Poultry News

SPRING 2019

from the team at AgriHealth

ISSUE 1

This issue marks the first of a series of AgriHealth Newsletters intended to inform you of recent technical information from our suppliers and in the literature, and also information from recent events in and around New Zealand that you may find helpful. The aim of the AgriHealth Newsletter series is to provide information to help you do what you do. In turn, we hope this information is used to help our animal production industries to improve and evolve to ensure we remain profitable, competitive and continue to meet market demands.

We hope that our AgriHealth Newsletter will provoke thought but we're also keen to hear from you on what subjects you would like to see more information. To provide suggestions for upcoming newsletters, or to request a copy of any of the information referred to below, please get in in touch with the AgriHealth Monogastric team.

poultrynews@agrihealth.co.nz

Nick Rodgers
Technical Manager - Monogastric
nick@agrihealth.co.nz
+61 419 040 906

Paul Dwyer
Key Account Sales
paul@agrihealth.co.nz
021 821 470

Ed Catherwood
Managing Director
ed@agrihealth.co.nz
021 821 421

Lyndsay Lawrence
Technical and Marketing Manager
lyndsay@agrihealth.co.nz
021 0258 4258

for further information on any article in the newsletter, please email, or contact Nick or Paul

we welcome your suggestions for upcoming newsletters

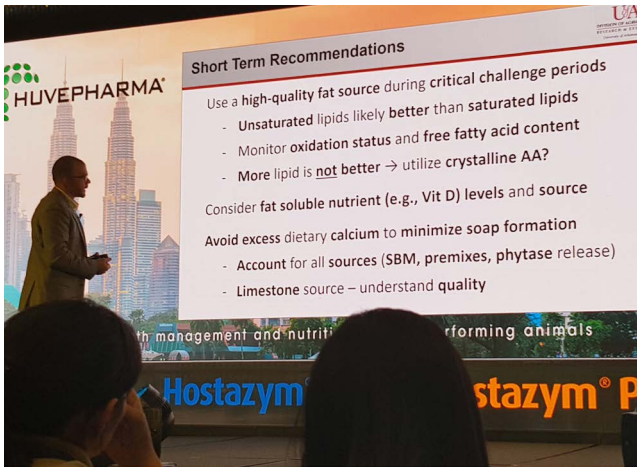
Read on for the latest news and updates!

In this issue

Local and Regional Events

Huvepharma International Seminar on Animal Nutrition, Kuala Lumpur

This year's theme for Huvepharma's International Seminar on Animal Nutrition, held at the Grand Hyatt in Kuala Lumpur was "Nutrition and Gut Health Management of High Performing Animals", delivered across nine presentations by speakers from Europe and the US. More than 140 delegates from across the Asia Pacific region attended the Seminar held over 4th and 5th July.



On Wednesday afternoon, **Alain Kanora**, DVM, Huvepharma Director International Distributor Sales, welcomed delegates and presented a brief overview of Huvepharma's core competencies and how this has contributed to the company's impressive global and Asia Pacific presence in the animal nutrition and gut health sectors.

Dr. Theo Niewold, KU Leuven, Belgium, discussed **what "gut health" means, why it is important in production animals** and how to measure and manage it, taking the audience through some emerging, non-invasive methods to allow rapid and objective assessments. Dr. Niewold explained that what we are really looking for when assessing gut health is inflammation, as this is the gut associated immune system's response to a challenge and has the largest impact on animal performance. During an immune system challenge, 70% of the resources used in mounting the response is associated with the mucosal immune system, and only 30% is used by the systemic immune system. The inflammatory response can reduce growth by between 10 and 30% depending on the level of response generated to combat a challenge, and is associated with lowering of appetite, muscle catabolism, disease associated pathology, pathogens and lowering abdominal fat. Metabolic inflammation can be exacerbated by high dietary energy and glycaemic index and by some immunogenic feed components. Some oral antibiotics have been shown to be anti-inflammatory and exert their effects on immune cells and enterocytes alike. Although aspirin and ibuprofen have been shown to exert similar effects, their use in production animal nutrition is likely to be limited in the future.

A few dietary functional carbohydrates such as resistant starch and arabinoxylan oligosaccharides (prebiotics) and polyphenols show promise in this arena, however high functional dose and cost may limit their acceptability in least-cost formulations. Probiotics can either be pro- or anti-inflammatory based on the metabolites and peptides they produce. Some lactobacillus products can induce inflammation, whereas butyrate producers (such as Miya Gold) have been shown to be anti-inflammatory. Similarly, butyrate delivered to the lower intestine is the most potent anti-inflammatory organic acid, though consideration must be given to organic acid supplementation so as not to increase dietary energy levels excessively.

