

The Benefits of Liquid Dough Conditioners

Neil Hargreaves

Good morning ladies and gentlemen

I want to introduce you to this new technology. I shall cover the current environment we are in, then talk about the need for liquid dough conditioners, talk a little about where the industry is at, and sum up with the benefits. First the industry drivers that we have. Health and Safety is important for our products but also for the health and well-being of our employees. The Food Standard Agency has a key objective to reduce dust in the environment. We all know that occupational asthma in bakeries is recognised as an issue. Research has been going into the key sensitisers in our industry, e.g. flour dust. The H.S.E. have now given a maximum exposure limit of 10 mg/cu.m. per 8 hour shift. Enzymes have now been subject to a chemical hazard alert notice relating to alpha amylases. Another driver - we are all driving our costs down in our manufacturing environments. We are driving to get lower manning levels, to automate processes where possible. Waste reduction is on everybody's mind. We like well trained workforces, we don't like skills shortages. The overall drive is to reduce, remove or effectively manage complexity in our business whilst maintaining quality. Consistent quality has to be delivered day in/day out. Quality is determined by the "brand" owner. This can be the large national producer or the local bakery. The quality is your own standpoint. Of course we all need variety, we must produce a multitude of recipes and products. Individual choice is increasing and is wanted.

We use dough conditioners already. What do they give us? They give us tolerance to variations in flour quality, help with dough development during mixing, with dough processing and proof stability and they manipulate the quality attributes such as crumb structure and texture and shelf-life that we all strive for.

Dough conditioners comprise a multitude of ingredients, e.g. emulsifiers, enzymes, ascorbic acid, soya flour in varying amounts but they all are available as a powder blended from powdered ingredients. Powders can be dusty, there are ways of reducing dust from dough conditioners. They have to be handled correctly but we can use agglomerated ingredients making them more dense and less dusty. We can use fat-based paste products. These have started to appear over the past 10 to 15 years. We can also use liquid dough conditioners which are what I want to talk about.

Let us look at those agglomerated ingredients. All the functional powdered ingredients can be compacted into granules in an attempt to eliminate free dust. However during storage transport and handling the granules can break down causing dust. They are difficult and expensive to automatically dose.

Paste products have limited flexibility so these traditionally contain fat, salt, and vinegar, formulated for the production of specific products. They are difficult to dose automatically and require increased packaging compared to liquid dough conditioners.

Let's move on to liquid dough conditioners – what are they? Essentially they are a blend of the required functional ingredients identical to the powders we love, fluidised within an oil based carrier. We eliminate the potential for dust pollution and they can be accurately pumped or metered. What have the technical challenges been and still remaining? It is how to get all the ingredients into the oil. How to concentrate these ingredients as much as possible. Not all recipes need a lot of oils or fats. We need to maintain that functionality over the shelf- life of the conditioners, e.g. for 6 months. We need to maintain the suspension of powder over the shelf-life period as we need a homogeneous liquid as we pump it. We need to be able to accurately pump and dose the conditioners. The object is to totally replace the functionality of powders, suspending the powder ingredients. Working out how to suspend them has been one of the key challenges. We have also had to design, in co-operation with emulsifier suppliers, new fluid emulsifier systems which enable more fluid liquid dough conditioners to be made in concentrated form. We have had to understand the interactions during the shelf life and to understand how to process a homogeneous product and how to maintain it in a homogeneous suspension.

One of the key areas is 'how do you make a structured oil system fluid and strong enough to hold the particles we need to hold?' It has to be able to maintain this suspension of fine powdered ingredients sufficiently fluid to remain pumpable. Most of the fluid systems we have developed are thixotropic in nature, i.e. when at rest they are thicker than when they are pumped. This is one of the key characteristics of the products that we use. That gives the stability over the shelf-life but still allows the product to be pumped.

