make bread rolls of your choice. You can see how it works in the recipe 'fast & light colored', however, with 100% wholemeal you should note that small baked goods simply remain smaller in volume than if you work with white flour.

INGREDIENTS:

SOAKER:

150g wholemeal
wheat flour

250g boiling water

MAIN DOUGH

soaker

850g wholemeal
wheat flour

550g water

10g fresh yeast or
½ package dry yeast (3g)

15g salt

RECIPE: WHOLE GRAIN SPELT – THE BESTSELLER OF SUCCESSFUL BAKERIES



PREPARATION:

Prepare the soaker in the afternoon and 2-4 hours later pour together all ingredients, knead and then leave to rise overnight in the fridge. Take the dough out of the fridge in the morning, place it on a floured work surface and stretch and fold once. After 1-3 hours, depending on how much in a hurry you are, form and decorate with flour or sunflower seeds. Leave to rise on the baking tray until the dough has increased significantly in size again. Make cuts into the dough immediately before baking and bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use all or part of the same dough to make bread rolls of your choice. As described above, spelt is often said to have very positive nutrients, so it is not surprising that wholemeal spelt bread is currently a bestseller in many German bakeries.

INGREDIENTS:

SOAKER

150g wholemeal
spelt flour

250g boiling water

MAIN DOUGH

soaker

850g wholemeal
spelt flour

100g sunflower seeds

600g water

20g oil

10g fresh yeast or
½ package dry yeast (3g)

15g salt

RECIPE: SPELT RYE SEEDS



PREPARATION:

Prepare the sourdough the evening before, pour together all ingredients the following morning and leave to stand at room temperature until the afternoon. If you have time, stretch and fold several times in between. Finish the dough and shape as required if you want to make sure that it doesn't spread too much, then bake it in a loaf tin. Leave to rise again until the volume has increased. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

You can also use the dough to make bread rolls. However, because both wholemeal rye and spelt flour deliver a rather runny and sticky dough, it is better to choose shapes that don't look like perfect rolls, e.g. twists, a rustic stick or similar.

When it comes to this bread, we benefit of the valuable nutrients of the whole grains of rye and spelt, and additionally, minerals such as iron and zinc should also be bio-available for your body to absorb when using rye sourdough and a long dough fermentation time.

INGREDIENTS:

SOURDOUGH

250g wholemeal rye flour

250g water

50g starter

MAIN DOUGH

sourdough

750g wholemeal
spelt flour

50g sunflower seeds

50g pumpkin seeds

450g water

5g fresh yeast or
¼ package dry yeast (1g)

15g salt

30g oil

RECIPE: MIXED RYE BREAD



PREPARATION:

Prepare the sourdough the evening before, pour together all the ingredients the following morning and leave to stand at room temperature until midday. The dough is sticky due to the high proportion of rye. Work it up on a well-floured work surface and leave to rise in proofing baskets for another 1-3 hours. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

The bestselling bread of many bakeries is the mixed bread made from rye and wheat (rye light), here in the wholemeal version.

INGREDIENTS:

SOURDOUGH

250g wholemeal rye flour

250g water

50g starter

MAIN DOUGH

sourdough

250g wholemeal rye flour

500g wholemeal wheat flour

500g water

5g fresh yeast or
¼ package dry yeast (1g)

15g salt

RECIPE: FIBRE-MAX



PREPARATION:

Prepare the sourdough and the soaker the evening before, pour together all the ingredients the following morning and leave to rise at room temperature until the afternoon. If you have enough time on your hands, stretch and fold several times in between. Process and shape the dough as you like if you want to make sure that it doesn't spread too much, then bake it in a loaf tin. Leave to rise again until the volume has increased. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

With this bread, we benefit from the valuable nutrients of the whole grains of rye and wheat. We also add an extra load of fiber and minerals as well as vitamins and secondary ingredients, using psyllium, oat bran and some seeds. Roughly speaking, there are 50-100% more positive nutrients in this bread than in wholemeal wheat bread! In addition, minerals, such as iron and zinc, should also be bio-available for our body to absorb by choosing rye sourdough and a long dough fermentation.

INGREDIENTS:

SOURDOUGH

250g wholemeal rye flour

250g water

50g starter

SOAKER

100g oat bran

50g psyllium bran

50g sesame

50g linseed

50g pumpkin seeds

50g sunflower seeds

50g poppy seeds

700g boiling water

MAIN DOUGH

sourdough

soaker

600g wholemeal wheat flour

200g water

5g fresh yeast or

¼ package dry yeast (1g)

20g salt

40g oil

RECIPE: ANCIENT LOAF – WHOLE GRAIN



PREPARATION:

Prepare the soaker, knead everything 3-5 hours later and leave the dough in the fridge overnight. Add the oil and vinegar just before the end of kneading.

