QUALITY WHEAT
CRC PROJECT REPORT

Program 3  Processing of Wheat and Wheat Products

Project 3.4.1

International Baking Industry Expo ‘97

Arran Wilson
Crop and Food Research Ltd, Christchurch, New Zealand

Date: December 1997

QWCRC Report No: 6
Copy No: 19

CONFIDENTIAL
(Not to be copied)

Quality Wheat CRC has taken all reasonable care in preparing this publication. Quality Wheat CRC expressly disclaims all and any liability to any person for any damage, loss or injury (including economic loss) arising from their use of, or reliance on, the contents of this publication.
CONTENTS

1 EXECUTIVE SUMMARY ........................................... 1

2 INTRODUCTION ...................................................... 3

3 IBIE '97 .............................................................. 4
   3.1 Industry trends .................................................. 4
   3.2 Plant bakery equipment .......................................... 6
   3.3 Packaging and display ............................................ 9
   3.4 Retail products ................................................... 9

4 IMPACT ON CRC SCIENCE ......................................... 11
EXECUTIVE SUMMARY

IBIE 97 (International Baking Industry Exposition) was held in Las Vegas, Nevada, USA, from 22 to 26 September 1997. The show, which is held every four years, featured incremental improvements on existing equipment rather than major new equipment or processes. Many exhibitors from Europe attended and Australian and New Zealand industries, including the supermarket chains, were well represented.

Exhibit highlights

- More sophisticated computer control, often using touch screens, was a feature of many items. The use of electronically controlled servo-motors enables smoother, more controlled operation of bakery equipment.

- Bagels remain the featured product, with bagel machines being the most frequently exhibited piece of equipment at the show. The product, however, has still not been successful outside the USA.

- European style crusty breads (mixed grain and sourdough) are the new growth area with many exhibitors showing equipment for producing them, mainly on a small scale. Premix and frozen dough companies were also prominent in this area. These products are likely to be adopted by Australian and New Zealand companies as they fit existing consumer preferences better than products such as bagels.

- Sheeted products were much in evidence, particularly filled pastry products. Modern computer controlled sheeting lines can produce a wide range of shapes and patterns. Generally, sweet, fruit based fillings were demonstrated, but the technology could be applied to other types.

- Potassium bromate is making a comeback in the USA. There seems to be a perception that it is not dangerous. Bromate replacers have not worked as well for the USA sponge and dough process as they have for no-time doughs or MDD.

- The production of frozen dough for instore bake-off continues to grow in the USA driven by the lower cost to the retailer.
Plant bakers were offered little in the way of new equipment; rather, refinements of existing equipment were displayed. The use of chilled rotors and variable speed drives on horizontal mixers offer some small advantages in reduced dough temperatures and mixing time. No MDD mixers were featured. Make-up plant remained unchanged.

Dough chunkers (a guillotine in the base of a long hopper cuts off a dough strip that falls onto a conveyor) are replacing dough pumps in USA plants. Chunkers are also used to feed bagel and ‘no stress’ sheeting lines.

Information on the show is available on the Internet at http://www.bakingexpo.com/show/. This site includes a full list of exhibitors, some with links to their own web pages. The show programme, which contains lists of exhibitors classified by product or service, is a valuable reference to bakery equipment and service suppliers around the world.
The International Baking Industry Exposition (IBIE) is held every four years in Las Vegas. The event which is jointly sponsored by ABA (American Bakers Association) and BEMA (Bakery Equipment Manufacturers Association) has its origins in the 1897 Boston Food Show where the National Association of Master Bakers, predecessor of the American Bakers Association, was formed. Originally IBIE was held every six years, but in 1973 it decided to hold it every four years. IBIE is the premier exhibition in the world for plant bakery equipment, covering the whole range of equipment bakery and services from raw materials to retail products.

IBIE '97 was held over a week from 22 to 26 September. There were 822 exhibiting companies with displays covering nine acres. Of the 30,000 expected attendees, approximately 20% were expected to be from outside the USA, making this show a truly international event.

