InBrief32

IN THIS ISSUE:

Welcome to the Spring 2006 edition of InBrief. This is a slightly unusual edition as we are focussing on only two main areas.

Firstly we will be launching our new **enzyme pyramid.** Linked into the healthy eating pyramid being widely promoted to consumers it demonstrates how enzymes can assist at every level of the pyramid. Full details are inside.

Secondly we have been undergoing some major internal restructuring of our sales and marketing team. Central to this is the recruitment of a new Sales and Business Development Manager, Eduardo Beasley. Ed has joined us from the speciality chemical industry and brings with him a wealth of sales management experience. He is looking forward to playing a pivotal role in helping Biocatalysts to continue to achieve its rapid growth targets.

IFT 2006 is in Florida this year. We will be attending as usual. Our booth (number 542) is in a great position central to the show floor, so please come and see us if you are visiting the show. Managing Director Stuart West, Ed Beasley and Deborah Davies (Sales Executive) will be attending. If you would like to meet with a specific individual, please contact the sales office via sales@biocats.com.

Caroline West
Promotions Manager

BIOCATALYSTS

Biocatalysts Enzyme Pyramid
the way forward for food processors

Fats & Sugars
• Low fat mayonnaise

Milk Group
• Enzyme modified cheese
• Bioactives • Protein hydrolysis

Meat/Protein
• Meat flavours • Tenderisation
• Chondroitin Sulphate

Vegetables
• Increasing juice yield (upto 60%)
• Vegetable flavour extraction • Soluble fibre

Fruits
• Citrus fruit peeling
• Anti-oxidant extraction • Soluble fibre

Bread & Grains
• Rye bread • Real English Muffins

From innovative ideas come innovative enzyme solutions

The broad recognition of the food pyramid amongst both consumers and the food industry means that it lends itself very well as an illustration of just how broad the use of enzymes can be in food processing.

But are all food processors aware of the innovative and cost effective solutions that Biocatalysts enzymes can offer to a multitude of processes? Our aim here at Biocatalysts is to raise awareness of the wide scale of applications of enzymes and encourage the food industry to involve us in their processes to ensure that they are maximising their effectiveness, whatever they are producing. We provide person-to-person technical support in every sector backed up by our comprehensive website **www.biocatalysts.com.** Many of the processes involved are covered in our Technical Bulletins. These in-depth, sector specific packs cover topics such as egg, dairy, fruit and vegetable processing, baking and more. If you are involved in any area of the food pyramid then you can be assured that we are too. Enzymes can be applied to every level of the pyramid, whether it be at the top reducing the amount of fat in mayonnaise or at the bottom by producing Rye bread with a lighter texture and caramelised crust colour.

Let us consider all the levels of the food pyramid in turn and examine where Biocatalysts can assist in producing either foods of improved quality, or with specific benefits.

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Breads and Grains

Health guidelines suggest we should be eating between 6-11 servings of this category a day. Any food made from wheat, rice, barley, oats or any other cereal grains fall into this category and these can be subdivided into whole and refined grains.

Enzymes can assist in both of these categories and we produce a huge range of baking enzymes, details of which are available in the Baking Technical Bulletin and on our website. Below is a highlight of what the range has to offer.

If you are producing standard white bread you will be looking for qualities such as good loaf volume, even crumb structure and good dough stability. These and other benefits can be achieved with a range of enzymes including our top performing baking lipase **Lipomod™ 726P**.

Another popular white baked product is the English muffin. Bakers in the UK have used our tried and tested **Combizyme™ 666P** for a long time and enjoy the consistent results that it achieves time and again. If you are trying to produce English muffins then why not use the same products as the actual English muffin makers use! The visco-elastic properties of the dough are maximised allowing it to spread evenly in the griddle cup and ensuring that the size, shape and consistency are the same every time.

The appeal of European breads continues to become more widespread. Rye bread (made from either straight rye or a rye and wheat mixture) can be a heavy bread with a very dense structure. **Depol™ 680P** can result in up to a 20% increase in loaf volume with a light crumb structure and darker crust colour making it more appealing to a wider market who find the solidness of more traditional versions a little off-putting. Interestingly, one of the reported side benefits of this product is a more pleasant aroma from the bread.

