

# How to produce more meat from wheat

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Formulating pig feed in the most cost efficient way is a major contributor to improving on-farm profitability. However, the least cost feed formulation process generally makes simplistic assumptions about the feeding value of various key raw materials, and assumes additivity of nutrients.

The situation will be further confused, or potentially compromised, by feed additives purported to release more energy and/or amino acids from the feed.

Feed formulators therefore have to be well assured that an additive will consistently deliver what it promises in terms of nutrient release, otherwise they could be left making one assumption too many – and animal performance will suffer.

This article highlights some recent advances in our knowledge about the use of xylanase enzymes in pig feed formulation to reduce variability in raw materials, particularly wheat.

Working with a well proven product can give feed formulators both added confidence and much more flexibility to save money in feed, without risk of compromising pig performance.

## Assessing the costs

Wheat is a major component in pig diets with typical inclusion levels around 50% in much of northern Europe, Canada and Australia.

Consequently, its use strongly influences dietary feeding value in these markets.

However, data from global research trials has shown that the digestible energy content of different wheat samples can typically vary by as much as 1.3 MJ/kg and that the resultant variability in performance can cost the pig producer in excess of €1.50 per pig in reduced net margin.

Use of a feed additive that can give more consistency in pig performance will therefore have a high value in feed formulation, and certain xylanase based enzyme products have been independently proven to do just that.

## Making the right choice

Xylanase enzymes were first used in animal feeds in the late 1980s, primarily to help reduce the variable performance and litter quality found in poultry fed wheat-based diets.

Based on subsequent research and commercial experience certain xylanases have also been shown to benefit pig production.

Currently, some 19 products containing xylanase activity either alone, or in combination with other enzyme activities, have approval in the European Union for use in either piglet or grower-finisher pig diets.

Consequently, feed manufacturers, premixers and pig producers are not short of choice when it comes to feed enzymes. The trickier question they face is how to decide which one to choose?

## Learning from the Danes

The July 2009 census figures showed that the total number of pigs in Denmark was 12.4 million. More than 85% of Danish pig production is exported, which makes Denmark the world's largest exporter of pig meat and a very important global player.

**Table 1. Xylanases tested by Danish Pig Production for use in grower-finisher pig feeds ([www.danishpigproduction.dk](http://www.danishpigproduction.dk)).**

Year	Trial report	Product	Production value index*
1998	No. 403 (Pelleted feed)	Porzyme 9300	107
2002	No. 558 (Pelleted feed)	Porzyme 9300	106
2002	No. 558 (Mash feed)	Porzyme 9300	109
2008	No. 826 (Pelleted feed)	Bergazym P	100
2009	No. 848 (Pelleted feed)	Ronozyme WX	102

\*Gross margins per pen place per year based on the same feed price and an average five year pig price (excludes xylanase cost). All data expressed relative to the corresponding control diet (100).



Denmark fully supports the difficult decisions Danish pig producers have to make on feed additives by providing an independent testing service via its organisation 'Danish Pig Production'.

This service evaluates many feed additives to ensure that pig producers get value for money when using various products.

Results of these feeding tests are published and include a production value index, giving feed and pig producers a benchmark tool for impartially evaluating feed additives.

The results for xylanases tested for use in grower-finisher pig feeds, and published so far by Danish Pig Production, are summarised in Table 1.

Danisco's product Porzyme 9300 was tested on two occasions, and in three separate feed formulations,

and on every occasion gave a production value index 6-9% above the corresponding control feed.

At today's prices, after allowing for the cost of Porzyme, each trial gave a net benefit in production costs of more than 6%.

## Using the right tools

Trials by Danisco have shown that the optimum economic response to xylanase in pigs is dependent upon a detailed understanding of certain key characteristics of wheat that determine the magnitude of enzyme response.

In 20 performance studies, 142 wheat samples from across Europe, Canada and Australia were analysed for 20 different parameters.

Diets were then formulated with varying levels of enzyme addition and fed to either piglets or grower/finisher pigs.

The results showed that certain fibre fractions are the key factors in the grain that determine the magnitude of the enzyme response.

This advanced knowledge forms the basis of a unique software program (Porcheck) developed by Danisco to determine the most cost effective dose of Porzyme xylanase for specific diet formulations.

The software enables the feed formulator to tailor the dose of

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Porzyme xylanase in the feed according to information gathered during the preparation of a country specific harvest report.

Knowledge of optimum dose rate, linked to an energy improvement 'matrix number' generated by the software, allows the feed formulator to maximise the value from xylanase addition.

### Added benefits

The main reason for using enzymes in the feed is to improve the nutritive value of major feedstuffs, leading to more consistent pig performance at the same time as capturing feed cost savings.

However, there are other benefits from enzyme use that can 'add value' in commercial pig production systems. Under EU regulations for environmental and salmonella control these benefits can help to avoid the cost of some potential penalties in pig production.

In a trial carried out by Danish Pig Production it was shown that the use of a xylanase improved the utilisation of protein in grower/finisher pigs (Fig. 1).

This has a positive impact on the environment, as less nitrogen is excreted. Furthermore, improvements in nutrient digestibility as a

	Pelleted feed (with fine ground wheat)		Mash feed (with coarse ground wheat)		P value for xylanase <sup>*</sup> effect
	Control	+ xylanase <sup>*</sup>	Control	+ xylanase <sup>*</sup>	
Daily gain (g/d)	882	901	828	839	0.08
Daily feed intake (kg/d)	2.34	2.33	2.52	2.48	0.36
Feed:gain	2.65	2.59	3.04	2.96	<0.05
Production value, DKK <sup>1</sup>	655	695	431	469	–
Index	100	106	66	72	0.05
Salmonella positive pigs (%)	30.6	24.1	17.6	13.0	0.27

<sup>\*</sup>Porzyme 9300, Danisco Animal Nutrition <sup>1</sup>Gross margins per pen place per year based on the same feed price and an average five year pig price (excludes xylanase cost)

**Table 2 Effects of xylanase on pig performance (32-100kg), production economics and incidence of salmonella positive pigs, on a salmonella challenged pig unit, Report 558 ([www.danishpigproduction.dk](http://www.danishpigproduction.dk)).**

result of enzyme addition to the feed lead to reductions in the amount of substrate available to fuel the growth of undesirable bacteria in the hindgut, including salmonella.

Trials conducted by Danish Pig Production with wheat based diets on a salmonella challenged pig unit highlight the benefits of using a xylanase feed enzyme, in this case Porzyme 9300, not only in terms of the proven effects for feed efficiency but also for its potential to contribute to food safety.

Adding the feed enzyme numerically reduced the proportion of pigs testing salmonella positive by up to 26% (Table 2).

The consistent success of Porzyme xylanase in Danish Pig Production trials was the basis for DLG, Denmark's largest feed compounder, to introduce it routinely into their pig feed.

Jesper Pagh, chief nutritionist at DLG, had the following comment to make.

"Porzyme has a well proven track record following extensive independent testing in Denmark and subsequent studies have confirmed to us that making the correct enzyme choice is absolutely crucial to maximise the value of enzyme addition for both DLG and our customers."

**Fig. 1. Total protein consumption (g)/kg lean meat gain in grower/finisher pigs from 30-97kg (Danish Pig Production Trial Report No. 403).**