Novel biomarkers for gut inflammation have been studies by Dr. Niewold's group and others and some show promise for commercial use in the near future to assess the efficacy of gut health strategies or additives in use. Myeloperoxidase can be used as a biomarker in swine, whereas neopterin may be viable in poultry if a specific assay can be developed.

Dr. Sam Rochell from the University of Arkansas, USA, discussed **nutrition and health interactions during coccidiosis challenges and vaccination** in broilers. He stated that more than 50% of US grown broilers are vaccinated for coccidiosis each year. Coccidiosis and coccidiosis vaccination stimulate an immune response and as such can reduce feed intake and increase feed conversion ratio. Recent work has shown that increasing dietary digestible amino acid density increased performance and breast yield under coccidiosis challenge.

Other work has shown that energy digestibility can be reduced by up to 35% during a coccidiosis challenge, and much of this is through to be due to impaired lipid digestibility. This is exacerbated when a higher proportion of dietary energy is derived from lipids (and especially saturated fatty acids), usually later in the broiler production cycle. This mechanism also reduces the uptake if fat-soluble compounds such as fat-soluble vitamins and xanthophylls.

Recent work has shown that high dietary calcium concentration can predispose broilers to necrotic enteritis. Coccidiosis challenge reduces the fat-soluble vitamin D3 uptake from the intestine, thereby reducing plasma 25(OH)D3 and thus reduces Ca absorption predisposing broilers under coccidiosis challenge to necrotic enteritis, and promotes the formation of Ca-fat soaps in the lower small intestine and steatorrhea, where the use of betaine may help.

Key recommendations for the industry and broiler nutritionists in particular were that during peak coccidiosis challenge periods: consider amino acid balance and density, use good quality highly unsaturated fats, don't rely too much on fat for energy, limit excess calcium and consider the concentrations of other fat-soluble dietary components, especially vitamin D3 and D3 metabolites.

Wouter van Der Veken, Huvepharma Global Product Manager Probiotics spoke about the impact that poor gut health can have on performance and the **role that probiotics can play in maintaining and promoting gut health**. Probiotics are known to exert their beneficial effects in eight different ways (competition with pathogens for nutrients, bioconversion of substrates for animal absorption, production of substrates for growth of other beneficial microflora, production of antimicrobial organic acids and/or peptides, competitive exclusion of pathogens for binding sites on enterocyte surfaces, improvement of gut barrier function, inflammation reduction, stimulation of innate immune function) and no probiotic is known to exhibit all eight modes of action effectively.

