

# FEED

AND NUTRITION

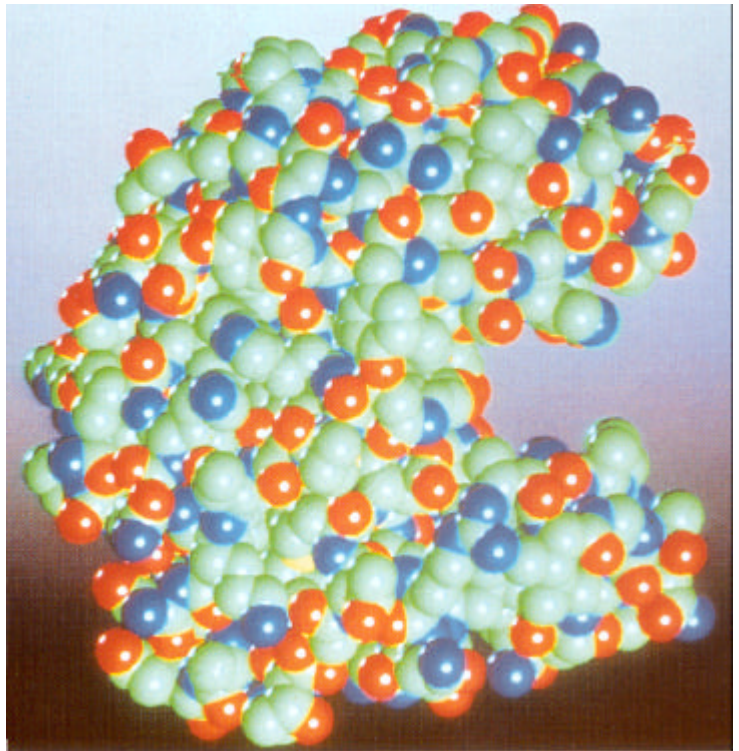
# Trials show benefits of ENZYMES...

REPRINTED FROM PIG FARMING NOVEMBER 1997

**New evidence is confirming early beliefs that the inclusion of enzyme additives in diets will help pigs digest cereal fibre and receive the maximum benefit from their rations.**



Dr Gary Partridge – use of enzymes steeped in history.



# Trials show benefits of

**E**vidence to justify the inclusion of enzyme additives in pig diets is now too strong for even the most hide-bound sceptic to ignore. Various factors have contributed to the value of enzymes in pig nutrition. One is the increasing use of home-grown grain, particularly wheat and its by-products in balanced rations.

Current inclusion rates of 40 to 50 per cent are likely to edge up, following dramatic price reductions of over £20 a tonne over the past six months.

A rough harvest with more wheat destined for the feed, compared with the milling market, will also increase the pressure to use more in pig feeds.

The snag is that pigs, despite being highly efficient omnivores, find it difficult to break down the complex cell structure of wheat grains. This in turn leads to poorer digestibility and depressed performance.

Inefficient breakdown of the fibre in wheat can also produce gut contents with a high water content of wallpaper paste consistency, which inhibits efficient absorption in the small intestine. More undigested feed is then conveyed to the lower gut where its presence can trigger non-specific colitis symptoms.

These can cause death in young grower pigs in severe cases and the syndrome is often aggravated by pelleted diets with a high wheat content.

The use of less digestible vegetable proteins compared with animal protein

ingredients can also cause digestive upsets, particularly in the young weaner pig which is ill-equipped to handle them until its digestive system "grows up."

Harmful anti-nutritive factors in soya bean meal and home-grown legumes can also impair the digestion and absorption of proteins from the diet, resulting in nutritional scours and depressed performance.

But such nutritional constraints and health hazards can now be reduced if not eliminated by the inclusion of specific enzymes in the diet.

Finnfeeds International Ltd of Marlborough, Wilts, markets a specialist range of enzymes for use in pig feed under the Porzyme label.

### Planned use

Dr Gary Partridge, technical services manager, for Porzyme says: "The use of enzymes is steeped in history with widespread use in the brewing, cheese making, textile, leather, paper making and detergent industries. But their accurate and planned use in animal nutrition is a relatively new development."

The first major uptake for livestock was in the early 1990s when broiler chicken producers were tempted to use a higher proportion of cheaper barley in their rations. Resultant problems with damp and sticky litter were cured by the inclusion of Finnfeeds' multi-enzyme Avizyme in the feed.

It helped broilers to digest barley more efficiently, improved feed conversion and growth rate and solved the damp litter problem.

### Breakthrough

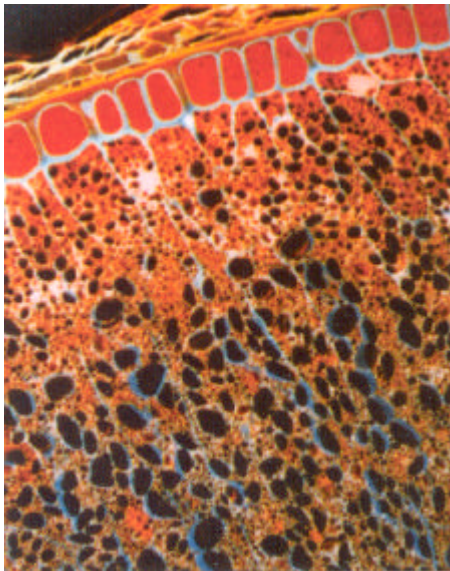
"The result is that some 95 per cent of all UK broiler feeds now include in-feed enzymes to promote efficient digestion. This was a major breakthrough for enzyme application, and growth in the animal feed sector has snowballed ever since."

Dr Partridge explains that enzymes in feeds for livestock is fast becoming a precise science, with a requirement for species specific products to maximise cost efficacy. All enzymes are specific in their action and those used in the company's Porzyme range are dictated by the major cereal constituents in the diet.

