ADDITIVES REPORT

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INTRODUCTION

WHAT'S an additive? It is a good question, especially when considering the health and diversity of the world's 'additive' sector.

Canadian food and drug regulations define them as "substances that, when added to food, can become part of the food or alter its characteristics, with the exception of mineral nutrients and vitamins (which are added to enhance the nutritional value of food), spices, seasonings, flavourings, agricultural chemicals, and substances added to the packaging material."

Clear? Not really. Maybe it would be better to ask academics what they think. Take this definition from Princeton University, of the USA's Ivy League: "An additive to food intended to improve its flavour or appearance or shelf-life". It is a simple explanation, and maybe for such a diverse industry, simplicity had best suffice.

JAPAN & SOUTH KOREA

ASK many additives experts where to fund the real action in the additives sector and they will point towards the rising sun. Yes, go east, for in Japan and South Korea, there is real innovation going on, in countries where the idea of consumer groups preventing the consumption of a new food fad just seems absolutely ridiculous (most of the time).

In South Korea, the national Korea Food Research Institute has a special food additives research team. Its scientists are charged with investigating anything that might yield a new additive for the market. Their work ranges from the selection of pigments, fortifiers, spices, preservatives and functional health additives to the discovery of new materials from natural substances. They probe the functions and safety of new additives that they did not discover themselves.

And if anyone doubted that this kind of innovation might not translate into the commercial world, think again. South Korean company MSC has built its not inconsiderable success on creating additives from local sources. For instance, Carrageenan, a polysaccharide extracted from red algae that grows in clean seawater, has been found to be an effective gelling agent, a suspending and emulsifying stabiliser, a swelling agent, fat replacer, binder, dietary fibre and crystallization inhibitor, says MSC. Useful, huh? It has long been used in South Korean cooking, as has another MSC product: Agar-agar. This is a non-digestible polysaccharide extracted from red algae such as Gelidium amansii, also found in clean seawater. Said the company: "Having been used as a material for home cooking since the old days, Agar-agar is now widely used for making jellies, cookies, tissue culture, and bacteriological cultivation base." MSC reported 74 billion South Korean wong (US$74 million) in sales in 2003.

Japanese companies are no less innovative. Take functional food company Yakult: it has marketed a fermented drink designed to lower blood pressure. It contains gamma amino butyric acid (GABA), produced from a mixed culture of Lactobacillus casei Shirota and lactococcus lactis. GABA, which is known as an inhibitory neurotransmitter, is sometimes taken to aid sleep. Meanwhile, Japan's Kao Corp. has developed a bottled green tea that it says can burn fat, seriously. It contains catechin, which company researchers claim eats body fat three to four times faster than regular green tea, reducing body fat in test subjects by around 10% over three months, it claims. Sounds a little scary, but not to the Japanese, whose penchant for additive innovation has been encouraged by a diet heavy on fish. Everyone knows that this foodstuff has a very short shelf life and can pose serious risks of food poisoning. Would you rather eat a fish preserved with unusual food additives or a fillet where microbes roam free. It's the former for the Japanese and the South Koreans.

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UNITED STATES

BY contrast, the USA additive industry is currently going through a time of uncertainty, trying to juggle what consumers want and what it takes to meet their demands. Barry Swanson, Professor of Food Sciences at the University of Washington State,

said: "At the moment, people's perspective of healthy eating focuses on fresh foods such as fruits, vegetables and dairy products but these foods need more shelf-life additives to appeal to consumers. It's a difficult balance," he said.

Partly as a result of the organic and healthy eating lobby in the US, there has been precious little innovation of late in America regarding synthetic additives. All scientists interviewed by just-food.com blamed the disastrous outcome of the fat substitute Olestra and the tough regulatory hurdles imposed by the country's Food and Drug Administration (FDA) on the current inaction regarding the invention of new synthetic additives.

Manfred Kroger, veteran expert on additives and food science professor at Pennsylvania State University said: "It is extremely expensive to have a new additive passed by the FDA. It took Procter and Gamble 20 years to have Olestra passed because of consumer groups insisting it needed more research. Now it must have may cause anal leakage on the label, because of pressure from the same consumer groups...not very appealing to consumers is it?" Olestra or Olean was a flop and continues to be unpopular.