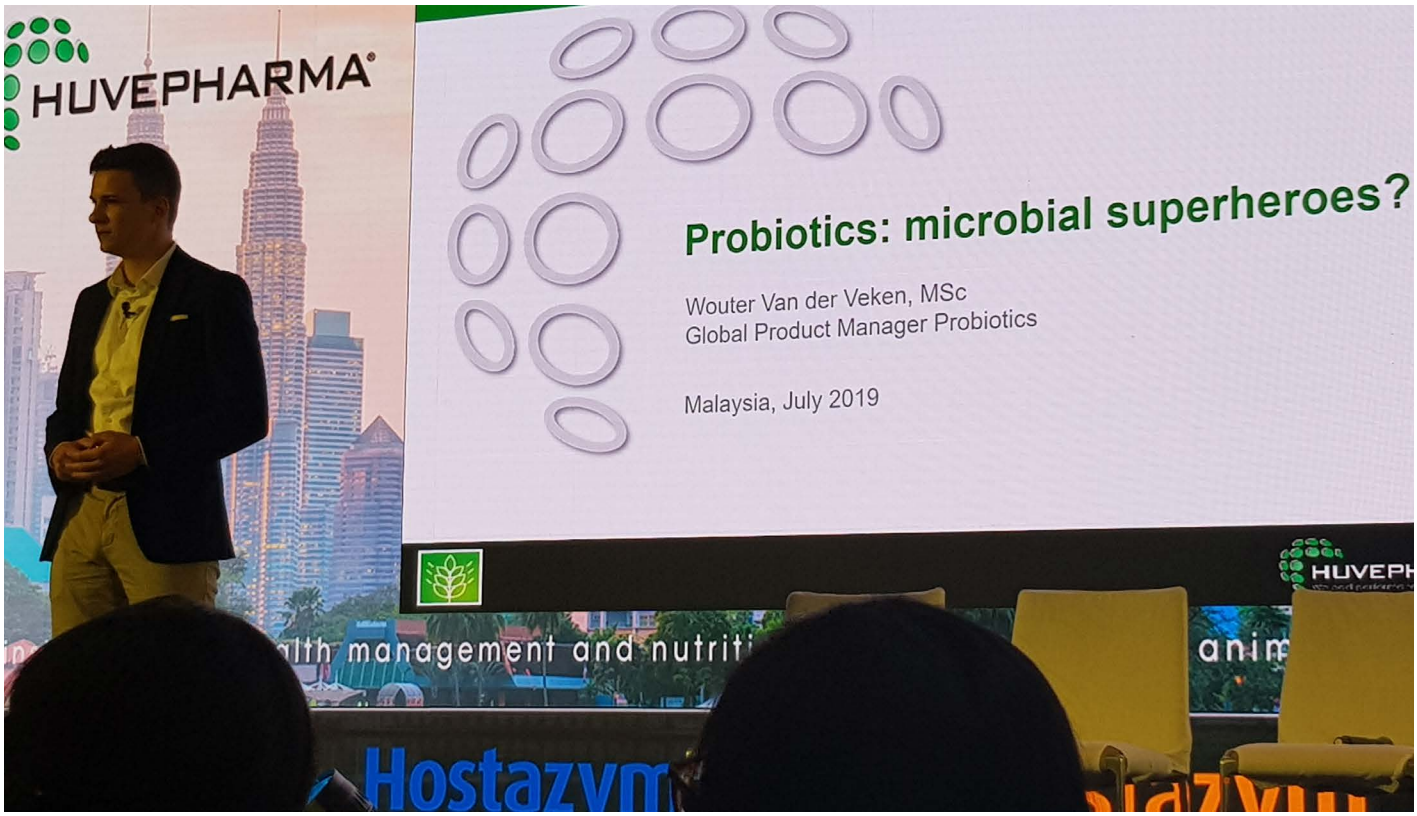
Attributes of probiotics for use in animal feed should be based on the desired roll of the product (disease prevention, gut health maintenance, seeding the gut at hatch/birth, etc.), the species in which it will be used and the corresponding conditions in the target part of the gut, and how it will be used (feed, water, intermittently, full time, one-off dose). Spore forming bacteria are stable in storage and through feed processing, however are able to germinate quick when ingested and are easily miscible in drinking water. Probiotics that are able to be used in combination with other products are desirable, as it is widely recognised that probiotics are a valuable part of a gut health strategy rather than a gut health silver bullet. It is also important to ensure that there are sufficient data to support the claims associated with each product in the

species and situation of concern. B-Act and Top Gut/Miya Gold products were reviewed for poultry and swine applications. The spore form and compatibility with other feed additives and ability to exert their effects under a wide range of animal gut temperature and chemical conditions that each product possesses make them ideal candidates for consideration for use in pelleted feeds and in poultry and swine. Mr. van Der Veken discussed research showing the beneficial effect of B-Act supplementation in necrotic enteritis and leg health (BCO) challenge models in broilers, and the benefits of using Miya Gold in swine and in piglets in particular.

Dr. Robert Hoste, from Wageningen University, Netherlands, joined the Seminar via video link from China, and spoke about **worldwide competition** in **pig meat production: trends and developments**. He stated that although swine production methods and efficiency varies greatly across the world, performance continues to improve (finishing pig FCR has reduced by 30% in the last 60 years). Profitability however, is most highly dependent on technical and management competence, labour efficiency, genetics and housing. Health status has increased and use of therapeutic antibiotics has reduced over the last 20 years, however African swine fever is of acute concern globally.

He estimates that ASF has caused a 20-30% reduction in pig meat availability in China to date. Piglet prices have risen by 130% and pig meat is expected to increase in price by 70%. The international pig meat trade is 8 million t/annum, and Chinese domestic consumption is 15 million t/annum, and soon there may not be enough traded pig meat to meet Chinese demand alone.

On Thursday morning, **Dr. Knud Bach Knudsen**, Aarhus University, Denmark, gave a presentation on **the role of fibre in animal nutrition and intestinal health**. He provided a comprehensive definition of what fibre is and the different fractions with the fibre classification. He explained that the chemical effects of fibres in the gut are microbially dependant as there is no direct hydrolysis of fibre by the animal, and that some specific fibres (carbohydrate fractions) can act as very effective prebiotics for specific purposes such as inulin and fructans to reduce the impact of *Brachyspira* infections in swine.



