FUTURE CHALLENGES IN CAKE TECHNOLOGY

P. F. Catterall - Campden and Chorleywood Food Research Association

Thank you David. Good morning Ladies and Gentlemen. Future challenges in cake technology. I'm very grateful to Jean for giving me this title.

When we look backwards its ok, lots of information, looking forwards its not quite so easy, and certainly the company crystal ball was is use when I started writing this lecture, so I had to look somewhere else for inspiration. I started thinking about the title and trying to define it. It reminds me of one of my ex bosses who used to tell when I went to him with a problem, that we don't have problems, we have challenges.

For the purpose of this paper I have defined challenges as any event that forces change on the cake technologist. I have produced a list of what I think are the main drivers that will affect the future of this industry, some have a positive effect and take the industry forward, while others have a negative effect and take the industry backwards, but that is just a personal view!

The Drivers of Change:

The areas I intend to discuss are:

Positive Drivers of Change -

ï Demands of the consumer/ customer/retailers

ï Health awareness concerns:

ï Improved technical knowledge of all areas of the business:

ï Improved standards and systems:

Negative Drivers of Change -

ï Loss of practical skills in the industry is a distinct challenge to cake technology.

ï Legislation is also a Driver of Change but can be both positive and negative.

Positive Drivers:

The needs of the consumer/ customer/retailer are continually changing, presenting the cake technologists with some interesting challenges. We as consumers all have less time now, we buy in bulk, eat out more, either in restaurants or on the hoof and we travel more.

As a result we are looking for longer and longer shelf-lives from our bakery products, both mould free and stale free, and ideally these should be achieved without the use of additives or preservatives. This presents the cake technologist with some

interesting technical problems not least of which is the understanding of the changes that are taking place within the product. We need to understand what effects ingredients have on staling and water activity, and we need to understand the spoilage organisms and the packaging requirements for these long life products.

There would appear to be an endless thirst for new product ideas, either to relieve boredom in the household or to fill particular niches in the market.

Good examples of these would be the cake bars which are wide spread within the market place, and novelty cakes which have developed a long way from the first Pink Pig and seem to be limited only by the imagination of the baker.

From our own work we have recorded a total of 858 new bakery products in 1998 with the trend over recent years being relentlessly upwards.

75% of these new products were specifically for own label, and while it is a staggering statistic, unfortunately we don't have any information on how long each of them lasted.

One area for development is hybrid products, products that don't readily fall into any particular category. Good example of these would be Pop Tarts, and Jaffa cake, but the possibilities are endless.

Recipe boundaries can always be pushed and the following slide shows the huge potential in this area.

Bakery Products Relationship Between Fat & Sugar. Each on a Flour Basis:

Figure 1 shows the relationship between many of the traditional products and while it is only indicative what is probably most startling is the amount of space between each product group. Each space is an opportunity for technologists to develop new products.

Improved Knowledge:

As a result of developing new products and ideas we have to develop our understanding of ingredients and process.

However it also works in reverse so as we develop our knowledge, so we can also develop new products.

The basic bakery ingredients are an area where more work needs to be done. It is not acceptable that we have to bake bread, or make cakes or biscuits in order to determine whether or not an ingredient is going to work in a given formula.

I define technology as the combining of science and art.

With the size of modern plants increasing, and the loss of expertise from the industry, which will be discussed later, we no longer have the ability to allow for uncontrolled plant and recipe changes. To get the best out of ingredients in the

future requires continuous research to give us the ability to more accurately predict functionality and as a result reduce wastage and produce a more consistent product. The art component of technology is going to have to be reduced.

And having made the product, we still don't understand what's happening to the products in the oven, how the various ingredients combine, and how to get the best performance out of the hardware. How do we make the baking process more efficient, and control the differences between ovens?

Many bakery technologists will have tried to bake the same product in the same oven, only on a different site and found the settings required are totally different!

Its one thing understanding the basic ingredients, but at the same time we must also take on board new ingredients coming through from our suppliers.

There is always a reluctance by many technologists to take new ingredients seriously, and to view any claims with suspicion. We may all have had bad experiences with milk and egg replacers in the past, but there are now many interesting new ingredients around which could give your product the edge over your competitors.

The use of enzymes, starches, novel sugars, protein and fibre isolates can all contribute something to a new or existing product.

One area of new technology, which is viewed with suspicion by many, is Genetic Modification (GM). It is not possible to un-invent technology, and GM is a good example.

Another emerging technology which may find a niche in Cake Technology is Pulsed White Light.

Most baked products emerge from the oven essentially bacteria-free, but the surface becomes contaminated during cooling and prior to packing.

This new technology post wrapping may find a use in improving mould-free shelf life. It is potentially more efficient than UV and should be readily acceptable.

Health Awareness:

As the average age of the population increases, so we all became more preoccupied with our health, and so more opportunities are developing in this area for bakery products.

The preponderance of new products in the reduced fat area is testimony to the amount of this interest.

In 1998 we saw 938 new products which gave some form of Healthy Eating statement, and half of these were ìreduced fat! It would appear to have taken over from the low calorie claim but there is still some confusion.