Stretch and fold the dough on a floured work surface the following day, then leave to acclimate for 1-3 hours. Then stretch and fold again, divide and shape. Roll in seeds or oat flakes as you like. Leave to rise again. Bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes. Use the vinegar for a tart, fresh flavor, a kind of a simple sourdough substitute.

INGREDIENTS:

SOAKER

200g wholemeal
emmer flour

300g boiling water

MAIN DOUGH

soaker

300g wholemeal
einkorn flour

100g wholemeal
emmer flour

400g wholemeal
spelt flour

500g water

10g fresh yeast or
½ package dry yeast (3g)

15g salt

30g oil, 20g fruit vinegar

RECIPE: GOLDEN & DELICIOUS



PREPARATION:

For the sourdough, mix the ingredients by hand and leave to mature at room temperature for a few hours (e.g. overnight).

Then pour together all the ingredients and knead intensively. Add the oil only shortly before the end of kneading, this ensures that the dough retains the water and does not release it again. Leave to rise for 3-4 hours at room temperature. The dough should have at least doubled in size. Then put the dough on a well-floured work surface and process as desired. After a final proofing of 30-60 minutes, bake it in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

Dough made with einkorn is very sticky when mixed but still stiffens. Bread made of einkorn has a great yellow crumb and an amazing flavor.



INGREDIENTS:

SOURDOUGH

200g wholemeal
einkorn flour

200g water

50g starter

MAIN DOUGH

sourdough

300g wholemeal
einkorn flour

500g wholemeal
spelt flour

200g natural yoghurt

300g water

5g fresh yeast or
¼ package dry yeast (1g)

15g salt

50g oil

RECIPE: ANCIENT SEEDS



PREPARATION:

For the sourdough, mix the ingredients by hand and leave to mature at room temperature for a few hours (e.g. overnight). For the soaker, roast the linseed, sesame and sunflower seeds in a pan and then mix all the ingredients with boiling water and leave to soak/cool for several hours (e.g. overnight). Roasting the seeds leads to an attractive roasted flavour.



The next day pour together all the ingredients and knead intensively. Add the oil just before the end of kneading. It ensures that the dough retains the water and does not release it again. Leave to rise for 3-4 hours at room temperature. The dough should have at least doubled in size. Then place the dough on a well-floured work surface and process as you like. We used the 'stretch and fold' method and then formed two dough pieces, rolled them in a seed mixture and placed them in different loaf tins. After a final proofing of 30-60 minutes, bake in a preheated oven at 230°C for 10 minutes, shortly open the oven to release the moist steam from the oven and then lower the temperature to 200°C and bake for another 40 minutes.

INGREDIENTS:

SOURDOUGH

175g rye flour Type 1150

175g water

50g starter

SOAKER

100g wholemeal
emmer flour

50g pumpkin seeds

75g linseeds

75g sesame

75g sunflower seeds

500g boiling water

MAIN DOUGH

sourdough

soaker

300g wholemeal
emmer flour

400g wholemeal spelt flour

200g water

5g fresh yeast or
¼ package dry yeast (1g)

20g salt

50g oil

RECIPE: POWER BREAD



PREPARATION:

Prepare the soaker and leave to soak and cool overnight. Pour together all the ingredients the next morning and knead carefully. Leave to rise at room temperature for 3-4 hours. Shape the sticky dough into 3 small loaves or a few rolls on a well-floured work surface and roll in oat flakes. Leave to rise again, cut immediately before baking and bake at 200°C for approx. 45 minutes. This is a real power bread providing you with lots of energy, filling you up quickly and for a long time. It is an ideal snack during sports or hiking, for example.

If you don't have einkorn flour, you can replace it with wholemeal spelt, although the flavor will not be quite as aromatic and nutty.