Exhibits included production equipment and baking supplies, ingredients and nutrients, packaging materials and systems, refrigeration systems, sanitation equipment, computerised technologies, transportation and distribution equipment, and retail products.

Many of the exhibitors displayed working examples of their equipment, e.g. fully operational sheeting lines, so that customers could readily see the operating principles of the equipment. As well as existing equipment, companies also exhibit prototype equipment. The high cost of bringing new equipment to the market makes it important to get early feedback on consumer interest in new developments.

From CRC's perspective the value of such shows is in seeing the directions in which the baking industries are heading, and seeing where there are gaps in our knowledge or understanding. As the baking industry evolves we must ensure that our research addresses the problems of today and the future, and not those of yesterday. As research providers to our industry we must be as knowledgeable as the industry if not more so. While there was a large representation from Australian and New Zealand industries, it is important that the research industry is also represented.
3.1 Industry trends

Potassium bromate

In the USA there is a move back to using potassium bromate. The bromate replacers do not produce the same tolerance for American style bread (sponge and dough process) as they do for MDD bread. Recent research has shown the risks of bromate to be very low. This trend is as yet unpublicised.

Retail bakeries

The move to greater use of frozen dough for bake-off continues, driven by the lower costs of using unskilled labour for bake off compared to the skilled staff required for scratch baking. While this is also the situation here, the economics of scale available in the USA mean they are likely to achieve greater savings than our industry.

European style crusty breads

A large range of European style ('old world' or 'artisan') crusty breads were being promoted by ingredient/premix suppliers and oven and equipment manufacturers. These products are generally hearth baked (directly on the solid oven floor) and contain a range of grains, often rye or meals. Some form of sourdough system is often used.

These breads, once a scratch baked product of small speciality bakeries, are now being produced by larger wholesale plants. Frozen dough and par-baked products have become popular in this area as it is difficult to scratch bake a large range of bread types. Special hearth ovens are also required for correct crust formation. This may be a problem for smaller Australian and New Zealand operations which simply do not produce sufficient quantities to justify equipment changes.

Bagels

Although bagel equipment featured strongly at the show, industry publications predict a slowing in the growth of the bagel market. There seems to be a trend to producing a softer eating bagel, making it similar to a bread roll. Bagels have not been successful in non-USA markets and it is hard to see this changing because they do not offer any advantages over existing products.
Pizza and tortilla

There was little equipment for making pizza and tortilla. Although much of the sheeting equipment could be used for making these products, this use was not emphasised.

Dough sheeting equipment

Sheeting systems were one of the most frequently displayed items of bakery equipment, possibly because they are easy to run demonstrations on. The displays from the major sheeting equipment suppliers featured the production of filled pastry products.

The concept of ‘stress free’ dough feeding has been taken up by most sheeting equipment suppliers. The process uses ‘chunkers’ to cut the dough into strips, or slow moving fluted rolls to produce the primary dough ribbon. Multi-rollers are then almost universally used for the primary reduction of the dough sheet. The multi-rollers are usually made from 6 2”-3” rollers, which rotate at about six times the speed of the dough sheet.

Roll/belt speed is controlled by the measurement of dough loops at the inlet side of the rollers. Droop in the dough loop is measured by optical means or by rocker arms. The use of servomotors to power laminating conveyors has lead to much smoother operation, and a greater degree of control over dough positioning.

The use of sophisticated depositing and dough folding, and stamping and cutting equipment has enabled the production of a huge range of filled pastry products of various shapes. Filled croissants were a particularly popular product. Computer control allows processing conditions to be rapidly altered to produce many different products from the one line with minimal operator intervention.

Sheet thickness is not usually measured on-line although some companies offer it as an option. Butter or shortening pumps were usually of the screw type with often long pipe runs to the extruder head.

Sheeting systems can be used to produce baguettes, foccacia, ciabatta and flatbreads, as well as more traditional lines such as pastry, biscuits, tortilla and pizza.

Automation

The adoption of computer control on bakery equipment has lead to the development of factory-wide control systems. Several companies offered generic production monitoring and control systems, preventive maintenance management systems and inventory control systems. The takeover of APV by Siebe brings together Foxboro, one of the largest factory automation
companies, with one of the largest bakery equipment suppliers—an amalgamation likely to lead to improved bakery computer control systems and expansion of their use.