As mentioned previously, resistant starch may act as a prebiotic, however Dr. Bach Knudsen highlighted that the concentration of this substance in the diet must be in the order of 10-15% before it exerts significant prebiotic benefits in the gut. Use of Non strarch polysaccharide degrading enzymes such as Hostazym X may be used to convert non-prebiotic fibre fractions into prebiotic fractions such as arabinoxylan oligosaccharides (AXOS), which in turn are fermented by specific bacteria in the lower intestine or caecum to produce butyrate. Butyrate production is higher when diets containing AXOS are fed compared with diets containing resistant starch.

Dr. Markus Rodehutscord from Hohenheim University, Denmark spoke about **phytate degradation in pigs and poultry**. He reviewed the different forms of phytate in feed raw materials and also the different phytases. 3-phytase is derived from fungi, 6-phytase is derived from bacteria, and 4-phytase is derived from plants. In the absence of added phytase (in any form), and where diets are deficient in phosphorus, there is a marked difference in the ability of poultry and pigs to degrade phytate in a diet. The range of phytate degradation under these conditions in poultry is 60-80%, but much lower (8-40%) in swine. Most of the phytase activity under these dietary conditions is due to brush border phytase activity, though some microbial phytase activity does occur. The inherent ability of the animal to degrade phytase is reduced with increasing calcium supplementation and even more so with added phosphorus and exogenous phytase. As calcium supplementation increases, phytase activity (of all origins) decreases. He also stated that amino acid digestibility improvements from phytase were modest, regardless of the product, and roughly equivalent to that of a commercial feed protease.

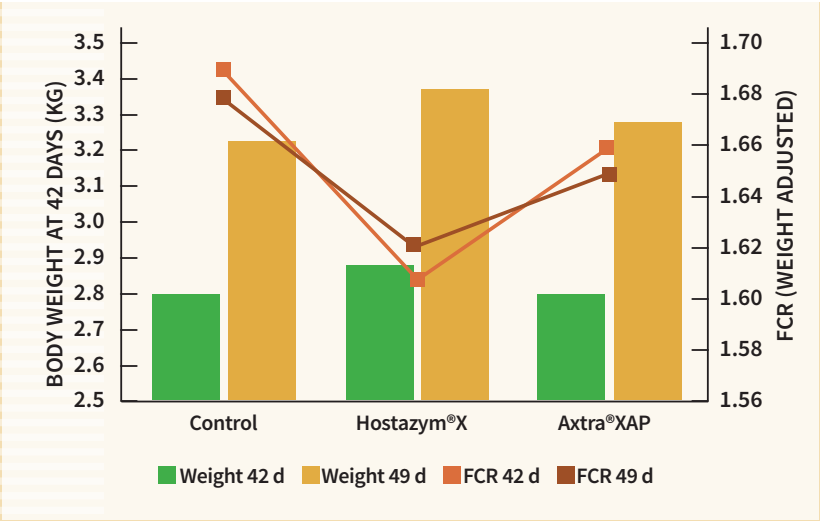
Dr. Lode Nollet, Huvepharma Global Product Manager Enzymes, presented on **enzymes for performance and economic return**. Dr. Nollet gave a compelling talk on the modes of action for Hostazym X and Optiphos and demonstrated that producers could achieve significant economic returns in poultry and swine diets compared to diets with no enzyme added. It was demonstrated that both products have significant advantages over other products on the market to ensure that they are fit for purpose, are capable of ensuring consistent feed performance and corresponding response in the animal to which they are provided.

Dr. Veerle Hautekiet, Huvepharma Global Marketing Director reviewed the **benefits of vitamin D and its metabolites in animal nutrition** in her talk, 360° view on vitamin D benefits. Dr. Hautekiet covered the many functions of vitamins D and how it is produced and metabolised in the body to become active. The roles of the different metabolites and the differences between Bio D and other products on the market were discussed. The improved potency of Bio D per molecule of $25(OH)D_3$ over the synthetic form was demonstrated, and the comparison of Bio D and vitamin D3 was also made, where use of Bio D in combination with vitamin D_3 (1000 IU vit D from Bio D + 1000 IU vit D from vit D_3) at only 25% of the dose of D_3 alone (8000 IU vit D from vit D_3) was needed to achieve the same plasma $25(OH)D_3$ concentration. The dangers of using some other commercially available products such as $1\alpha(OH)D_3$ and $1,25(OH)_2D_3$ were also covered before recommendations on the use of Bio D were provided. When an animal has no access to sunlight, has impaired fat digestibility, or high demand for calcium absorption and resorption, Bio D is recommended. This corresponds to early life (1-14 d) and during cocci challenge periods in broilers, and from 6-12 weeks of rear and from onset of lay in laying/breeder hens. It is recommended that a minimum of 50% of the vitamin D requirement is met using Bio D (34.8 mg/t is equivalent to 2788 IU vitamin D).