INGREDIENTS:

SOAKER

100g wholemeal einkorn flour

150g seeds (e.g. oat flakes, linseeds, sunflower seeds, buckwheat)

200g sultanas

400g boiling water

MAIN DOUGH

soaker

300g wholemeal einkorn flour

1 ripe apple in small pieces

150g spelt flour Type 630

50g honey

20g fresh yeast or
1 package dry yeast (7g)

2 pinches of salt

LOCAL FARMING

The population is constantly growing and our consumption habits are not sustainable. It is estimated that 45% of the fruit and vegetable production worldwide is destroyed, or simply thrown away. For cereals, we are talking about 30%. We humans also consume a lot of processed food such as meat and dairy products, causing a high carbon footprint. Climate change is getting worse, the destruction of agricultural land through construction continues and agricultural land on our planet is simply limited. This means that we have to take a multi-track approach in order to survive worldwide. Speaking about Germany – and other highly developed countries – we are of course living in a land of plenty. Before we starve to death, most of the others will be gone already, but they won't sit idly by, but will try to come to us as their last resort! Migration is expected to increase, and the reasons therefore include climate change.

Many countries around the world are involved in the trade of agricultural products. And that's a good thing because cereals, vegetables and fruits cannot be produced equally well everywhere. However, you also have to bear in mind that imports can be seen as a way of outsourcing production and if you produce less in highly developed countries, it has to come from some-

where else. Therefore, the issue of global food security affects us as well. **From a scientific point of view, strategies for overcoming the global food crisis are clearly identified: We need to consume less meat and dairy products, especially in developed countries, food waste must be largely reduced, distribution of food across the world must be ameliorated, agriculture worldwide must become more sustainable and somehow even more productive.**

In terms of agriculture, this means that we need a higher yield per area with ideally lower amounts of water, fertilizer and pesticides used. Fortunately, much is still being achieved through innovation. Plant breeding leads to higher-yielding varieties that have a better natural resistance to pests (see the following chapters). In agricultural technology, solutions have been identified, leading to entire fields that do no longer need to be sprayed, but only smaller areas and where necessary, or to a reduction in the use of herbicides or even to a replacement, using instead efficient mechanical hoes in the medium term, etc. However, it is not entirely clear whether this will be enough.

At the same time, there is a growing tendency among many

consumers, fuelled by some environmental associations and questionable test studies, to produce as extensively as possible without any pesticides and ideally for the same price. There are two aspects that cannot be ignored: Compared to conventional farming, organic farming produces a significantly lower yield per area, in the case of cereals this is over 30% (at least in good environmental conditions and soils). On the other hand, this also means that significantly more arable land would be needed, which is no longer available worldwide or can only be obtained by deforestation or ploughing up grassland and prairies. This would be a disaster for biodiversity and the environment, far worse than producing conventionally on the existing crop land with as few pesticides and artificial fertilizers as possible. Furthermore, the consumption of meat and dairy products will continue to increase worldwide, not that much in Europe and the USA, but in large countries, such as China, India and Africa.

We fully agree that we should aim high in order to create more sustainable societies but also a more sustainable agriculture and food production. However, anyone who has their own garden and produces their own fruits and vegetables knows how quickly snails, aphids,



Field trials at our breeding station (Photo: Volker Hahn).

fungal diseases and the like can invade and how difficult it is to get rid of them. Our current agricultural sector, including the entire organic sector, suffers from chronic underpayment for their valuable work. They are living on their work; they are entrepreneurs like Daimler or Facebook. This is why expensive manual corrections in the field are unfeasible in most countries of the world. We should also take a more differentiated look at the use of pesticides. The use of new production techniques and new varieties has already made it possible to use agrochemicals more precisely and therefore more effectively and also on smaller areas. However, due to current prices and the need to produce higher quantities on limited cropland, certain protective measures are necessary and very effective. Accordingly, many discussions are being held and political attempts are underway to reduce artificial fertilization as it is partly entering rivers, lakes and the sea from agricultural soils. Without doubt, the latter has to be avoided but for Germany and in the case of wheat we are already back to the fertilizer level from the early 1960ies, which is half of the amount used in the 1980ies. However, the average wheat yield nowadays amounts to approximately 8 tons per hectare compared to 4 tons in the 1960ies, which is a tremendous success of farming, enabling a considerable reduction of the carbon footprint per kg of produced wheat grains! It would be important to stop thinking in black and white terms in the various interest groups and to respond to the situation in a complementary but open manner. That is exactly what science is doing.

Only the best of the different production systems should

be combined for our future, e.g. herbicides with hoeing, fertilizing less but in a targeted way, choosing better crop rotations, using more resistant varieties, pricing fertilizers and pesticides in an environmentally fair way. The best

way to achieve this is to pay agriculture more fairly again, to link subsidies to environmental and societal contributions and to eliminate certain unfavourable structures along the supply chain.