Prof. Kroger said the lack of government funding in food science research is another reason, for the stagnation. "It is impossible for a small company or group of scientists to create a new additive here, given the cost of research."

But all this aside, there is still life in the US additives industry. For instance, marketing research company Freedonia analysts forecast that sales for nutraceutical additives will rise by 6.5 per cent each year until 2008, to US$370m from US$210m in 1998. Also artificial sweeteners are still considered to be a cash cow in the US, with the trend for sugar replacements far from waning, with more overweight people than ever in the US, zero-calories foods and drinks are big sellers.

According to a Freedonia report, the market for artificial sweeteners will enjoy steady growth of 8.3% per year until 2008. Sales will rise from a small base of US$81m in 1998 to US$189m in 2008.

Prof. Kroger said he foresees that taste enhancements and new uses for sweeteners will continue be created. He mentioned the sweetener Splenda as having good success in baking but that it will not be long before another sweetener derived out of existing ones will take up shelve space. "We are not inventing new sweeteners, we are mixing then up to see how they react together and how they can be improved," he said. This cycle of rehashing existing compounds and adding them with others to add to food is key for the industry that is shying away from creating completely new elements for human consumption.

Dr Mary Ellen Camire, professor of food science and human nutrition at University of Maine said that although new synthetic forms of additives were not within reach in the near future, she predicted more research on ingredients derived from food processing by-products such as fruit peels and seeds. These, she said, will be the next 'big thing' in USA natural additives, along with microbial fermentation products.

Meanwhile, American food makers are benefiting from an increasingly middle-aged population's desire to overcome illness by eating foods containing natural antioxidants (such as vitamins C and E) that also help extend shelf-life. Rosemary extract also protects food from oxidation, and performs the same function when ingested. Tomato paste adds colour, but also provides the anti-oxidant lycopene.

Prof. Swanson agreed that adding "disease-fighting" compounds such or neutracitical additives to food products was becoming increasingly common, although it is not new. Indeed, he said antioxidants have been added to food as long as ten years ago but there has been a large increase in the amount of products they are used in during the past two years.

However, their effectiveness, he claimed, is unclear. He said: "It is very difficult to identify if a compound is working individually if is mixed up so many other ingredients." For instance, the addition of tea extracts and plant flavinoids is de rigueur but how they react with other compounds is difficult to assess.

One thing that is not in question, however, is the money derived from adding antioxidants to food. "It certainly is a lucrative market for all parties concerned, because antioxidant suppliers are selling more than ever to food producers and consumers, mostly baby boomers, are buying more than ever," said Prof. Swanson.

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EUROPE

WHATEVER their difficulties, the food additive producers of the USA will always benefit from being located in the world's largest single national market. By contrast, the European food additives industry is fragmented into its many countries. Indeed, it is impossible to say that the European food additives business is concentrated in this or that country or that it follows any particular growth pattern because the big corporate players are so diversified, both geographically and industrially. "It's companies more than countries which dominate," says Maryse HervÃ©, secretary general of the Federation of European Food Additives and Food Enzymes Industries (ELC). But that does not mean that Europe is not active in the additives market. Most of the very largest companies - giants like Danisco of Denmark or the Kerry Group of Ireland - command extensive product ranges which expose them to a number of significantly different market pressures. Few companies in fact confine themselves to products that carry an E number, even though in a strict sense these products are the only genuine additives.

For instance, although Frank Hayes, director of corporate affairs at the Kerry Group, says his company is "not particularly in the additives business", its main products are ingredients and flavours. And while many people would argue that these, along with functional foods, health and dietary supplements and artificial sweeteners, should be described as additives, one can see Mr Hayes' point. Apart from anything else the E number products are basically linked to the food industry which gives them a stable but unexciting growth potential. By contrast other products can rise or fall sharply in demand according to the latest dietary or health fashions.

Since the centralisation of some food control regulation at European Union (EU) level, an E number signifies basically that the product has been fully evaluated for safety by the European Food Safety Authority (EFSA). The ELC says it has "full confidence" in the system which, it says, "makes additives among the most thoroughly tested and tightly regulated constituents of our diet." It says that the system is also "a simple and convenient way to label permitted additives across the range of languages in the European Union."

