Topical nutrition issues addressed

Recently Alltech held their 23rd International Feed Industry Symposium in Lexington, Kentucky, USA and well over 1,500 delegates from 78 countries attended.

Various papers were presented in the pig sessions and the key points from these are summarised in this article.

In an interesting and thought provoking presentation Francois Madec of the French Food Safety Agency asked the question why did PMWS arise?

She cited five hypotheses which she felt were not mutually exclusive. These were:

- The porcine circovirus type 2 (PCV2) changed so that PMWS was, in fact, induced by a new specific strain.
- The PCV2 did not change but there is another, yet to be identified, agent involved.
- The pigs are exposed to something new of a non-infectious nature that facilitates or triggers off PCV2 replication and/or modifies the virus environment within target cells. This factor is spread by international trade and could be something like a feed ingredient or a vaccine.
- Management practice(s) that result in less colostrum intake and overstocking that have modified the route(s) of PCV2 spread. For example, semen as a 'new' route for spread.
- The genetic background of the pigs has changed through reduced variability through targeted breeding programmes and increased susceptibility of certain lines.

J. E. Pettigrew of the University of Illinois, USA then considered whether dietary fibre changes resistance to enteric disease. This interest arose because there is a popular belief in the US industry that distillers dried grains with solubles (DDGS) in the diet helps to protect pigs against the enteric disease ileitis.

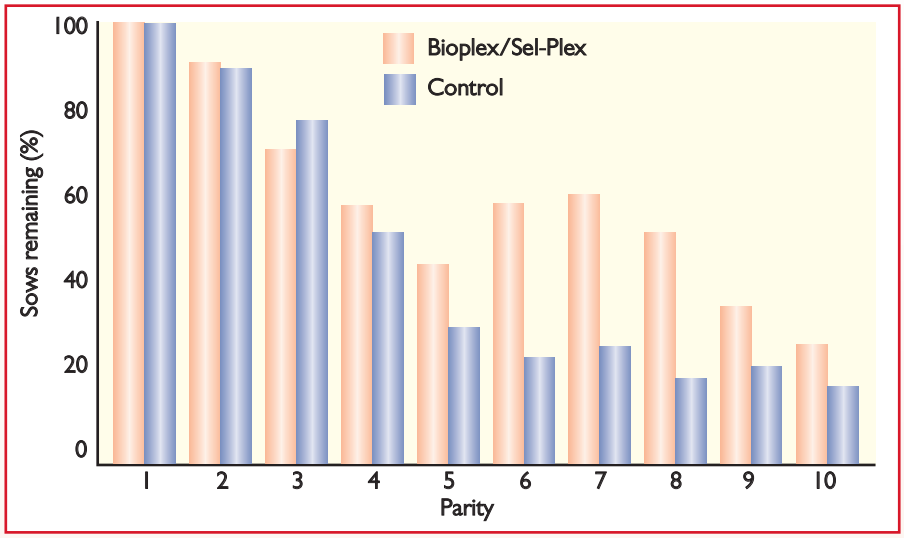

Fig. 1. Effect of an organic trace mineral supplement on sow longevity (from Fehse and Close, 2000).

It was felt that any conclusions about fibre must be made carefully as cereals vary in characteristics other than those associated with their fibre content.

Research done in Illinois favours rice which is very low in fibre and this is consistent with recent Australian results.

C. F. M. de Lange and colleagues from the University of Guelph in Canada then considered the effective application of enzymes and microbes to enhance the nutritional value of pig feed ingredients and considered whether there was a case for liquid feeding.

They concluded that based on growth performance of high health status pigs, there is no apparent benefit of liquid feeding to growing-finishing pigs that are fed conventional corn and soyabean diets. This is in contrast to European findings where diets are more wheat and barley orientated.

Liquid feeding allows for an effective use of water soluble products such as condensed whey and corn distillers solubles but when these are used at less than 15% of diet dry matter content their use does not result in major changes in pig growth and carcase quality.

When steeping high moisture corn and corn steep water with phytase, 85% or more of phytate phosphorus is quickly released indicating that the application of phytase in liquid feeding systems can be more effective than in conventional dry feeding systems.

Darryl D'Souza from Alltech Biotechnology in Australia then shared experiences on the issue of bridging the post-weaning piglet growth gap by using NuPro in the Asia Pacific region.

NuPro supplementation in sow lactation and piglet creep and weaner diets has been shown to be a viable option to enhance the growth performance of the pig post weaning by reducing the growth gap.

In a commercial evaluation in Western Australia it was shown that slow growing

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Table 1. The effects of dietary copper on growth performance.

	Copper sulphate	Bioplex	Copper sulphate
Dietary copper (ppm)	**20**	**100**	**220**
Start weight (kg)	28.0	27.9	27.5
Final weight (kg)	88.7	91.7	90.7
ADG (kg)	0.726	0.766	0.731
FCR	2.5	2.43	2.44
ADFI (kg)	1.820	1.855	1.779
Carcase weight (kg)	64.3	68.8	67.7
P2 fat thickness (mm)	9.6	9.7	9.6
Dressing percentage	74.5	75.1	74.8

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piglets fed NuPro in their creep and weaner diets had significantly improved growth rates. The ultimate weight variation was reduced from almost 20% to 15% thereby increasing the number of pigs that could eventually be sold in the top grade.

Then Darryl's colleague Paul Groenewegen from Alltech Canada reviewed the nutritional factors associated with the delivery of adequate nutrients to meet the ever increasing nutritional demands of modern genotypes especially in relation to nutritional supplementation.

Studies in 2000 by Fehse and Close (see Fig. 1) were some of the first to show that increasing trace mineral supplementation had a beneficial impact on reproductive performance and sow longevity.

