



*Pre-dough
solutions:
the key to delicious,
long-lasting flavour
based on a natural,
healthy basis*

Tastier bread the **natural way**

Pre-dough solutions for perfect baked
goods production





How to optimize dough quality prior to the kneading process

Bread production is an art, and its secret is naturalness. Good bread contains no industrial additives. All it consists of is cereals, water, salt, yeast, and above all pre-doughs that give it a characteristic flavour. The challenge of modern baked goods production therefore is the naturalness of the products. Thanks to pre-dough systems consumers can consciously enjoy tasty, natural bakery products. This applies worldwide for all sorts of creative combinations to produce unrivalled bakery products: pre-dough can be used to optimise a wide variety of dough types. From toast as well as ciabatta and pizza dough to brioche, croissants, and gluten-free bread - there are almost no limits to the potential culinary applications. In addition to variety and taste pre-dough technologies also enable various forms of further processing as well as packaging and secure a longer shelf life of the baked goods.

Naturalness - an **ongoing trend** across the bakery industry

In addition to the ever-relevant key topics such as digitalisation, automation and hygiene in baked goods production, end customers' demands certainly influence the production of baked goods as well. Above all, the demand for healthier, more natural „clean label“ bakery products simply should not be ignored. This growing trend can be met both by a growing range of clean label baking ingredients and by versatile (pre-)dough technologies. Thanks to a well thought-out integration of pre-dough technologies, bakers have many options to respond to the trend with creative, tasty products. This paper will explore the different ways in which pre-dough technologies can be used to produce high quality, natural bakery products.

The **definition of** pre-dough

Generally pre-dough production belongs to the group of food processes named „fermentation“.

- Pre-dough is made from milled cereal products
- Cereal Products coming from grinding mills and machines
- Which can be combined with other raw products, such as seeds
- Is made before the main dough
- Is produced under thermic and/or microbiological conditions for a specific length of time to keep functional attributes

Many benefits go hand in hand with pre-dough technologies, to name a few:

Clean Label

Besides the avoidance of certain ingredients, some of which were declared with E-numbers or sounded like „chemicals“, the term „clean label“ is often used when

the list of ingredients is reduced. Many „clean label“ requirements can be met by pre-dough technologies, for example in terms of eliminating the need for pre-mixes as well as reducing the use of preservatives.

Cost Reduction

In addition to saving space and time, production with pre-dough can significantly reduce the following cost factors: Yeast, premixes, and improvers. Ready-to-use sourdoughs can be completely replaced as well. Furthermore, pre-dough also allows the re-use of waste dough and of unsaleable bread.

Improved Shelf-life

An optimally matched integration of pre-dough into the production processes enables the extension of shelf-life, freshness, and mould retardation of the baked goods. Additionally, the structure and taste after frozen processes are significantly improved. A beneficial side effect is sustainability: reduction of logistics costs and fewer waste products result by using pre-dough.



Spotlight on „clean label“

Today, „clean label“ is a term that has many interpretations. In the past, it was simply the avoidance of certain ingredients, some of which were declared with E-numbers or sounded like „chemicals“. Since then, the term „clean label“ has often been used when the list of ingredients is reduced so that the composition appears simple and clear from the consumer’s perspective. To this end, manufacturers of baking ingredients offer baking agents or baking mixes that support these claims. However, many requirements for “clean label” can also be met by suitable dough technologies.

Areas of application that can be addressed with dough technologies for the „clean label“ topic:

- ➔ **Dough stability for mechanical processing**
- ➔ **Shelf life/freshness**
- ➔ **Shelf life/mould retardation**
- ➔ **Pastry structure due to long dough runs**
- ➔ **Pastry structure after deep freezing processes**

➔ **Dough stability for machine processing**

After a dough has been kneaded, it is divided, portioned, and further processed either immediately or after resting. Typically, the dough is worked up by machine in the industrial bakery process. To do so it must have a sufficiently elastic, yet stable, structure. In addition, it must not be moist and sticky. To improve the machinability of the dough, certain ingredients can be used to ensure the desired dough structure is achieved. They do this by strengthening the gluten network (cysteine, ascorbic acid, vital gluten, etc.,) and promoting water absorption through swelling agents and the work of enzymes.

What are the technological possibilities here?

Pre-swelling is achieved in a pre-dough with the addition of yeast. During the ripening process, enzymatic processes take place which, among other things, support the subsequent binding of water or the improvement of elasticity (softness of the bread). If a yeast pre-dough is added proportionally to a main dough, the dough is well suited for machine processing and at the same time elastic and stable. It is not for nothing that the so-called „sponge and dough process“ is one of the most common production methods for sandwich bread and toast bread (tin bread).