There are currently 20 members of the ELC: 15 European-level associations of manufacturers of related products, four broadly-based national associations and an affiliated US member. Although national law remains important for some legislation, the use of food additives is regulated, and often very strictly, at European level. The ELC draws up members' common positions on regulatory issues and by providing technical expertise to the EU institutions plays a key part in elaborating EU directives.

In the absence of clear sales figures for additives there is no clear overall market leader. Ms HervÃ© says the additives market cannot be defined as a single entity but each product must be looked at on its own. That being said, however, it would be hard to deny that following its acquisition of the US company Genencor announced just last month (January), Danisco must be at or near the top in most of the individual products. The company recently reported that consolidated profits in the first half of 2004/5 grew (with the help of acquisitions) by 29 per cent to 727 million Danish Kroner (about Euro 11.7 million).

The purchase of Genencor will take Danisco into industrial enzymes and generally expand the Danish company's presence in enzymes for food and feed. According to company spokeswoman Natalie Weber, Danisco was already the largest European manufacturer of a range of products including emulsifiers and stabilisers, anti-microbials, animal nutrition, enzymes, flavours, functional systems and sugar and sweeteners, the second largest in cultures and the world number eight in flavourings.

One new product is the enzyme Power Soft, developed with Genencor, and which is used to keep cakes moist and used particularly for doughnuts.

Another enzyme controls the browning of cheese. Danisco's low carbohydrate natural sweeteners which appeal to diabetics and follower of then Atkins diet are also proving highly popular.

Looking westwards, the Kerry Group based in Tralee in Ireland is a leader in the global food ingredients and flavours markets and a leading branded consumer foods processing and marketing organisation. Some 36% of turnover is in Ireland and 34% in the rest of Europe. Although only created in 1972, the group now has annual sales of more than Euro 3.75 billion and employs 20,000 people. The group supplies over 10,000 food, food ingredients and flavour products and has become "one of the largest and most technologically advanced manufacturers of speciality ingredients in the world." These include seasonings, coating systems, sweet ingredients, nutritional systems and speciality proteins. Kerry's Bio-Science division serves pharmaceutical, culinary, snack, bakery, confectionery, dairy and beverage markets worldwide and has leading global positions in bio- and pharma-ingredients, including protein hydrolysates, emulsifiers, yeast, enzymes, hydrocolloids, cultures and fermentation products which enhance the nutrition, flavour, texture and shelf-life of food and beverages.

"Some companies are bigger than us in single technologies but we have a range that makes us one of the biggest," said Mr Hayes.

Another industry heavyweight is the German company Degussa Food Ingredients one of the world's leading food and nutrition ingredients suppliers, "providing all major segments of the food, beverages and pharmaceutical industry with

specialized individual ingredients and custom-developed solutions for making and keeping food fresh, tasty, healthy and safe." Sales in 2003 were Euro 11.4 billion, making it Germany's third-largest chemical company. Degussa specialises in natural food ingredients covering dietary supplements, functional food and special nutrition, as well as dairy systems. The company has just announced a new alpha-Lipoic Acid formulation product in cooperation with Wacker Fine Chemicals of Munich, which is "dispersible in water and characterized by a significant improved shelf life, taste and lessened throat irritation." Alpha-Lipoic Acid is used for detoxification and is popular as a food for diabetics due to its blood glucose lowering properties. Degussa Food Ingredients is to launch a new liquid formulation for beverages and soft gels in the near future.

In food colours, one of the main markets is caramel, used in particular for soy sauce. The main European (and world) supplier is the American firm DD Williamson, which had 15 agents in western Europe before EU enlargement. The Belgium-based company Cerestar, which is part of the Cargill Group, is a major European manufacturer of starches and starch derivatives from regular and modified starches through glucose and high fructose syrups to maltodextrins and spray-dried glucose syrups, dextrose, sorbitol, mannitol, maltitol, xylitol, erythritol, cyclodextrins, wheat gluten, maize oil and animal feed ingredients.

Europe's largest supplier of monosodium glutamate is the Japanese company Ajinomoto which first developed the widely-used product more than 90 years ago and for which it is the world leader. MSG is the company's main business in Europe though it also markets nucleotides and several kinds of amino acids for nutritional use. The French company Roquette is one of world's largest starch and starch-derivatives business, manufacturing starch from maize, wheat and potatoes, and a world leader in polyols.