By the way, many big scientific studies have shown that the consumption of cereal products is very sustainable compared to other foods such as meat, milk and some fruits and vegetables. **The so-called planetary health diet combines sustainable agricultural production with necessary nutrient supply and recommends a considerable increase in the consumption of cereals, ideally as whole grains.** If we still want to improve the sustainability of bread and cereal products, there are two main actions we can take: further reduce nitrogen fertilization in conventional wheat farming and grow more crops per region, i.e. increase biodiversity, for example by growing the seeds used in bread locally or by growing alternative grains, such as einkorn, emmer and the like. Nitrogen fertilization is ecologically highly effective from several points of view. The production of nitrogen fertilizers is very energyintensive



Wheat varieties largely differ in their baking quality.

and too much fertilizer often causes this nitrogen to be washed away from fields by the rain; that way the nitrogen enters into the nearby streams and rivers, which is one of the major ecological problems worldwide. According to numerous experts, wheat could certainly be fertilized less, but international trade demands a high protein content in wheat, which in most production areas can only be achieved through heavy fertilization. This is why there are slowly but steadily initiatives against the pricing of wheat according to its protein content but directly according to its dough- and baking quality as well as for a better separation of the wheat batches along the supply chains. For classical bread, which we are mostly talking about in the present book, an intermediate wheat quality with limited protein content is sufficient, and thus only a limited fertilization is required. In contrast, for certain products like toast bread and burger buns, a high bread baking quality, an increased protein content and more fertilization are needed. Currently, many professional bakers use the best quality for all types of bread and bread rolls, which leads to their products having an unnecessarily

high carbon food print.

We consumers can still do a lot, for example buy directly from those farmers who produce in an environmentally friendly way. By the way, our domestic value chain has many advantages: short transportation routes reduce negative environmental impacts; the staff is often

better trained than elsewhere, so they tend to use pesticides and the like more efficiently; fewer toxic sprays are approved in Germany and in the EU than elsewhere, as residue analyses repeatedly show; this way, we are securing domestic jobs and we are increasing the biodiversity because we

are diversifying the range of crops cultivated again. Of course, this will be a little more expensive, because labor costs are high here, but our daily food should be worth it.

PLANT BREEDING FOR OUR FUTURE

There is almost as much fake news circulating about plant breeding as there is about wheat. That's why we want to use the example of wheat to briefly explain what plant breeding really does. Strictly speaking, **we humans have been breeding plants ever since we started growing wild plants for ourselves around 12,000 years ago**, i.e. actively practising agriculture. Plant breeding is nothing more than creating new variability within a species, such as wheat, and then selecting the supposedly best varieties from a large number of

candidates. In the early days of agriculture, nature took on the task of creating variability. New varieties were (and still are) created through naturally occurring mutations. The best plants and grains were used by our ancestors as seed, the rest was consumed as food, a process that we would today call mass selection. Incredible progress has been made over the centuries with wild plants becoming our cultivated plants, which today feed >8 billion people. In the beginning, it was very important to get rid of the classic wild plant traits. In

the case of cereals, for example, this is spindle brittleness, which causes the ear to shatter before it is ripe – certainly important for a wild plant and its propagation, but very tedious for humans as the grains have to be picked up individually from the

ground. In this respect, there was great joy when someone discovered a plant that had a stable ear which did not shatter until it was ripe around 10,000 years ago, and therefore all you had to do was cut off the ripen ear. Thus, this plant was continuously propagated and cultivated more and more frequently. Nowadays, the creation of new variability in wheat is no longer left to nature. Parents are specifically selected and crossed in order to combine traits. For example, a wheat variety with good baking quality could be susceptible to an emerging field disease, while another could be healthy but with poor baking quality. **By crossing these parents and then testing hundreds or more progenies across several years, the breeder tries to select one new wheat variety that both bakes well and is resistant to the new disease.** Crossbreeding is nothing more than targeted sex, the pollen (male sex cells) of one variety is transferred to the stigma (female sex organ) of the other variety and pollen from other plants is



Ears from different wheat varieties show the diversity within wheat.

prevented from reaching the selected stigma. Subsequently, an attempt is made to place as many offspring of this cross as possible in the field, hoping that at least one of the offspring will have the desired combination of traits and that this will be found in a multi-year propagation and multi-location testing programme. This procedure is very time-consuming because initially you only have one grain per progeny, and in the case of wheat you have to consider over 30 different traits at the same time. In addition to a high yield per area, these include region-specific climate adaptation, high resistance to field diseases and fulfilment of the required quality criteria for baking. Unfortunately, some of these characteristics are negatively correlated, such as yield and baking quality, which means that the varieties with the highest yield unfortunately do not bake as well, so compromises have to be made when it comes to selection.