Spotlight on „liquid sponges“

Modern bakeries are increasingly working with „liquid sponges“, i.e. pumpable yeast pre-doughs (flour:water 100:100). An advantage of “liquid sponges” is the lower space requirement, but the main benefit is the mature pre-dough can be cooled and stored for a limited time, which makes it possible to separate production and processing of the pre-dough. The improvement of gluten quality in the sponge comes from the improved extensibility and swelling.

Many different starter cultures for wheat are available on the market, ranging from strong starters that achieve a significant stabilisation of the gluten even with a small addition, up to mild-tasting starters that nevertheless lower the pH-value as well, which has a positive effect on the gluten network formation. This is due to the fact that gluten swells and cross-links are dependent on the pH-value. By completing a few baking tests in advance, the appropriate amount to add (depending on the starter) is determined.

➔ Shelf life - freshness

The term „shelf life“ covers the areas of freshness from the consumer’s point of view as well as the aspect of durability (biochemical and microbiological stability, especially the delayed formation of mould). Many baking agents fulfil this requirement.

Among the dough technologies, the sponge process previously mentioned plays an important role. By adding a sponge, the freshness perceived by the consumer – the softness of the bread – can be significantly prolonged. This makes use of the pre-swelling, but also of the natural enzymatic processes during the maturing of the pre-dough.

An alternative option is to use the starch contained in the flour or other vegetable ingredients. This makes use of the fact that starchy ingredients can be gelatinised by adding hot water, which later increases the total water content in the dough. The pre-gelatinisation approach is followed, for example, with pre-gelatinised flour, a common ingredient in baking agents. Another baking ingredient that follows this route is potato flakes or potato flour.



Prolonged freshness with „grain cooking“

Another compelling approach is the „flour cooking/ grain cooking“ technology: a part of the flour is heated with water to such an extent that the starch gelatinises, thus introducing additional water into the dough. Even a few percent of the “scalding dough” in the final dough prolongs the freshness. The result – longer moist bread – is clearly noticeable to the consumer. With suitable plant technology, such scalding doughs have the option to be produced in advance, then refrigerated or frozen, and used later.

Introducing sourdough to the mix

The use of sourdough is also important for keeping the bread fresh, resulting in good crumb cohesion whilst remaining elastic. Some sourdoughs also ensure a particularly soft crumb that remains for many days. The main plus of sourdoughs is their taste and aroma. A specialised process to improve the aroma of baked goods uses the same equipment as „grain cooking“, but using a special starter instead. By using this „aroma technology“, maltose is formed from starch in a temperature-controlled process, fibre components are opened, swelling is optimised, and the aroma of the baked goods is improved. This process is particularly suitable for baked goods containing grains and seeds, as well as pastries.

➡ Shelf life - mould retardation

Shelf life – in the sense of delayed mould formation – is naturally extended, following the „clean label“ trend, by using sourdough. The possible extension depends not only on the sourdough culture used, but also on the entire baking and packaging process. Extending the shelf life by a minimum of one or two days can almost always be achieved, and can be more in many cases.

A practical example: in the case of tin bread, which is typically made with an anti-mould agent, it is possible to replace the preservative with sourdough in temperate climate regions completely in the winter months, and at least proportionally in the summer.

In some cases, sourdoughs are made from cultures that can themselves produce substances to naturally inhibit mould. However, as these sourdoughs require special treatment, their use on an industrial scale is not yet common.

➔ Pastry structure due to long dough runs

A growing trend, which is increasingly accompanied by corresponding marketing, is the processing of retarded doughs, usually overnight. This has the advantage that the baked goods made from these doughs remain fresh and have a unique aroma, which can also help justify a higher selling price compared to breads from fast (direct) doughs. Long-time proofing is traditional for breads such as baguettes and ciabatta. Essentially, the advantages of a sponge processing are combined with the mild activity of lactic acid bacteria present in the flour.

This technology is increasingly being used for other types of baked goods. Since many enzymatic processes take place during long-time fermentation, it is important to let these take place in a controlled manner. One tried and tested method is to cool the doughs/dough pieces. Increasingly, sourdoughs are also being used. Here, mild cultures are advantageous, which strengthen the gluten and bring enzymatic degradation and structure building into balance.

