

Free Range Bulletin 04/01:

# Use Your Loaf! – The Problems With Industrial Bread



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<http://www.fraw.org.uk/rangers/index.shtml>

**In October 2004, the Baker's Federation in the UK will be holding its third *British Bread Month*<sup>1</sup>. However, rather than celebrating the excellent bread produced by British craft bakers, it is in reality a large promotional exercise for *industrial bread* – a mass produced product that is reliant on various biochemical processes developed over the last forty years rather than on the skills of bakers developed over the last few centuries. So what, in reality, is industrial bread?**

Publicity material produced by the Baker's Federation (in fact, by their public relations consultants, *Nexus Communications*) proclaims that, *British Bread Month aims to put aside those myths, and tell consumers the truth about bread*<sup>2</sup>. However, the nature of the UK's bread industry is rather different from the depiction provided within the British Bread Month literature – to a point where a person might assume that the industry is being rather disingenuous in the way it presents its public relations.

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Given the way bread is marketed we might believe that it is produced by the same methods used to produce bread for hundreds of years. Whilst similar at the most simplistic level, in reality most of the bread produced in the UK is created in computer-controlled production lines that use specialised biochemical processes to drastically reduce the time it takes to produce a loaf.

## What is Industrial Bread?

To achieve industrial-scales of production something has to give, and in modern bread-making what's been removed are the traditional skills of bread-making. In fact, the industrial bread industry now distinguishes itself from the small number of bakeries that still use traditional methods by calling them *craft bakeries*.

Increasingly, chemicals and compounds produced

from genetically modified enzymes, are being used to plug the gap between what we recognise as bread and the product that is produced by industrial bakeries. These increasingly pouffy loaves – containing ever more water and air but less material sourced from natural grain – rely on high-energy processing and chemicals to create in the space of an hour or two what a craft bakery might take five or six hours to produce.

The grain used in industrial bakeries is specially milled to smash apart the carbohydrates it contains, reducing the nutritional quality of the grain but increasing the capacity of the flour to absorb water and be processed faster by the yeast and enzymes. Also, as many of these chemicals and enzymes are classed as *baking aids*, not ingredients, they do not have to be declared on the labelling of the bread products<sup>3</sup>.

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At the heart of industrial bread is the *Chorleywood Bread-making Process*, or CBP (see the box on the next page). CBP was invented in the early 1960s and allowed bread making to move from the traditional bakery to the industrial scale. The key to the original CBP system was the use of high-speed dough mixing and ascorbic acid to increase the activity of the yeast and natural enzymes in the flour. This *proves* (or raises) the

## Industrial Bread and the Chorleywood Bread-making Process (CBP)

CBP was originated in 1961 by the British Baking Research Association.

Wheat for the CBP process is milled at high speed between metal rollers. This breaks down the starch molecules in the wheat so that they can be more easily acted upon by the yeast, making the bread rise faster. Another factor related to the use of roller mills is that the damage caused to the starches in the grain makes the flour absorb more water – meaning that an ever increasing part of the total weight of a loaf of bread, is water, not flour (today almost half the weight of a CBP loaf is water).

Wheat flour is mixed with water, yeast, soya flour, fat, baking aids, and ascorbic acid (designate on packaging as E300) in a large drum. The mixing arms rotate at about 400 rpm for around five minutes, transferring around 40,000 Joules of energy per kilo of dough (for each large loaf that's roughly the energy an 18 Watt low energy light bulb uses in half an hour). The reactions created by this violent input of energy, assisted by the ascorbic acid, releases the gluten in the wheat very quickly and produces a stiff dough in a small fraction of the time compared to craft bakeries.