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BRITAIN

What is driving today's additives market in the UK? Changing tastes, health concerns and harmonising legislation from the European Union (EU) are all playing their part. By summer 2005, all EU member states will have to comply with Directive 95/2/EC, which harmonises the use of food additives, other than colours and sweeteners, in flavourings across the EU. This continues the move begun in 2001 to harmonise food additives generally and opens up the market for UK manufacturers. Now that the rules are established, this should encourage them to innovate.

Global manufacturers Sensient Technologies, which has a UK branch in Milton Keynes, Buckinghamshire, is confident that "natural" flavours and colourings are the way forward. Natural savoury flavours, notes US-based chief executive officer Kenneth Manning, are very popular at the moment, particularly in the UK. Consumers want natural flavour penetration, but they are avoiding monosodium glutamate and salt because of health concerns.

The company is now looking at special flavours for prepared foods that are activated by the heat of cooking, and is researching new and more effective emulsifiers, mainly for beverages.

Waste in food processing is a cost problem for manufacturers, and many are interested in ways of reprocessing this for additives such as carotenoids, sugars, fibre, proteins, oils and waxes. The UK market may well take a lead from Spanish

researchers Azti Fundazioa, who are trying to find an efficient way of extracting useful additives from tomato waste.

UK consumers, however, are very interested in "functional" foods that claim added health benefits. Manufacturers will be looking with interest at research underway at Michigan State University into fruit compounds called anthocyanins. Preliminary tests shows that these could help to lower blood sugar levels in people with diabetes.

Natural food additives are in increasing demand. Braes Group, a global company with headquarters in London, UK, now has a lucrative American market for its granules and powders produced from fresh fruits, vegetables, juices and pulps. These are used in beverages, healthcare supplements, nutritional sports and cereal bars as well as in ready-to-eat meals, soups, sauces and savouries.

Likewise, Suffolk-based R C Treatt is finding a growing UK market for its natural flavours, which include fruit oils, feeding off growing consumer demand for natural food products. This, in turn, has increased the use of naturally derived flavouring compounds, now being used more widely in product recipes and as replacements for synthetic ingredients in existing recipes.

Meanwhile, Bristol-based TasteTech Ltd has developed a new range of mixed spice flavourings that manufacturers can use to add individual flavour to breads, biscuits, bagels and muffins. Speciality breads, says the company, are becoming increasingly popular and with the new flavourings it offers, customers can chose from flavours such as cinnamon, clove and nutmeg.

Its process works by locking essential oils and resinous extracts of spices into a microfilm of hardened vegetable oil, to create a free-flowing powder that can be mixed with other ingredients. This process, says Treatt, allows manufacturers to mix ingredients that would normally be incompatible.

Managing director Roger Sinton says: "Not only are these mixed spices suitable for a wide range of products; they are up to seven times stronger than ground equivalents."

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EASTERN EUROPE & RUSSIA

In many ways eastern Europe and Russia remains a backwater for the additives and flavourings market. This is in part because of tradition: predominantly rural communities gathered and ate their own food, with no need to industrially preserve and process it.

Consequently the region offers rich pickings for foreign companies specialising in additives and preservatives. In Russia, the country's tradition of refraining from using preservatives has come under pressure in the post-Soviet capitalist world where the country's huge size and poor infrastructure means that decaying foodstuffs is one of the country's main problems. Among those companies introducing pectins, stabilisers and other additives to the country are Danisco Cultor Russia, a branch of Danish food giant Danisco.

There are undeniably more processed food products available in the region than 10 years ago, according to the company. Margarine, for example, is no longer a large, solid block of fat and Bulgarian yoghurt with its high acidity and syneresis, has lost market share to softer, creamier Western-style products.

In terms of additives, Czech companies are developing a number of new products and means of embedding additives in to food. The company CPN spol. s r. o, for example, is a member of the Czech Contipro Group. It has developed a refined grade of Sodium hyaluronate, a substance found in all vertebrates, mainly in connective tissue and body fluids. Sodium hyaluronate alone or in combination with chondroitin sulphate is a suitable component of food, (as well as a feed supplement for animals) preventing joints or tendon disorders.

Industry analysts are also intrigued by an emerging trend in Russia - that of frozen bread. Historically Russian bread has been baked without additives but frozen bread is increasingly popular with the food service sector. Danisco Cultor has looked, in certain kinds of breads, to use the stabiliser Grindsted FSB 011, which contains added vegetable fibres and which delays the staling process.