Breads and grains are also a valuable source of soluble fibre. This key health benefit is being widely promoted in the media at the moment and Biocatalysts can provide enzymes that demonstrate an impressive increase in the amount of soluble fibre available from wheatbran.

Depol™ 761P is a GM enzyme producing outstanding results on soluble fibre. Laboratory trials have shown that this enzyme increases the amount of available soluble fibre by a massive 46%.

If you are unable to contemplate a GM enzyme then, as always, we have an alternative in **Depol™ 762P** which again increases the amount of soluble fibre from wheat bran by 19%.

Fruits and Vegetables

This enormously important area of the food pyramid is being heavily promoted in the media.

Consumers are encouraged to aim for '5-a-day', that is 5 portions of fruit and vegetables a day. Many people, however, find this very difficult and therefore many consumers are looking for easy ways to increase their consumption. This has resulted in large increases in the amount of fruit and vegetable juices being consumed. Therefore, Biocatalysts range of enzymes that increase the yield of juice extracted from fruits and vegetable means more profit for processors and also reduced amounts of waste material for disposal. **Depol™ 692L** can increase the amount of juice extracted from carrots by up to 60%!

Milk and Protein

The underlying chemical reaction that unites these two areas together is the hydrolysis of protein.

The degree of hydrolysis brought about by the use of enzymes can do one of two things, one is to release the functional attributes of the protein and secondly to produce distinctive flavours. One of the key issues is that a protein with good functional attributes very often has a very bitter or off taste.

Functional Attributes

Proteins can be hydrolysed for a variety of reasons. One of the key reasons is to increase solubility. The hydrolysis can also increase the emulsification capabilities of proteins such as soya. Increasing the foaming properties of whey and other proteins can produce egg white substitutes and these are becoming an increasingly popular ingredient amongst food manufacturers keen to reduce the use of eggs.

Finally, a key area of market development is the release of bioactives. The benefits of bioactives are now being promoted to the consumer directly and therefore enzymes that can increase both the amount and quality of the bioactives released will improve the end product in a cost effective way.

Moving away from the functional side of protein hydrolysis, we can then look at the other key issue, that of flavour production. Now instead of functional attributes that may produce a bitter flavour we are focussing on the production of specific desirable flavours.

Flavour Attributes

We have expertise in two main areas of flavour production, savoury flavours and dairy flavours. Meat and savoury flavours can be made from many other materials apart from meat. Yeast extract and enzymatic hydrolysed vegetable protein (eHVP) are both good savoury flavours.

Developing a distinctly flavoured milk product can be the key to being a market leader. Creating high quality distinctive flavours with enzymes is a main skill of Biocatalysts and very often we will develop a distinctive flavour that will set you apart from the competition. Our enzymologists understand the biochemical production of flavours and by combining these skills with our customers' flavour knowledge, a winning combination for flavour development is created.

Enzyme modified cheese (EMC) is a highly intense cheese flavour produced by the addition of lipase and/or protease to immature cheese. Biocatalysts is a leading expert in this area with considerable experience in providing enzymes to produce a wide range of flavour profiles from sharp blue to Cheddar-type flavours.

The EMC enzyme range is typified by our **Lipomod™** and **Promod™** ranges of products, for example **Lipomod™ 187P** is an extremely popular enzyme producing a good Cheddar-type flavour. If you are looking for the piquancy of a blue cheese then you will find **Lipomod™ 338P** performs well for this particular flavour profile. We also have products available that will de-bitter the protein hydrolysates that are sometimes linked with EMC, this product **Flavorpro™ 192P** is very often used in combination with other enzymes.

Different enzymes from the same ranges can also be used to unlock the valuable and flavourful compounds in milk fat and protein, this is the biochemical basis for numerous modern flavour products. Commercially, lipolysed butter oil is manufactured from butter-oil by controlled lipase action, which releases the flavourful short-chain fatty acids (such as butyric and caprylic acid), and also the non-volatile long-chain fatty acids.

Following on from the protein hydrolysis aspects of this level of the pyramid, we must also consider other areas of the protein level that enzymes can have a positive impact including enzyme marinades and the use of enzymes in the extraction of chondroitin sulphate from a range of cartilaginous material.

Marinades and Tenderisers

Enzymatic tenderisation of meat has been around for centuries and there is widespread use of enzymes in the formulation of marinades and tenderising recipes.