Research has shown that increasing the trace mineral levels in hyperprolific sows with inorganic minerals results in reduced reproductive performance but supplying these trace minerals in an organic form as BioPlex and Sel-Plex resulted in enhanced performance.

In addition, the application of novel feed ingredients that can modulate the immune system to allow the sow to produce improved colostrum, thus improving passive immunity to the piglets is an area that needs further consideration in commercial production.

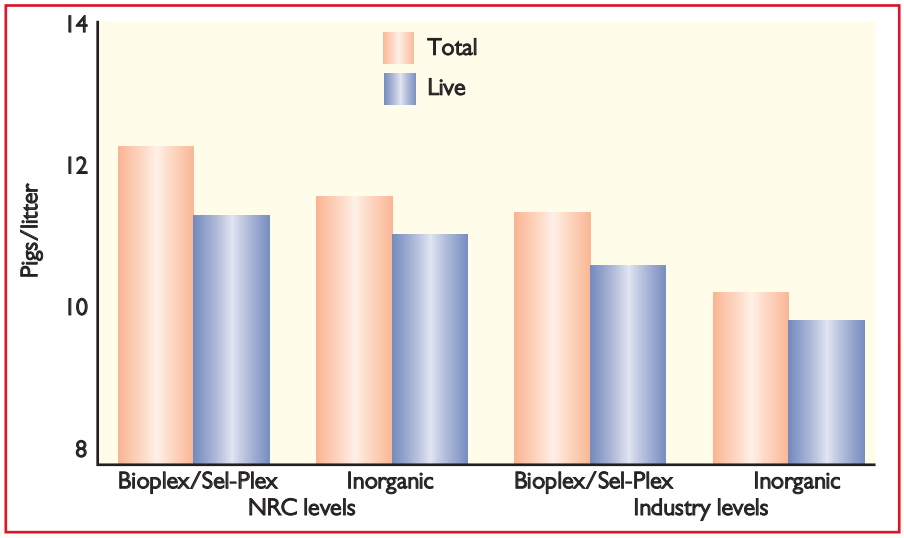

Fig. 2. Reproductive performance of sows over two parities provided either inorganic or organic trace minerals at levels recommended by NRC (1998) or by industry (Peters and Mahan, 2004, referenced by Mahan, 2005).

Copper level/source	Faecal copper content (ppm) Males	Females
Basal diet	159	187
Basal diet + 160ppm copper sulphate	373	372
Basal diet + 50ppm Bioplex copper	198	200

Table 2. Faecal copper content of growing pigs fed different sources and levels of copper.

Dave Henman of QAF Meat Industries in Australia considered the production of pigs in the face of ever increasing environmental constraints. His presentation is, in effect, summarised in Tables 1 and 2. Note, in Table 1, how giving over 50% less copper in an organic form results in better performance than inorganic copper sulphate supplementation.

Continuing on the mineral theme, Don Mahan of Ohio State University, USA then considered the best way to meet the mineral needs of highly prolific sows.

Studies at Ohio State University have shown that the use of organic trace minerals increase litter size when compared to their inorganic counterparts although which minerals, in addition to selenium, has yet to be fully elucidated.

Their results indicate that sows of high productivity may be unable to meet the trace mineral needs of a three week lactation period and that this probably warrants further work.

J. J. Matte of Agriculture and Agri-Food Canada then addressed the issue of selenium metabolism of sows. In a recent study he had shown that the improved selenium status of the sow via supplementation with organic selenium (0.3ppm selenium as Sel-Plex) has important consequences for embryos.

In early gestation selenium transfer from the dam increased by up to 60% and embryonic development increased by 10% compared to sows with no selenium supplementation or sows which had been supplemented with inorganic selenium. It was also felt that the critical role of vitamin B12 needed further consideration.

Bruce Mullan from the Department of Agriculture and Food in Western Australia addressed the subject of defining the organic mineral requirements for pigs.

Recent studies (Fig. 2) showed the benefits of using organic minerals. Bruce suggests that when additional trace minerals are added to the diet at 'insurance levels' they may, in fact, contribute to the accumulation of free radicals which can result in a decline in performance when the animal is placed under stress. More is needed to be known about the requirements of modern genotypes for minerals.

J. S. Radcliffe and colleagues from Perdue University, USA spoke on understanding organic mineral uptake. Based on their research findings they hypothesised that copper bound as a proteinate might be absorbed through the di- and tri-peptide transporter, PepT1.

When they blocked PepT1 there was reduced absorption of copper from BioPlex but not from copper sulphate. It therefore appears that organic copper in the form of BioPlex Cu proteinate can dissociate and be adsorbed by passive diffusion, active transport or can be adsorbed while still attached to the di- or tri-peptide through the PedT1 transporter.

Although the physiological significance is not clear, it may well explain differences observed in the bioavailability of copper from these two sources.

Finally, in a change of topic Trevor K. Smith and a colleague from the University of Guelph in Canada addressed the subject of foodborne fusarial mycotoxins and their effects on the metabolism and reproductive performance in gestating and lactating sows.

In particular, they looked at the efficacy of Mycosorb in the prevention of these effects and their findings are summarised in Table 3. ■

Table 3. Countering the effects of fusarial mycotoxins in gestating gilts with Mycosorb.

	Control	Contaminated grain	Contaminated grain + 0.2% Mycosorb
ADFI (kg/day)	2.41	2.12	2.15
ADG (kg/day)	1.14	0.62	0.80
G:F	0.37	0.19	0.37
Stillbirths (%)	6.27	15.52	4.60
Born alive (%)	90.5	80.8	95.4