In a recent project we conducted, titled the Barriers to the Production of Reduced Fat Bakery Foods, some of the recipients when asked why they bought reduced fat products, said it was so they could eat two instead of just one!

Having considered GM previously as a possible opportunity, we have to accept that the consumer is not impressed with this technology in food, and we have to deal with their short-term requirements. The use of GM free ingredients has put a strain on the cake technologist over recent months, and will continue for the foreseeable future.

We also talk about clean label. This is not easy to define and is generally seen as the lack of F numbers, but allows the use of unnatural technology.

As a result enzymes have been developed for many different tasks, including:

- the extending of shelf-life;

- the replacement of relaxants in pastry and biscuits.

Few are currently used in the development of cakes but it shouldn't be long before they are considered an essential ingredient.

The ultimate clean label is surely organic reflecting the trend of consumers to go back to basics.

From our own information there has been a significant increase in the number of new products in this category.

Starting at 34 in 1997, it rose to 199 in 1998 and, for the first 5 months of 1999 it had already reached 201, more than 7.0% of all new products launches.

While consumers are not very happy with additives in their foods the one possible exception to this is in the area of Nutriceuticals or Functional Foods. These are foods that have healthful properties beyond basic nutrition.

Margarines that lower cholesterol are already available, as is bread containing folic acid. The use of other bakery products as a vehicle for functional food has to be seen as an opportunity. With suppliers of functional ingredients already lining up with claims for their products, it wont be long before we see more bakery goods in this area of the market.

Systems:

Many technologists often view standards and systems very critically. They are seen as time consuming and wasteful but in any modem bakery it is essential to have a system to control product safety and quality.

While HACCP - Hazard Analysis, Critical Control Point is now essentially a legal requirement for product safety, the principles of identifying the problems, determining the critical control points and establishing monitoring systems can also be used for controlling product quality.

A good system will control the way a product is made, avoid any unnecessary variables and concentrate the effort at the points were it is required. It will preserve the knowledge of many of your senior staff and make it available to new and more junior staff so that it wont be lost.

Negative Drivers:

The industry does not develop the senior technologists that were once part of the shop floor. Many bakeries had an employee who had an intimate knowledge of the companies products and processes, and had the answers to many of the problems. There are fewer of these valuable members of staff and much of the bakery expertise now resides with the ingredient suppliers.

1. The lack of suitable scientific training;

2. Career mobility.

Employees rarely stay with the same employer, and when they move on they may well move to another branch of the industry. While this can be seen as building experience it also has a diluting effect.

3. Automation. With bread plants now being run by 1 or 2 people, baking skills are now being replaced with other skills such as IT.

4. Lack of an attractive career structure.

Neither Positive nor Negative Drivers:

I have labelled legislation in this category as the effects can be quite varied. The one area that is very relevant to cake technology, is the imminent demise of chlorine as a flour treatment agent.

Much work has been done in recent years on how chlorine works as a cake flour improver, and the best way to replace it.

The only acceptable alternative will be heat treatment and many millers have developing products to meet the deadline of November 2000.

The problems associated with this flour are the capital cost required to install a heat treatment plant, the cost of running it and hence the additional cost on the finished product.

Chlorine was a great leveller of all flours, but it would appear that heat-treatment is far more critical and may even be sensitive to recipe variations. The baker needs to be aware of three main differences

1. The moisture content of the flour from different millers could vary. The heat treatment process dries the flour down to as low as 5% moisture. With some millers rehydrating their flour back to 10-12% it may be that some flours will require a little more water than others will.

There is also the potential for more dust at the lower levels of moisture.

2. In our experience heat treated flours do not perform as well as chlorinated types and volumes tend to be smaller.

3. Cake colour will be different. Chlorine was a particularly good bleaching agent, and removed the natural pignientation of the flour. This is not the case with heat treatment and the products will be a more natural creamy colour. This could cause problems with products such as angel layer cake, but on the positive side will make other products appear more natural.

Many bakers have already converted and others are doing extensive trials but I am a little concerned about the smaller baker who may be leaving the change until the last moment. He does not have the technical back-up of the larger bakeries and will be relying heavily on the technical resources of his suppliers. Many of these have done their own work to see how their ingredients react with the new flour.

There are other legal issues, which are going to be challenging for the cake technologist. Changes to low fat claims have been proposed. Claims such as ì95% fat free are being actively discouraged and the requirement to make low fat claims is being moved from less than 5 g fat per l00gî to only 3 g.

Fat is a very useful bakery ingredient, as can be seen from some of the early attempts at low fat products, so this change will make it even more difficult to achieve good quality, low fat baked goods.

My final concern under this heading is the possible requirement for weight control and marking for cakes. While still only at the discussion stage it is an area that is actively being considered.

Conclusion:

It was never the intention of this article to give answers to all the problems facing the cake technologist. The millennium is now just around the corner, and many people are looking ahead and seeing all the problems coming. But I have always been told in business that we don't have problems only challenges, and it will be those companies that take the challenges on board and convert them to opportunities, that will be successful.

Thank you very much