An important part of CBP is the use of a hard fat. This works with the gluten to create a stiff dough that will rise very quickly and retain its structure during the baking and cooling of the bread. Until recently *hydrogenated fats* were used in CBP. These contain more stable heavy fat molecules, which give the fat a higher melting point. But recent bad publicity about hydrogenated fats, in particular their implication as a key contributor to heart disease, has created a switch to *fractionated fats*. These are created from the processing of ordinary vegetable oils to remove the heaviest fatty compounds, usually by cooling the oil to make the heavy fats crystallise. They therefore have the same properties as hydrogenated fats, and may possibly cause similar health problems. Often, when a manufacturer states they no longer use hydrogenated fats, it's likely that they are using fractionated fats instead. After mixing the dough is poured in bulk and left for a few minutes before processing into tins, or onto trays, where it is left to prove for up to a hour (again, perhaps a half of the time, or less, used in craft bakeries).

CBP uses two or three times the usual amount of yeast compared to craft bread. This creates a large volume of gas and in the process a spongy loaf. The proving dough may also be put under a low pressure vacuum to make it rise much faster than if it were at ambient air pressure. This large increase in the amount of yeast we consume in our bread means that

the use of CBP is one possible answer to the growth of yeast intolerance, irritable bowel and thrush (candidiasis/*Candida albicans*) disorders over the past few decades.

Another significant additive is soya flour. This reacts slightly differently during the proving of the dough and helps improve the crumb (or granularity) of the bread. To make the fats bond to the wet flours emulsifiers are also added to the mix (usually E471 or E472e). In addition a small amount of vinegar is added as a preservative.

A significant addition, at roughly 5 grams per kilo of dough, is salt. This makes industrial bread a high-salt food under the current government guidelines<sup>3</sup>. However, one reason for the addition of such a large amount of salt is so that it acts as a flavour enhancer, improving the otherwise bland taste of industrial bread (it is the long proving period used by traditional craft bakeries that allows the yeast to develop the flavour of the bread). It is actually possible to make good bread without the use of salt, fat, ascorbic acid or emulsifiers – but not using industrial processes<sup>4</sup>.

After baking for twenty to twenty-five minutes in a gas oven the bread emerges and must be cooled for one to two hours. This long period can't be avoided because the bread must be cool before it can be sliced and bagged. One further step carried out at this stage may be to dust the bread with an anti-mould compound to prevent moulds forming on the bread. Freshly baked bread, having emerged from an extremely hot oven, should be mould-free. But the use of anti-mould agents prevents mould contamination during storage in areas contaminated with mould spores. This would include contamination on the premises where the bread is made and sold, not just in the consumer's home. A common anti-mould agent is *calcium propionate* (E282), and its use has been linked to allergic reactions amongst bakery workers<sup>5</sup>. However, as calcium propionate is classed as a *baking aid* its use need not be declared on the packaging.

The most recent development in the use of CBP is the genetic modification of enzymes. Most of the enzymes that help the proving of the bread occur naturally in the grain. In order to decrease the time it takes to make bread using CBP some of these enzymes are being genetically modified in order to improve their reactivity. Recently there have also been moves to breed strains of wheat that work more effectively with the CBP process. Again, as these modified enzymes are classed as baking aids they needn't be declared on the labelling of the bread.

bread much faster before it is baked.

Industrial bread making requires *strong* flour (high in protein), produced from hard wheat. The UK, except in very hot years, doesn't produce much hard wheat and for this reason a large proportion of the wheat used for bread-making is imported from North America and blended with UK wheat. Bread need not be made with hard wheat, but the CBP process does not work with the softer wheat produced in the temperate climates of Europe.

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The effects of CBP upon the quality of bread, and on the health of those who produce and eat it, are still not clear. There are studies that indicate the health and nutritional quality of CBP bread are not beneficial compared to the product that can be produced by traditional methods. There are also studies indicting that some baking aids, such as enzymes, are not wholly broken down by the baking process<sup>6</sup> and may cause allergies or dietary intolerance. It's not just the additives and baking aids that are a problem. Proving the dough over a number of hours allows the yeast to break down the gluten to make it digestible. The lack of proving time in the CBP process may be contributing to the greater incidence of gluten and wheat intolerance amongst the population<sup>3</sup>. The problem we face in deciding whether the CBP is safe is that the information about the effects of industrial bread are anecdotal<sup>6</sup>. This will remain the case whilst there is no concerted effort by food regulatory bodies to establish whether or not there is a link between industrial bread consumption and various digestive and allergenic ailments.