Nowadays, a lot of technology is used to recognise as quickly as possible which of the many candidates has the best combination of traits across many growing locations. While at the beginning of a development and selection phase, which lasts around 10

years, it is primarily the trained eye of the plant breeder that makes the selection, at the end of the selection process, machines (such as combine harvesters), laboratory baking tests and biostatistics are predominantly relied upon. To ensure that the test cultivation of thousands of candidates does not get out of hand, special technology is used for sowing and harvesting, only 1-10m² per variety. You can see such a test field from the air on p. 66.

On the one hand new genomic methods help to better and faster identify or track traits, such as a disease resistance, in the breeding programme, on the other hand they also help to introduce them in a targeted and efficient manner by using genome editing. However, the latter is only possible if, firstly, a trait (such as a disease resistance) is only influenced by one or a few genes and, secondly, if a suitable resistance gene exists in another variety or species. With the discovery of the so-called CRISPR/Cas method, a highly efficient and safe tool for targeted genome editing has been available for a few years now. It is just one of many methods that are quite expensive but sometimes used in breeding. Despite its potential, it is not (yet)

used in the EU due to regulatory problems.

Nevertheless, most traits are influenced by many genes, each of which has only a small effect on the trait expression. In these cases, the only option is to work continuously: keep crossing the best with the best in order to achieve further breeding progress. This progress has been quite impressive over the decades. As a result, it has been possible to continuously increase the yield per area, in Germany by around 200 bread per hectare (= slightly larger than a soccer pitch) every year! At the same time, resistance to field diseases is constantly being improved or adapted when new pathogens emerge and/or the races of known pathogens change again. Unfortunately, this happens just as often in the plant kingdom as with the coronavirus mutants, that we are now familiar with. Did you know: Resistance breeding is the most sustainable way to reduce the use of pesticides without having to accept yield losses and fungal toxin residues on grains.

Thanks to this success in plant breeding, modern wheat varieties deliver significantly higher yields per acreage than old wheat varieties, with less need for fertilizers and pesticides. This significantly reduces the carbon footprint and the environmental impact per kilogram of wheat. Plant breeding is therefore an incredibly important discipline. Together with further developments in agricultural technology, it offers one of the few realistic opportunities to secure the world's food supply and to make agriculture more sustainable at the same time.



Left: Plot seed drill, right: plot combine harvester.

RESIDUES, PESTICIDES, ADDITIVES – TODAY'S BREAD IS BETTER THAN EVER!

First of all, don't be afraid of your food, because it is cleaner and safer than it has ever been in the history of mankind.

And the fact that we humans are getting older and older today also shows that our food cannot be as harmful as it is often claimed on the internet, social media and the like. Even in the last century, and unfortunately still today in some parts of the world, people are still getting sick due to really spoiled food or fungal toxins, that can be caused by poor cultivation or storage. All participants in the supply chain are regularly inspected and have to implement stringent hygiene measures, in some cases even more so in Europe than elsewhere. And it is a good thing that these measures are regularly reviewed and tightened up if necessary, but they should be implemented worldwide on a comparable level following the strict regulations we have in Europe.

But have you ever visited a mill? It's unimaginable how many state-of-the-art cleaning machines there are, sorting out black grains (poisonous ergot), small and discolored grains (fungal toxins) as well as

stones, metals and soil, and using color sorting before anything is ground at all. In Europe, residue analyses by independent laboratories repeatedly show that only a few samples have any residues at all and these are usually well below the legal limits. Contrary to many claims, these limits are not simply set as high as possible because of lobbyists, but by an independent authority of experts, the European Food Safety Authority, and in such a way that the limit value would have to be significantly exceeded before there could be any danger to us at all. If new findings of harmful substances come to light, these limits will be set stricter, when necessary.

Nevertheless, it is encouraging that the findings of natural and chemical residues in Germany and the EU are low, and they are often even lower in German goods than in imported goods. When you are reading test results, you should pay attention to whether the testers really drew on the official limits or, as some test magazines prefer to do, define their own limits or devalue them as soon as something is detectable. Of course, there should be as little residue as possible, but it is important to realize that we can find almost everything today thanks to the most modern detection methods – finding a needle in a haystack is a walk in the park!