Elsewhere in Russia, food scientists have been developing more inventive uses of additives, such as a fish sausage formula created by food scientists from the department of fish and meat product technology at the Kubani State University Institute for Technology in Krasnodar in southern Russia. The sausage contains lactic acid-producing bacteria, which increase its flavour and shelf life by fermenting its contents. It also contains vegetables and is flavoured with spices - the aim is to supply protein to markets where meat is in low supply or of poor quality.

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LATIN AMERICA (ARGENTINA and BRAZIL)

Argentina is seeing a host of new food flavours coming onto the market with a new fruity flavour from Argentinian firm Laboratorios Basso and three new flavours from Brazilian firm Duas Rodas Industrial. Laboratorios Basso's Amarandina is an acid cherry wild fruit flavouring paste, similar to the Italian amarena cherry flavour, for use in cakes and ice cream. And Duas Rodas Industrial recently launched in Argentina the following new flavours: Caramel Taste to enrich dairy products, sweets and biscuits with caramelised and malty notes; Gratin to add a lightly-toasted cheesy note to savoury products such as home-made style sauces and frozen ready meals, and Citrus which has been specifically developed for fruit-tasting drinks.

Laboratorios Basso has also launched Felices Fiestas, a powder base for the preparation of cider-flavour ice cream and Baco, a powder base to facilitate the production of ice creams with alcohol.

"Baco base solves the problem of not being able to introduce alcohol into ice creams because it hinders the freezing process. Now we can have ice creams such as Beer or Cider with fruit," said chemical engineer Lucio Basso.

In the bakery line, Argentinian firm Ran Industrias QuÃmicas has launched Doble Enlace EcoPan (correct), a multi-purpose bromate-free additive for bread making. The Buenos Aires based company has also launched Doble Enlace Freshness Extender, a additive which enhances the shelf-life of products such as rolls, pizzas or panettone, maintaining their moistness and preserving the organic volatile compounds which give them their smell and flavour.

In Brazil, reflecting an increasing trend globally towards more natural foods, Metachem has launched a new product for use in the ice cream industry: polysaccharide Tara gum, derived from the seeds of the native Peruvian plant Caesalpinea spinosa, which works synergistically with other gums such as the widely used stabliser, thickener and suspending agents Xanthan and Agar-Agar gum, creating a homogenous creamy texture and slowing down the melting process. Elsewhere in Latin America, Peruvian company Ecopro is among those producing the natural emulsifying stabliser, which looks set to be a regular player in the future.

In Brazil, another natural product, pectin, is also seeing a growth in demand. Along with Florida in the US, the state of Sao Paulo accounts for around 50% of the world production of oranges and some 80% of worldwide production of orange juice, suppliers are stepping up production of pectin to meet high global demand for the gelling agent.

Sao Paulo based additives and thickeners firm CP Kelco, which was recently bought by private firm JM Huber, is aiming for a 25% increase in capacity of pectin at its production site in Limeira in Brazil by mid-2005 and to double capacity by the first quarter of 2007.

Business unit director of food gums Martin Sapone says: "Global demand for pectin products continues to be strong, primarily spurred by growth in developing geographies and new product entries in developed markets."

Pectin has been enjoying strong growth with food makers increasingly looking to include the product in functional food sports nutrition formulations. The agent is extracted and blended from citrus peel and as well as setting jams and preserves, is used to enhance texture and appearance of a range of foods whilst contributing to flavour release.

Demand also continues to be strong for non-fat-soluble additive sodium erythorbate, used in soft drinks, poultry and meat as an anti-oxidant, to speed up the curing process and to deepen the colour of meat. Brazilian firm Nutri.com, based in Diadema, says it is selling much more of this additive.

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AUSTRALASIA

There are currently 300 food additives approved for use in food processing in Australia and New Zealand. To see the full list, browse to www.foodstandards.gov.au/whatsinfood/foodadditives.cfm then click on 'Food Additives List Alphabetical'. As might be expected for two developed food markets, entries cover a wide range of additives. Some examples:

*Additives improving the taste or appearance of a processed food, such as beeswax glazing agent (901), which coats apples to improve appearance;

*Those improving the quality or stability of a food such as sorbitol - humectant (420) - added to mixed dried fruit to maintain the moisture level and softness; and

*To preserve food (eg. sulphur dioxide - preservative (220) - added to meat products to prevent microbial growth).