### **Premixes and the death of craft bakeries**

In parallel with the development of CBP, the UK bread industry itself has also undergone fundamental change over the last forty years. More and more small bakeries have closed, and at the same time industrial bakeries have grown larger and larger. Today around 80% of the UK industrial bread market<sup>10</sup>, producing over 7 million large loaves per day, is operated by a dozen or so companies operating from around sixty industrial bakeries (most of whom are the members of the

Bakers' Federation<sup>9</sup>). About 17% of our bread is produced by supermarket in-store bakeries using semi-industrial processes. The other 3% are the craft bakeries who bake a large part of their product traditionally.

One of the key factors in the collapse in traditional craft baking has been the development of premixes. The ingredients of bread and other types of dough can be put together as a single dry compound – *the premix*. This will contain not just the wheat flour, soya flour, fat, and yeast, but also the other additives and baking aids required to produce a particular type of bread. No longer do bakers have to know how to produce a standard

### **The Fortification of Bread Flour**

CBP bread is lower in vitamins than bread produced by traditional milling and baking methods, and for this reason the law requires that certain vitamins and minerals are added to all flour – even flour produced traditionally to organic standards<sup>7</sup>.

Without the addition of artificial nutrients stoneground wholemeal flour contains far more beneficial compounds (with the exception of starch) than industrial white flour<sup>7</sup>. This is because as well as smashing the starch molecules to aid CBP, the rolling and the heating caused by the compression of the grain breaks-down the essential nutrients the grain contains. Whilst this happens to a certain extent in stone grinding, the slower speed of the stone grinding process reduces these effects.

The figures below, expressed as a percentage of the flour by weight<sup>8</sup>, show the different nutritional content of white and wholemeal flour:

	<u>White</u>	<u>W/meal</u>
Protein	2.3	3.1
Fats	0.2	0.6
Carbohydrates	15.6	11.2
Iron	0.4	0.7
Thiamine (vitamin B1)	0.01	0.09
Riboflavin (vitamin B2)	0.01	0.05
Nicotinic acid	0.2	0.6

The minimum level of essential nutrients is specified in the *Bread and Flour Regulations*. The concentrations of thiamine must not be less than 0.24mg, nicotinic acid 1.6mg, and iron 1.65mg, per 100g of flour. All bread flour must have these compounds added if their composition falls below these levels. The only way to avoid the addition of these compounds would be to obtain your own wheat and mill it yourself.

loaf, cob or bagel. Instead they just open a large sack or drum of premix and empty it into a high-speed mixer, along with the required amount of water. From then on a large part of the processing of the dough will be mechanised.

The corollary of the expanding use of premixes is of course a gradual deskilling of the baking trade. It's not just that the large industrial bakers or in-store bakeries use premixes. Even some High Street bakers may use premixes because it reduces the cost of production and storage significantly (in you are unsure you should always ask the bakery whether they produce dough from premixes). Overall the use of industrially produced premixes and a low-skilled labour force has reduced the price of industrial bread compared to craft bakery produced bread, in the process making many of the small craft bakeries uneconomic to run.

The trend seen in the UK over the past forty years is not, however, universal. Across Europe the picture is very different, in part because of the patterns of work and food preparation peculiar to the UK and one or two other countries – especially the move from small to large-scale retailing through supermarkets. This can be seen in the figures, produced by the Baker's Federation<sup>10</sup>, which show the proportion of craft to *non-craft* bread (industrial bread plus semi-industrial bakeries such as in-store bakeries) sold in different EU states:

	<u>Craft</u>	<u>Non-craft</u>
Italy	90%	10%
Austria	80%	20%
France	68%	32%
Germany	65%	35%
Belgium	59%	41%
Denmark	49%	51%
Netherlands	21%	79%
UK	3%	97%

However, all this is about to change. Due to the free market in goods within the European Union cheap industrial bread will be allowed to flood the EU market, produced in those countries (the UK, Ireland and the Netherlands) where industrial bread dominates. The Baker's Federation cite statistics which indicate that half of Germany's 18,000 craft bakeries will close within five years<sup>10</sup>. In countries such as France, industrial food lobby

groups are also working to break the protection that has traditionally been given to small food retailers – for example in 2004, the ban on TV advertising by French supermarkets was overturned by the EU.