What are the advantages of these bulk liquid dosing system? There are many advantages, when compared with a powder, which is a traditionally hand fed system. You can get increased operational efficiency, you can reduce your manpower but I wouldn't say you can remove it, but you can reduce it significantly. You can improve your weighing accuracy with resultant waste reduction of both ingredient and product. You can definitely reduce complexity, e.g. you will need to purchase fewer SKU's, fewer number of ingredients to be bought and stored, e.g. oil in recipes is already included in the liquid dough conditioner. There is no cleaning of storage and weigh bins and less chance of foreign body contamination.

Where is the industry now? There is a range of liquid dough conditioners proven to be successful in plant bakeries. This is where the majority of the work started about 10 years ago but has been increasingly available to the plant baker for the last 5 – 7 years. Now we can say that bakeries can have total confidence in the

Stability

Shelf-life

Performance

of these products.

We've also been using engineering companies expert in the weighing and delivery of fluids to design and install pumping equipment in bakeries. We have a range of

dough conditioners available to the plant industry. But liquid dough conditioners are available to the craft or semi-industrial baker.

We have various packaging options – intermediate bulk containers holding 900 kilos, nominally 1000 litres with an integral pumping and delivery system. These are suited to the larger baker. We have batch delivery system which has also a small pump fed by pails of product. Also available is a ‘bag-in-box’ that you can place on a stand, a little bit like a ‘wine box’, holding 20 litres of product with a tap on it which you can open into a normal dispensing bowl. Let us look at the bulk containers we are using. They have individual throwaway lines, which eliminate contamination and cleaning uses. The boxes are collapsible and returnable. We also have a single use returnable unit. There is no cleaning or hygiene contamination problems associated with that. Returning to the ‘wine box’ and stand idea. You still require hand weighing or measuring and it can be difficult to dose into the mixers because of the viscosity of the mixer but accurate weighing is a little more difficult. The batch dosing unit - a diagram which you see here of a unit that we are building – has a top section which holds the liquid dough conditioner. The middle section is the pumping and metering section accurate to a few grams in dosing and the lower section which is storage of spare pails for the holding vessel. This batch dosing unit does allow consistent and accurate dosing. It eliminates the need for hand weighing which can be messy and it gives reliable and accurate dosing. To summarise the benefits of liquid dough conditioners as I see them. There is no dust. It does improve the operating environment and all the issues created with that. It can reduce the unit cost of manufacturing because it is easily automated, it has the potential for a reduction in manning and it reduces waste and complexity. It can maintain quality. All the functionality of traditional powdered dough conditioners are available in the liquid format. It can be made available to suit all requirements.

I would like to finish by saying that liquidity, a technology that is entering our industry and let us not forget that bread making is an ancient art and technology is never ending. Liquidity marries the two. Thank you

Question - Stan Cauvain, High Wycombe

I was wondering now that we have liquid dough conditioners, do you think it might herald a possible comeback for continuous mixing?

Answer You now have the ability to more easily automate weighing etc. It may kick-start continuous mixing, but I wouldn't go so far as to presume that it will follow as you now have the ability to more easily dispense these types of ingredients. I would be interested to discuss it with anyone.

Q Maidenhead

We've heard about the advantages of using fat and oil in liquid dough conditioners but you did not mention soya. Do we still have to add this as a powder?

A. Soya is included in the liquid do conditioner.

Q. Waterfield, Leigh

Traditionally baguette does not contain any fat or oil. Have there been any tests done using LDCs to see whether they affect the crust or structure of specific types of bread?

A. We have looked at the quality of the bread produced from all our recipes. One of the prime criteria for accepting quality of LDCs is that the quality of the product produced is maintained equivalent to the traditional method. You would need to concentrate the ingredients to add the minimum amount of oil. We haven't done any specific tests on baguettes in that sense but I can imagine with concentrated conditioners we'd be close to maintaining equivalent quality.

Q. Adrian Wetherley, British Sugar

What state is the sugar in the dough conditioner, is it dissolved or is it finely milled sugar held in suspension?

A. It could contain both.