Nowadays meat processors use enzymes to tenderise and marinate many types of meat to good effect. A well-designed functional marinade system alters protein structure, increases water binding abilities resulting in a plumper, more tender piece of meat with improved texture and mouth feel, which is more acceptable to consumers. There are 3 different protease products available for this application depending on the process conditions you are working with. The table to the right outlines which products are superior in specific process conditions:

Enzyme	Advantages and disadvantages of available Enzyme
Promod™ 144P 100TU	• The best option if you want basic cost effective tenderising enzyme. • Rapidly acting protease. • Effective on tougher types of meat such as steak. • Difficult to stop reaction due to high inactivation temperature.
Promod™ 184P	• Dispersible in oil and therefore suitable for oil based marinades. • Difficult to stop reaction due to high inactivation temperature although lower than Promod™ 144P.
Promod™ 728P	• Effective in low pH marinades containing vinegar, lemon juice. • Inactivated by mild heat treatment, enzyme totally deactivated at 40°C. • Active under conditions which inhibit the growth of spoilage organisms (low pH and temperature). • However this means the enzyme is still active when the meat is being chilled and therefore marinading time needs to take this into account. • Effective on fish and calamari. • Best choice if meat is frozen already marinated.

Chondroitin Sulphate

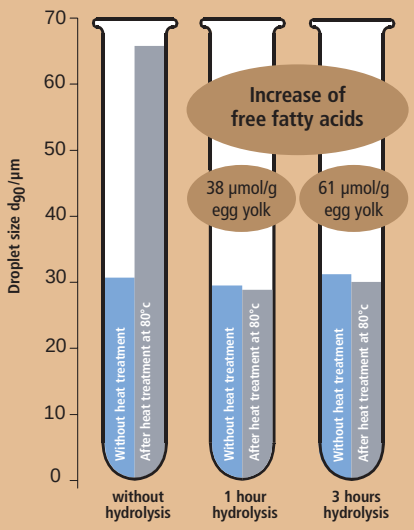
The use of enzymes in the extraction of Chondroitin Sulphate, a food supplement proved by medical research to have a positive effect in the generation of new cartilage in joints, is on the increase. Increasing the amount of chondroitin sulphate extracted from material such as trachea makes the process more cost effective and reduces the amount of waste material to be disposed of. **Promod™ 648L** is extremely effective, means more profit for processors and also reduces the amount of waste material to be disposed of.

Fats and Sugars

And finally, to the top of the pyramid with Fats and Sugars, the least desirable food ingredients in large quantities from a health point of view, but adding much flavour, texture and mouthfeel to a wide range of food products. In this section, the main impact of enzymes is on the use of eggs in food processing.

Enzyme	Advantages and Disadvantages of Available Enzymes
Lipomod™ 699L	• Improve emulsification properties by modifying yolk phospholipids
Lipomod™ 34P	• Improve foaming properties of egg white by removing contaminating yolk lipids
Catalase C641L	• Remove peroxide used to pasteurise egg
Promod™ 194P	• Improve foaming properties of egg white by modifying protein.

Eggs are extremely useful food ingredients and have a variety of functional properties including foaming, gelation, emulsification and texturisation. Eggs provide foaming properties in cakes and meringues, gelation in cakes and quiches; emulsifying components in batters and mayonnaise and improve the texture of baked goods. The main components of egg are proteins and lipids and these are responsible for the functional attributes.



Droplet sizes of model emulsions before and after heat treatment made from hydrolysed and non-hydrolysed egg yolk

Egg yolks have extremely useful emulsifying and gelation properties due to the presence of various lipid and protein types and have been extensively used in recipes for products such as mayonnaise. **Lipomod™ 699L** can be used to improve this functionality, producing enzyme-modified yolk with enhanced emulsification characteristics or to manufacture speciality emulsifiers such as lyso-lecithin giving the benefit of less yolk being required to produce a firmer emulsion. Also the emulsion is more stable and can be heated (e.g. during pasteurisation) without separating out. So the product is functionally better and more cost effective.

Emulsions produced from egg yolk treated with **Lipomod™ 699L** shows better stability after heat treatment. In contrast to the unmodified yolk, the changes in the droplet size in emulsions made with hydrolysed yolk after heating up to 80°C are very small indicating a much better stability of the emulsions. The improved heat stability of the emulsion can be observed after 1 hour although the further increase of free fatty acids indicated that the hydrolysis is not completed.