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Another factor in relation to the viability of craft bakeries is that it's not just automation, deskilling and premixes that have caused their closure. Since the 1960s bread consumption in the UK has dropped from an average of 1,289 grams per week to 720 grams per week in 2000<sup>11</sup>. This reflects a change in the way people eat generally. Today far more of our food is processed and ready-made, and far more of the snacks we eat are biscuits and convenience foods. Instead a significant proportion of the bread produced today is used in the processed food, catering and ready-made sandwich trade.

### Isn't this really a just matter of choice?

It would be very easy to blame the demise of traditional craft bakeries the public's choice of bread. In fact, the issue of how bread is produced and marketed is symptomatic of a greater problem that exists within our systems of food production and consumption.

Bread is used by supermarkets and major chain retailers as one of the *known value indicators* (KVI's)<sup>3</sup>. Bread, butter, milk, sugar and tins of baked beans are things which people buy regularly, and are often the only commodities that shoppers will remember the price of (hence, *known value*). Supermarkets compete with each other by lowering the cost of KVI's, often to the point where they are making a loss on each individual item sold. However, in order to extract a profit other items, such as fresh vegetables or meat, will be marked-up at a higher price. Therefore it's not simply a choice between industrial bread and craft bread – the unfair pricing practices used by large retailers are something which craft bakeries are wholly unable to compete with.

Due to the size of supermarket chains and their

reliance on KVs the industrial bread industry makes an important contribution to supermarket profitability. They keep the wholesale price of bread low. However, to keep that price low in the future they will have to employ ever more artificial processing in order to bake bread faster and make it last longer on the shelf. Industrial bread needn't pursue these two goals. Instead it could concentrate on improving the quality of the bread we buy. But the symbiotic relationship between industrial bread and supermarkets means that industrial bakeries must make their bread ever cheaper – if they don't somebody else will.

The real issue here isn't just the death of the traditional craft bakery. It's also an issue about the large-scale experiment being carried out on our health in order that bread can be sold at a loss. The development of the CBP process has been implicated in the growth of wheat intolerance and digestive ailments. But the potential impacts of baking processes on our health is now moving into a wholly new area with the development of ever more exotic baking aids – in particular the use of genetically modified enzymes. And, unlike the recent arguments over the use of genetically modified crops in our food, the public know little about the potential risks to health of existing and potential future industrial bread processes because the use of these baking aids need not be declared on the packaging.

It would be easy for those concerned about the quality of the bread they eat to buy from craft bakeries, lobby to support craft bakeries, or make their own (this is discussed in a companion *Free Range Practice Guide*<sup>4</sup>, produced to accompany this briefing). But we should view the problems with bread as symptomatic of the greater problems that exist with our entire food supply system. Rather than ignoring industrial bread, we recommend that those concerned about bread should:

- ◆ Pressure retail outlets and the food regulators

to provide full disclosure of the substances used to produce the bread and bread products sold to the public.

- ◆ Make sure that marketing exercises such as British Bread Month are presented honestly, and balance the promotion of industrial bread with a public debate on how our bread is made and marketed.
- ◆ Write to your MP and the Food Standards Agency demanding an investigation into the health implications of industrial bread, CBP, and the use of baking aids by the industry (see our website for details).
- ◆ **Most importantly**, buy your bread only from craft bakeries, or bake your own<sup>4</sup>.

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The Free Range Network is a 'disorganisation' of activists and specialists that organises workshops and develops information resources for community and grass roots campaigning organisations. Free Range Bulletins are produced on an occasional basis, and are intended to promote debate and learning on current campaign issues.

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