Unusually the two countries share a food regulator, and this chief bi-national agency, Food Standards Australia and New Zealand (FSANZ), carries out stringent safety assessments of food additives before they are allowed to be used, checking that the additive is safe at the requested level in that particular food, that there are good technological reasons for its use, and that consumers will be clearly informed about its presence.

There have only been three recent new additives considered by FSANZ in the past few years.

FSANZ is assessing an application on June 21, 2004, from Danisco Australia Pty Ltd, submitted by Axiome Pty Ltd, seeking approval for the extended use of natamycin (pimaricin) as a food additive to a maximum level of 15 mg/kg in each of the following food categories: breads and bakery products; fruit and vegetable preparations including pulp; dairy and fat based desserts, dips and snacks; and sauces and toppings including mayonnaises and salad dressings.

The Australia New Zealand Food Standards Code currently permits 15 mg/kg of natamycin on cheese surfaces and 1.2 mg/dm2 on uncooked fermented manufactured meats. Natamycin (INS 235) is a naturally occurring antimicrobial agent produced by the bacterium 'Streptomyces natalensis' and related species.

Meanwhile, in March 2003 FSANZ recommended the approval of the use of gamma-cyclodextrin as a novel food ingredient after an assessment found there was neither any evidence of public health and safety concerns associated with it, nor any significant nutritional problems at proposed levels of use. Gamma-cyclodextrin serves a variety of functions in food applications including stabilisations of emulsions, elimination of undesirable molecules, solubilisation of ingredients and protection from oxidation. It also serves as a carrier of nutrients and vitamins.

The third additive considered was from the Netherlands' Holland Sweetener Company for aspartame-acesulphame salt, an intense sweetener made from existing, permitted intense sweeteners. Aspartame-acesulphame is a widely known (and sometimes controversial) 'sweetener-sweetener' salt, a combination of two oppositely charged sweeteners to create a compound in which each molecule contains both 'parent' sweeteners - aspartame and acesulphame potassium. All components are commercially available and food-grade, and the process introduced no new impurities, the regulator ruled.

The salt is suitable for a wide range of products including beverages, dairy products, tabletop sweeteners, and confectionery.

One interesting difference between Australasia and the UK, for instance, is that additive 164 (saffron - or crocetin/crocin) is approved as a food additive in Australia and New Zealand but not in the UK where it still can be used as a food ingredient.

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CHINA

The food additives industry is big business in China. Although national figures are extremely difficult to come by, the Chinese Food Chemical Additive Industry Information Network said the value of food chemical additive output value frequently accounts for 3% of total food industry output value.

A further glimpse of industry revenues can be gleaned from the performance of some key players.

One chief manufacturer, the Zhejiang NHU Co Ltd, was the first company to be listed on the newly launched Shenzhen Stock Exchange's small and medium-sized enterprises (SME) board in May last year.

The high-tech firm has total annual sales of Yuan 1 billion (US$120.8 million) and produces a wide range of products including food additives, flavourings, fragrances, medicine and health-care products. Its operations, claims its website, are carried out "strictly under the supervision of ISO 9001 and ISO 14001 environment systems".

The Chinese Food Chemical Additive Industry Information Network says the space for the food chemical additive industry to develop is huge with more domestic demand for higher quality, healthier foods and more variety, as well as a demand for products such as vitamins from overseas companies, some who have factories in China.

China currently authorizes the use approximately of 1,500 kinds of food chemical additives, and as usual with the world's largest emerging market, quantities are vast. In the year 2000 alone, the Chinese food chemical additive industry produced 1,800,000 tonnes of product, worth an estimated Yuan 18 billion (approx US$2.1 billion). What's more, China's food industry growth rate is approximately 12% yet its food chemical additive sector growth rate is 12-14%, said the Network. Looking ahead, the Chinese government is keen to increase its exports and hence is widening the application of international standards by the nation's food industry to 55% of production, from the current figure of 23%.

Information on new additive products is hard to come by but some of those being researched and pioneered are among the topics to be discussed at the Food Ingredients China conference in Shanghai in March. They include oil resin in rice-flour noodles and meat products, and a new generation of sugars.