3.2 Plant bakery equipment

Microwave baking bread crumbs (Oshakiri)

Oshakiri introduced a prototype microwave system for producing J-crumb. The continuous system uses a conventional batch mixer to feed a sheeting line which feeds a ribbon of dough to a prover and then through a microwave oven (2450 MHz). After microwaving the dough ribbon is cut into short lengths for cooling and grinding.

No pans are used in the system, and unlike the electrode system, there is no damage to the crust which remains white and smooth. The new system solves the problem of the crust sticking to the electrode plates or burning from arcing, and insufficient baking of the very top of the loaf which can occur with the electrode system. All dough handling is automatic.

Cost of the system is likely to be an issue as microwave generators are more expensive than gas burners, and have a short lifetime.

Dough mixing/mixer cooling (Peerless)

Peerless has introduced a cooled rotor system to their horizontal bar mixers. Glycol is circulated through all the heater bars of the rotor. Independent tests at AIB have shown that dough temperatures decrease 5°F when this system is used.

Dough mixing control systems (Peerless, Oshakiri)

Several companies are promoting the use of computer controlled dough mixing and recording. The Oshakiri system can be fitted to both small and large mixers. It records mixer motor power and dough temperature rise during mixing. Mixing curves can be stored for later retrieval. Other parameters (up to seven) such as flour temperature can also be recorded. The Peerless system incorporates a variable speed drive with energy and temperature monitoring. The speed can vary between 80-120 rpm with the mixer set up to run in constant power mode, e.g. to run faster at the start when the load is low as the ingredients combine, and slower at the end of mixing when the dough tightens. Constant power mixing can significantly shorten mixing times on some doughs.
Control equipment

There is a major shift to touch screen controls on bakery equipment rather than discrete buttons. This is (supposedly) easier for operators, as long as the software is written with this in mind.

Image analysis

Two systems of image analysis were demonstrated. Both used video cameras to measure product dimensions/colour to accept or reject the product. The Dipix system used a combination of green light and a red line with an obliquely mounted camera to measure product dimensions and colour separately at 60 frames per second. The Burford system used strobe lighting (white) and a colour CCD camera to also measure product dimensions and colour. Products are compared to standard images for accept/reject decisions. These standard images can be based on the product itself or its packaging.

Advantages of both systems include replacement of inspection staff, accurate inventory control (exact count of products maintained), and collation of trend statistics on product variation which enables better control of the process. System prices ranged from US$30,000 to US$60,000.

Both systems are new with only limited sales to date.

Bagels

More than 50 companies were offering bagel making machines for both small and large producers. Most machines worked on the same principle. A dough ribbon is produced by cutting dough from the base of a hopper (dough chunker), or extruding using large, slow—moving fluted rolls to roll out a dough ribbon. The dough ribbon is fed to a portioning system that consists of a large diameter roll with several smaller rolls around the periphery. As the dough travels around the large roll the smaller rolls form it into a regular sized ribbon. A floating roll at the start of the system controls the system to ensure a steady supply of dough. A knife system cuts the dough ribbon into bagel sized pieces which then travel to the forming section which consists of a belt that folds around a central rod so forming the bagel. On the larger machines, automatic panners are attached at the end to position the bagels for further processing.

Larger bagel production lines tend to use multipocket dividers of more conventional design.

Roth's have introduced a croissant shaped bagel, which is designed to be filled like a sandwich. This solves the problem with the standard bagel shape and texture which means sandwich fillings simply squirt out the sides when the bagel is bitten.
Australian crumpets

TSA Griddle Systems promoted its Australian (English) crumpet lines as a fat free alternative to bagels or English muffins. The system also produces pancakes.

Patriot divider/rounder

The Patriot divider/rounder uses a dough pump and knife system to scale the dough piece(s), which are then rounded by angled rounding bars running along the dough piece conveyor at a slight angle. This system uses no oil and can handle very slack doughs. It is unlikely to be satisfactory for MDD or no-time doughs as these dough types are easily damaged.