Porzyme 8100 is designed for use in barley-based piglet diets; Porzyme 8300 for wheat-based diets and Porzyme tp100 for mixed cereal starter diets. For grower-finishers, Porzyme 9100 is specified for barley-based diets and Porzyme 9300 for those based on wheat.

Specific enzyme products come in granular form on a cereal carrier and the inclusion rate is standard at one kg/tonne of feed. The enzymes used are robust with a 12-monthly shelf life at 22°C and can withstand normal pelleting temperatures.

Dr Partridge explains: "Enzymes are proteins which act as catalysts by speeding



**Above:** Cross section of a wheat grain showing the complex cell structure and outer fibrous layer which is resistant to digestion by the pig.

**Left:** The three-dimensional structure of an endoxylanase molecule which helps the pig digest certain dietary fibres. It cannot secrete the enzyme itself.

# Enzymes

**‘They encourage breakdown of cereal fibre and allow pigs to derive maximum benefit from rations’**

chemical reactions. They are natural and biodegradable products, and those developed by Finnfeeds are designed to aid animal digestion, which can also be likened to a complex chemical process.

“We now know that the pig is unable to digest 15-20 per cent of the food it eats because it does not produce the enzymes needed to digest fibre. Digestion is hindered by the presence of, for example, beta-glucans in barley and arabinoxylans in wheat, and the effects are intensified when both cereals and their by-products are included in pig rations at a high level.”

The potential digestive upsets are magnified in young piglets when they are weaned abruptly and before they have had sufficient time to produce their own range of

digestive enzymes to handle solid cereal and vegetable protein feed ingredients effectively.

### Targeted

“This is where enzymes, targeted specifically to encourage the breakdown of different feed ingredients, and cereal fibre and vegetable protein in particular, can help the pig to derive maximum benefit from the rations provided.”

Dr Partridge cites a wealth of commissioned and independent feed trials data to support the claims made for the Porzyme range of enzyme additives. Trial results at the Meat and Livestock Commission’s Stotfold Pig Development Unit are particularly impressive.

They show Porzyme 8300 improving daily liveweight gain in young pigs by 27 per cent on a diet including 70 per cent wheat and 22 per cent soyabean meal for a 40-day period after weaning. Feed intake and feed conversion rate were both improved by 12 per cent. The starting and finishing weights were 8.0kg and 23.3kg respectively on diets with Porzyme and 8.2kg and 20.2kg for the controls.

### Growth rates

In another Stotfold trial, Porzyme 9300 numerically improved growth rates by four per cent and feed conversion by six per cent in grower-finishers fed pelleted wheat based diets.

Uniformity of final weight was improved by the inclusion of Porzyme, a feature of many similar trials with the product and throughout the trial pigs offered the supplemented diet were visually much

cleaner than those on a control diet. The starting and finishing weights were 33.3kg and 93.9kg respectively on the Porzyme diet and 32.7kg and 92.8kg for controls.

In another study, this time at Harper Adams Agricultural College, Porzyme 9300 was included in sow feed to study the effects over a 25-day suckling period.

Results showed supplemented sows gained 2.2mm of P2 backfat while control diet sows lost 1.8mm.

The response suggested that the sows’ ability to improve body condition on an enzyme supplemented diet could encourage prompt rebreeding and extend total breeding life.

It is conceded more work is needed to confirm the benefits of enzymes in sow diets. Trials evidence from all sources so far indicates a conservative net payback benefit ratio of 2:1 for enzyme inclusion.

### Cumulative benefits for industry:

- Improved feed use and growth
- Reduced variability in raw material feeding value
- Reduced variability in performance
- Opportunities for feed cost savings with no reduction in pig performance
- Reduced digestive problem, when provoked by certain anti-nutrients in the diet.

## COMPOUNDER RECOGNISES ADVANTAGES

Perhaps the best recommendation for Finnfeeds International additives comes from national compounder Dalgety Agriculture Ltd.

Appropriate Porzyme products have been included in piglet creep feeds for the last five years and in most grower feeds, recommended up to 30kg liveweight, for the last two years.

From November they will also be included in the majority of grower-finisher feeds in the Dalgety Optima range of pig feeds.

The proven efficacy of enzyme additives in poultry feeds has encouraged Dalgety to examine the benefit in pig feeds.

### Evidence

Mick Hazzledine, Dalgety’s technical and marketing manager, says: “We now have irrefutable evidence that enzymes improve digestibility and feed conversion efficiency, delivering a net benefit of about £1.50 a tonne.

“We have also seen in a number of trials, that digestive disturbances at the grower stage, mainly non-specific colitis symptoms, are reduced significantly by enzyme inclusion. Such upsets, which can have a serious effect on pig health and performance, seem to be aggravated by including more wheat in the diet.

“Because of GATT, we have been obliged to reduce our raw materials range and are now using more home-grown cereals in pig diets. Cereals and their by-products now comprise some 70 per cent of the total product mix and this alone justifies the inclusion of specific enzymes to improve digestion.”

Recognition that wheat and to a lesser extent barley are variable commodities in terms of nutrient availability to the pig is another reason for including enzyme additives in compounds.

### Balanced package

“Our aim is to present a balanced package of nutrients, including UK cereals, which deliver consistent results, and we now have good data that enzyme additives also help to reduce variations in P2 backfat levels and batch liveweights by the time pigs are ready for slaughter. This in turn means improved abattoir returns for commercial producers.”

An increasingly important benefit from improved feed digestibility is that nitrate and phosphate levels in muck and slurry are also reduced.

Pollution is now a serious issue in countries like Holland, and similar pressure and legislation to reduce environmental pollution could be imposed on UK livestock farmers in the future.