Beyond the bluster and the big figures, however, China also realises its food additive industry is open to abuse, especially by producers of counterfeit products, and requires some urgent regulation after a series of security scares. For instance, in 2003 when, according a two year survey covering 15 categories of food including of 106,000 enterprises producing a variety of foodstuffs including flavourings (plus soy sauce, meat and dairy products), more than 10% had no authorised business licence, more than half failed to have their products inspected, and about 25% failed to check the quality of materials before processing.

The Xinhua News Agency reported in January 2004 that as a result of the survey the State Administration of Quality Supervision, Inspection and Quarantine (AQSIQ) introduced a "market check-in" system.

"The first batch of domestic-made food labelled with production license numbers and the logo of 'quality safety' was permitted to enter the market in January 2004," the agency said.

In December 2003, China's National Development and Reform Commission, the Standardisation Administration, and the Ministry of Agriculture announced their 2004-2005 development programme for national food standards. The programme's aim is to set up inspections for all known banned materials in food manufacturing within two years.

Recently the secretary-general of the National Food Industry Standardization Technique Committee, Hao Xu, told the China Daily newspaper: "Safety is the first consideration for anything entering people's mouths, followed by nutritional value."

He said the use of food additives would be a major consideration in drafting the new standards. In one case talcum powder was discovered added to flour products in a breach of standards.

Another incident in which 11 people died from poisoning in China's Guangdong Province last May, prompted the Provincial Administration for Industry and Commerce to launch an urgent seven-month food safety campaign to collect inferior food products.

The use of toxic additives and the overuse of edible additives were cited as being among the most common problems associated with "questionable" goods.

Unusually, China has been asking for overseas help in this matter, with Australia and New Zealand working very closely with Beijing to assist China improve health standards.

The Chinese State Food and Drug Administration and Food Standards Australia New Zealand (FSANZ) signed a Memorandum of Understanding (MOU) at the Australian Embassy in Beijing last year. This MOU was for the sharing of information relating to food safety between the Chinese State Food and Drug Administration and FSANZ.

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SOUTH AFRICA

The hub of the South African food additive industry is in the Western Cape, with the majority of these businesses locating themselves to be closer to their clients, the country's food and beverage producers.

However, the sector is small - the South African additive market is currently dominated by the multinational corporations such as Pfizer offering a wider range of products to food manufacturers than domestic players can even consider developing. There does, however, there appear to be room for smaller niche players.

Hennie Grobbelaar, development and research manager of Anchor Biotechnologies, a division of Anchor Yeast says that majority of the research and development of products is conducted outside of South Africa, mostly European countries, due to the fact these states tend to be the main export destinations for South African food producers.

However, his company, Anchor Biotechnologies, has been developing yeast cultures locally for a number of years, supplying yeast additives for the processing of wines, fruit beverages and bio-control yeasts for the preserving of fresh fruit to other companies in South Africa, Namibia, Botswana and Zimbabwe.

Specialist importers also play a key role. South African company Prime Pharm imports three enzymes from the Martin Bauer Group in Germany, for instance. They are, pimaricin (natamycin) used for the processing of dairy, fruit juice and wine products, nisin for preserving processed cheese and rennet for thickening cheese.

Doreen Moller, corporate communications at Prime Pharm says that the diary and wine producers are their core customers. "Our smaller product range implies that we are able to focus on our clients' specific needs to a greater degree."

The use of 'natural' additives of this type is of increasing demand in South Africa, noted Mr Grobbelaar. "Consumers are becoming more health conscious leading to a greater awareness of additives with producers trying to meet these needs. The challenge that this presents to the additive sector is that there will be an increased drive to find natural preservatives and flavourings," he said.

Indeed, South Africa's Woolworths chain (a food retailer in this country) started its drive to remove food additives in 2001 with the removal of all MSG (mono sodium glutamate - a flavour enhancer) and tartrazine (the colourant) and recently took the step to stock only rBST-hormone free Ayshire dairy products and fruit juices without sulphur dioxide.

In South Africa there are various national laws governing the use of additives in food products, but maybe the most important is the Health Act. At its core is a demand that certain chemicals or food additives may not be used if deemed harmful and able to trigger allergic reactions in susceptible people. If additives are used they must be proved to be safe, effective and necessary. Also approved food additives must be listed by name on a product, rather than a list of their 'E numbers'.

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