➔ Pastry structure after deep-freezing processes

The challenge with bakery products that have gone through a freezing process as dough pieces, or (semi) baked, is the quality of the baked pastry or bread from the consumer's point of view. If you want to work with a "clean label", different pre-dough technologies make sense. You benefit from „flour cooking“ (described above), especially in the frozen sector. The natural water binding by the starch proves its worth especially during thawing; a softer, juicier crumb and better "spreadability" are the sensory advantages. If the recipe also allows the combination with sourdough, you have also improved the cohesion of the crumb and its elasticity.



Pre-dough **technologies**

DIOSNA offers technologies to meet the requirements of freshness and shelf life in all distribution channels. This is done by pre-doughing, with suitable plant technology, and is supported by yeast and DIOSNA's own starters. The next step is dough preparation. DIOSNA provides advice on which kneading parameters are best used to incorporate the pre-doughs into the dough.

A well-known process is the preparation of a yeast pre-dough. Regardless of whether it is firm or soft, it can keep the crumb soft and fresh for a noticeably longer time. Of increasing importance is the use of sourdough. The crumb is strong but remains elastic at the same time. Some starters ensure longer softness. The big plus is the taste and natural extension of shelf life. A third option are swelling, scalding, and cooking pieces. Even a few percent added to the dough significantly prolongs freshness. Especially regarding frozen baked goods, a juicier crumb is achieved.

The chart on the following page shows the great variety of pre-dough technologies applicable for all types of bread. DIOSNA offers the whole process from pre-dough preparation, partly with starter, to fermentation and storage, up to dough mixing optimized for your recipes.



➔ **Get your free consultation now!**



Cell +49 541 331 04 721
Mail leadteam@diosna.com



Pre-dough technologies - application overview

| Technology | DIOSNA Equipment | Microorganism or starter | Temperature control | Pastry examples | Advantage | |
|---|--|--------------------------------|---|---|------------------|--|
| | | | | | Longer freshness | Delayed mold growth |
| Yeast pre-dough/ sponge (firm or soft guide) | Wheat-fermenter, Multi-fermenter | Yeast | Cool, e. g. overnight; Warm, for short fermentation | Sandwich bread, toast, hamburger bun, roll, free white bread | ✓ | - |
| Pre-dough allowing sour-dough cultures to develop alongside the yeast | Kneader for feeding tubs or dough vats; manual or automated dough resting stations; industry: linear transport | Yeast and lactic acid bacteria | Warm preparation, then overnight | Ciabatta (Biga), Baguette (Levain naturel), Pizza (Lievito madre/naturale), Frozen Pizza Fresh, chilled, and frozen goods | ✓ | ✓ With longer maturation & mild acid formation. |
| Wheat sourdough | Wheat-fermenter, Multi-fermenter | DIOStart wheat starter culture | Depending on starter | Wheat baked goods, rolls, baguettes, Mediterranean pastries, starter-dependent yeast reduction is possible; pizza, pastries such as croissants; | ✓ | ✓ |
| Spelt sourdough | Wheat-fermenter, Multi-fermenter | DIOStart spelt starter culture | thermically- led | spelt baked goods | ✓ | ✓ |
| Rye sourdough | Rye-fermenter, Multi-fermenter | DIOStart rye starter culture | Depending on starter | Rye bread and wheat-/ rye-mixed bread | ✓ | ✓ |
| Rice sourdough | Multi-fermenter | DIOStart rice starter culture | thermically- led | Gluten free breads with rice content | ✓ | ✓ |
| Quellstück® | Swelling vats, swelling fermenters | | Cool or warm swelling | Breads with seeds and kernels | ✓ | - |
| Kochstück® | Aroma-/cooking systems | | Hot swell | Wheat bread (fresh and packed); particularly good for pre-baked frozen baked goods; frozen hot dog breads; wholemeal flour breads | ✓ | - |



About us

DIOSNA - Quality Made in Germany

The complete range: DIOSNA's machine engineering and technology offers everything from compact systems for small-scale operations to fully automated solutions for large-scale operations. The product portfolio for the food industry includes the most important processes of dough production from dosing, pre-dough preparation and kneading to transfer logistics - for research, pilot and industrial production. It also offers mixers, granulators, dryers and coating systems for the pharmaceutical and cosmetics industries.

Joint product development with the customer, process planning as well as optimisation, efficient project management and comprehensive after-sales and value-added services are continuously optimised and customer-centred yesterday, today and tomorrow.

That is why DIOSNA's customers have appreciated our quality, performance, competence and philosophy for over 135 years.

DIOSNA Dierks & Söhne GmbH

Am Tie 23, 49086 Osnabrück, Germany

+49 541 33104-0

info@diosna.de

www.diosna.com