Extrusion dividers of various sorts are reasonably common in the USA (APV J-divider, AMF) and they seem to work well with sponge and dough type dough. They have generally not been successful with MDD or no-time doughs.

Ultrasonic cutters

Colborne Corp. exhibited a range of ultrasonic cutting knives. These are specially shaped blades that vibrate at ultrasonic frequencies. They can cut through the softest of materials without applying downward force. Layer cakes, cream cakes, etc. can be cut with no smearing of layers, product displacement or risk of product contamination. Product does not stick to the blade.

3.3 Packaging and display

Plastic display containers

Several companies promoted rigid, clear, plastic (polyethylene terephthalate PETE) display containers for cakes and confectionery products. These almost unbreakable containers could be combined with coloured or patterned bases of the same material.

Ovenable paper moulds for muffins, cakes and other such products were also exhibited. The moulds came in a large range of colours and styles.

Freezer to oven plastic containers were also on display.
Cake decorating systems

Decorated cakes, often based on cartoon character motifs, are very popular in the USA. Several companies exhibited tools and systems for producing such cakes. The very bright colourings and style used are outside the traditional styles used in Australia and New Zealand.

Several systems enabled the purchaser to design a cake decoration via a computer. By selecting from a hierarchy of menus, the design, colouring, and wording can be specified and the results seen on the screen. When the customer is satisfied the order is placed.

3.4 Retail products

A large portion of the show was devoted to retail products, or the equipment used to produce the products at the retail outlet. These products targeted the American market often featuring brightly coloured icings and fillings and very rich cookies and cakes. The emphasis was on the retailer doing the minimum to finish off the product to give the appearance of instore production. Interesting products are described below:

- Pidy offered a range of croustades (baked pastry cases) which the retailer could fill with sweet or savoury fillings, producing a very attractive product with minimal effort.
- Various chocolate manufacturers offered pre-formed chocolate cases, which could be filled with sweet fillings, and decorations along with bulk chocolate and fillings.
- Several companies offered small bench top (size of a portable TV set) or under bench two pass sheeters for producing pizza bases or pocket breads.
- A huge range of par-baked, frozen pre-proofed, frozen dough and premixes are available for every conceivable product.
- For the fast food industry, contact grills offer a fast way of cooking a wide range of snack products, e.g. toasted sandwiches, hamburgers, eggs, omelettes, steak, etc.
- Rheon offered a salad injector. This device has a large hopper which is filled with salad ingredients. The device coarsely chops these and extrudes them from a short pipe over which a roll or croissant can be placed, thus filling the roll. Both savoury and sweet fillings can be used.
- Kettle King demonstrated a hand-held croustade shell maker. This device has a range of different shaped heads. The heads are dipped in batter, held in a fryer briefly to cook the shells, then removed and the cooked shell ejected. The shaped shells can then be coated or filled with sweet or savoury icings and fillings.
Parco Foods promoted its Freaky Flavours character cookies—brightly coloured shaped cookies with glitter icing (a very American product).

Dried, dried and infused, and freeze dried fruit products, e.g. blueberries, apricots, etc. were promoted by several companies. The freeze dried products maintained their original shape and flavour very well. Particularly impressive were freeze dried banana pieces which tasted as good as fresh bananas.
4 IMPACT ON CRC SCIENCE

The lack of major changes in plant bakery equipment for mixing and make-up points to a lack of innovation in this segment of the industry. Our work on understanding the industrial scale baking process may be very timely in filling this niche.

The field of on-line monitoring of the baking process is wide open. The first steps are being made with horizontal mixer manufacturers offering mixing curve recording, and image analysis companies offering systems for final product checking. However, the bulk of the process is left unmonitored. The increasing sophistication of bakery computer control systems offers scope for on-line monitoring of the process.

The challenge will be to capture the benefits of any innovations we produce as no major bakery equipment manufacturers are based in Australia or New Zealand. The CRC should continue to talk to manufacturers to build relationships, and perhaps leverage our research. Crop & Food Research has a development agreement with APV Baker for one product, and could help with future similar arrangements in the CRC.