Huvepharma Technical Updates

NSP enzymes:

Recent work conducted by Texas A&M University (USA) demonstrated that Hostazym X outperforms (P<0.05) Axtra XAP on live performance (below) and carcase yield. Without giblets yield when fed a diet supplemented with Hostazym X was 0.6% higher and breast meat yield was 1.0% higher than when birds received a diet supplemented with Axtra XAP.



Direct fed microbials:

Over three broiler necrotic enteritis challenge trials conducted at Southern Poultry Research (USA), challenged birds receiving B-Act (at 500 g/t) maintained performance and mortality equivalent to a challenged bacitracin (BMD) control.

Effect of B-Act or BMD alone or in combination on 28-day performance of broiler chickens challenged with *Clostridium perfringens*.

Treatment	Weight gain Day 0-28	Feed conversion Day 0-28	%NE Mortality
Positive control	0.946 a	1.601 d	0.0 c
Negative control	0.709 e	2.087 a	16.7 a
BMD® 50 g/t, CP	0.839 bc	1.696 c	0.0 c
B-Act 0.5 500g/T, CP	0.838 bc	1.728 bc	2.1 bc
B-Act 1.0 500g/T, CP	0.875 bc	1.669 c	2.1 bc
B-Act 1.0 500g/T, + BMD® 25 g/t, CP	0.879 b	1.677 c	0.0 c
B-Act 1.0 500g/T, + BMD® 50 g/t, CP	0.973 a	1.597 d	0.0 c

Peer reviewed work of interest

Poultry

A question put to us by some of our customers is why Huvepharma doesn't include a sodium value in the Optiphos nutrient matrix, as many other manufacturers do? Work conducted at Massey University in conjunction with the University of Sydney in 2008 (Ravindran et al., 2008) tested the effect of dietary electrolyte balance (DEB) on the efficacy of phytase and digestibility of nutrients, and in particular amino acids. The work suggested that at a DEB of 184 mEq/kg was sufficient to allow a good response to phytase but reduced amino acid digestibility without phytase, whereas higher DEB values (below 374 mEq) allowed better intrinsic nutrient digestibility without phytase. Phytase did not affect litter quality within each DEB tested. Attribution of a Na value a phytase would serve to reduce the DEB value and thus negatively impact intrinsic nutrient digestibility, without no measurable effect on litter quality. Results of this paper and others (such as Goodgame et al., 2011a and Goodgame et al., 2011b) suggest that there is no evidence to suggest that a Na value should be attributed to phytase.

Swine

Across the food producing animal industries, there has been a steady focus on minimisation of antimicrobial use from within and outside of these industries. A recent review of young pig gut health by Pluske et al. (2017) focussed on the importance of other management factors that influence gut health outcomes when transitioning from milk to feed. The authors provide some direction on what "gut health" means in animals with reference to the piglet, provide practical guidelines for management of young pig gut health and summarise that indices of good gut health could include: 1) effective digestion and absorption of food (and excretion of wastes), 2) a functional and protective gut barrier, 3) a stable and appropriate microbial population, 4) effective functioning of the gut immune system, 5) minimal activation/stimulation of stress/neural pathways, and 6) the absence of disease(s). Further understanding what "gut health" is and how it can be monitored may allow improvements in mitigating factors which may denigrate gut health and reduce reliance on veterinary interventions to manage enteric disease.

References:

Goodgame, S. D., Mussini, F. J., Lu, C., Bradley, C. D. and Waldroup, P. W. (2011a) Effect of phytase on the sodium requirement of starting broilers 1. Sodium bicarbonate as primary sodium source *International Journal of Poultry Science* 10:251-258

Goodgame, S. D., Mussini, F. J., Lu, C., Bradley, C. D., Comert, N. and Waldroup, P. W. (2011b) Effect of phytase on the sodium requirement of starting broilers 2. Sodium chloride as sodium source *International Journal of Poultry Science* 10:766-773

Pluske, J. R., Turpin, D. L., and Kim J.-C. (2017) Gastrointestinal tract (gut) health in the young pig *Animal Nutrition* in press, https://doi.org/10.1016/j.aninu.2017.12.004

Ravindran, V., Cowieson, A. J., and Selle, P. H. (2008) Influence of dietary electrolyte balance and microbial phytase on growth performance, nutrient utilization, and excreta quality of broiler chickens *Poultry Science* 87:677-688.