The main functional property of egg white is its high foaming capacity. Any cross contamination of egg white with egg yolk lipids greatly reduces foaming capacity. In a high throughput egg processing plant, it is impossible to avoid cross contamination. The solution is to remove any egg yolk lipids from the egg white using Biocatalysts **Lipomod™ 34P**. This enzyme breaks down the lipid complexes and ensures the egg white maintains full foaming capacity.

So we can see that at every level of the food pyramid, enzymes have something to offer.

For those not currently using enzymes, the increased benefits can be considerable and for many food processors already using some enzyme products you may not be aware of the breadth of applications that speciality enzymes offer. Detailed above are products from our standard enzyme range but as always, if you have a specific problem that needs solving or an unusual substrate or set of process conditions, we will develop an enzyme solution to meet your needs. If you would like to discuss any of the products discussed in this article or talk to a member of the team about your individual needs, please do not hesitate to contact us at **sales@biocats.com**.

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New sales and marketing structure in preparation for 2010

One of the exciting elements of being part of such a rapidly growing company is planning for the future. In order to continue to achieve our rapid growth targets we have identified 3 key areas that need expanding in order to guarantee we keep the momentum of our current business activity. These changes were mentored by external consultant Jon Thedham of Charter Solutions who has been a long-term advisor to the company on many issues relating to customer service and satisfaction including our annual customer questionnaire.

The first recommendation was the recruitment of a new Sales and Business Development Manager who would take responsibility for the existing sales and marketing team. After a rigorous interview process, Eduardo Beasley joined the Biocatalysts team on 18th April 2006 and is already planning joint visits with his sales team for the coming months.

Ed comments *"I'm looking forward to getting back into a commercial role after the last couple of years in my role in a non-profit association. I hope to help develop the excellent work that has already been achieved in identifying new opportunities for sales growth and turn them into profitable business. As well as this I hope to be able to contribute to the strategic direction of the company in its next phase of growth and be part of an ongoing success story."*

The second change is the move over to sector based sales responsibilities rather than geographical ones. Due to the technical nature of our products, this makes perfect sense. Each member of the sales team will be matched up with the corresponding Sector Expert, a member of our research team that takes responsibility for a particular area. For example Deborah Davies (sales) will be responsible for flavour with Ceri Simpson the sector expert for this area. Not only is their technical knowledge in this area superb but also they are constantly updating themselves with new industry information as it develops. This winning team combination of knowledgeable sales executive with a technical sector expert will provide our customers with an even more cohesive service.

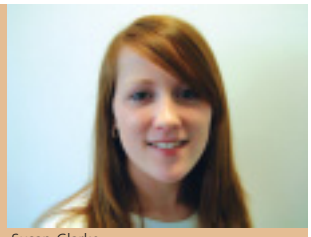
This will have a significant beneficial impact on our global customers. Whereas different sales staff would have looked after different parts of the same company, the same team will now look after one company worldwide. This will enable the team to build up more in depth knowledge and assist out customers even more in problem solving and in providing innovative new product ideas.

And finally, the marketing department will now initially be handling all new sales enquiries coming into the company. This should enable us to respond faster on a more consistent basis to your sales and technical enquiries. We are in the process of recruiting additional staff to the team who we hope to have in place soon.

Eduardo Beasley, new Sales and Business Development Manager

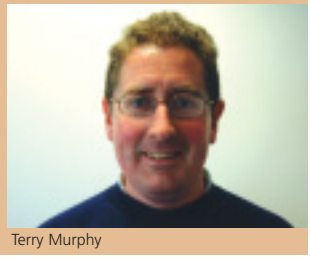
Additional new recruits

Biocatalysts always promise to have a live person answering the phone during our normal working hours. No voice mail, no press 1, press 2 etc; we know that many of you value us having a real person to answer your enquiries. We give you the choice of how you want to communicate with us. To that end we have recruited a new telephone receptionist. Susan Clarke joins the Administration team as Office Assistant working with Theresa Cannon our Office Manager.



Susan Clarke

To our New Product Development team we welcome Terry Murphy who joins the Research Scientist team. Terry will be working on a number of projects to develop new products for customers and will be taking on sector expert responsibilities.



Terry Murphy

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What application is the requested sample for?

CUSTOM TAILORED PRODUCTS:

My special application for enzymes is:

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