Furthermore, we don't usually eat grains, i.e. wheat, spelt or rye directly, but in the form of refined products, such as bread and baked goods. However, this also means that if we are concerned about a healthy

diet, we need to pay special attention to the finished products and should not, as in most best-sellers that are bashing wheat, scapegoat the raw material wheat.

This leads directly to another hot topic: the discussion about additives in foodstuffs; according to the European Additives Regulation, as many as 340 additives are permitted for foodstuffs in Europe. This may seem alarming, but we want to reassure you right away. Many additives may not be used in bread, such as colorings or preservatives; the latter may only be used in industrially packaged bread. Others, such as beeswax, sweeteners, gold, etc., simply don't make sense in bread either. Furthermore, many of the additives that are often used in bread are of natural origin, for example malt flour, which is nothing more than germinated barley that has been dried and ground. It is used in bread rolls quite frequently. Lecithins and other emulsifiers are also often used in bread rolls that contain vegetable fats or parts thereof, e.g. from soybeans. Ascorbic acid is often added to flour to make it ripen faster, which millions of people regularly take as a vitamin C supplement in winter to treat colds. Nevertheless, there are also artificially produced additives and enzymes being used, the latter even without the obligation to declare them because they supposedly no longer have any 'technological effectiveness' in the finished bread.

It is impossible to generalize what is being used by bakers because there are too many different



Field trial of new emmer varieties in Hohenheim.

bakeries and concepts. Additives tend to be expensive and the trend is definitely towards fewer additives, even in the large baking industry. However, it must also be clearly stated that additives are mainly used to ensure that bread and rolls always look perfect at the lowest possible price, regardless of where the grains come from, what temperatures prevail, who makes the baked goods, etc. And the higher the expectations towards the bread dough are, the more these de-

mands have to be satisfied. This applies to quick baked goods, frozen rolls, perfect toast or super-soft burger buns.

In Germany, all additives, except for enzymes, must be declared in packaged bread and lists of ingredients must be displayed in bakeries for loose baked goods. **Even if all these additives have been tested for safety, we believe that sensitive people who seem to tolerate spelt, for example, but not wheat, should also pay at-**

tention to all these substances. After all, a good loaf of bread doesn't need any more ingredients than flour, water, yeast or sourdough and a little salt. In the past, bread also tended to be baked with a longer dough fermentation time, a trend that is currently replacing quick baking, at least in innovative bakeries. So, ask your trusted baker what kind of bread you can get or start baking wholesome baked goods yourself.

YOUR WONDERFUL FUTURE WITH HEALTHY BREAD

The corona crisis has led to interesting developments evolving around the topic of wheat and bread. In addition to toilet paper, wheat flour, pasta and yeast were quickly sold out in Germany. During this global crisis, the need to avoid wheat products or gluten was apparently no longer relevant. Families started eating together again, buying more bread directly from the baker or even discovering how to bake their own bread. During that time, my colleague and I became more involved in this hobby as well, which we and our friends will continue to enjoy for a long time to come. And going to the bakery has become super interesting again. People have more respect again for the work of the baker and for what he achieves, and people are also trying to copy new ideas and are being open for new products.

With this book, we hope we have been able to alleviate your worries when dealing with the stressful topic of intolerances,

additives and harmful substances in foods such as bread and rolls. These are perfectly tolerated by the vast majority of people and, from a food safety perspective, are cleaner than ever before in human history. So enjoy them, make use of the placebo effect in a positive way, because the good mood at the dinner table has a significant influence on your gut feeling. Also, use our recipes as a starting point for numerous new ideas and recipes that you invent yourself, because baking bread is easy if you follow a few rules:

- Use enough water, about 700g to 1kg of flour for bread with light flour, at least 800g to 1kg of flour for bread that is rich in wholemeal and seeds; be sure to use a soaker for wholemeal;
- Allow the yeast or sourdough bacteria enough time to develop; the dough volume should already be doubled;
- To ensure that all the nutrients are bio-available, leave the dough

to ferment for a long time, e.g. overnight in the fridge; you create more freshness and flavour this way;

- In a loaf tin, even the softest dough cannot flow away and results in a nice loaf;
- Moisten the surface of the bread slightly before putting it in the oven;
- Bake the bread at high temperatures, 200-230°C top and bottom heat.

Don't be discouraged if your baked good doesn't turn out the way you hoped; this happens to everyone and of course more often to beginners. There is a good reason why there are professional food photographers for bread baking books, and not everything you see is real. There are numerous blogs, Facebook forums, YouTube videos and baking books that all follow their own philosophy. Take a look around.

