# News from Alltech's 28th Annual International Symposium



International Hatchery Practice recently attended Alltech's 28th International Symposium in Kentucky, USA. Here are just some of the items of interest to breeders and hatcheries.

## The 37 + test for mycotoxins

#### by Dr Alex Yiannikouris, Global Mycosorb and Analytical Research Director, Alltech.

Mycotoxins represent an unavoidable feed safety risk stemming from fungi associated with spoilage and environmental influences that can result in unpredictable contamination patterns. To achieve adequate protection from mycotoxin contamination their accurate determination is necessary, ie, a selective 'surveillance radar'.

The principal challenge to developing analytical procedures has been mycotoxin diversity; about 500 molecular structures have been identified to date, each exhibiting differences in toxicity. Moreover, the multiplicity of feed matrices inherently complicates toxin extractability. Analytical tools that allow a more holistic approach are needed to understand multiple mycotoxin contamination patterns and which take into account the diversity of feed materials used in animal feeding strategies.

Alltech's 37+ program initiative involves a novel methodology to investigate mycotoxin contamination patterns using ultra performance liquid chromatography coupled with tandem mass spectrometry (UPLC-MS/ MS). This approach is a breakthrough compared with existing commercial methods that have narrow windows of mycotoxin targets. The methodology is able to identify multiple mycotoxins simultaneously and in a variety of feed matrices.

Of course, the dynamic range of activity for each toxin in feed varies significantly. Thus, mycotoxin levels must be evaluated within the context of practical concentrations that can adversely affect animal performance and/or health. Accurate toxin identification and quantification can aid in generating correlations with animal production and overall health effects. Adsorption (binding) of mycotoxins before entry to an animal's circulatory system represents the major practical, effective technique to combat mycotoxin contamination.

Mycosorb is an organic mycotoxin adsorbent processed from carefully selected strains of Saccharomyces cerevisiae and cell wall extraction. It selectively binds several groups of mycotoxins allowing them to pass through the digestive tract without negative effects on animals or carry over to edible animal products.

Mycosorb has been the subject of numerous studies worldwide over the past two decades. The advances of the 37+ method for mycotoxin identification, along with a deeper understanding of adsorbent properties, have empowered Alltech to study Mycosorb efficacy in a broader context in vitro, in vivo, and in the field.

# World beating performance

### by Dr Bill Williams, General Manager of Agriculture, Tegel Foods Ltd.

Tegel Foods Ltd is New Zealand's largest fully integrated poultry company. Tegel stocks Ross 308 and Aviagen often quote Tegel broiler performance as the best in the world. Tegel is currently achieving growth rates and average monthly FCR performances that are 8% better than the Ross 2012 published broiler performance objectives. That is an 'as hatched' liveweight of 2.3kg at 34 days (versus 37.2 days in Ross STD) with an FCR of I.500 (versus I.63 Ross STD). Individual flocks of broilers in commercial operations within Tegel perform up to I4% ahead of this standard.

Over the last 10 years, FCR performance has improved by about 0.015 and liveweight at the same age by 50g per annum.

This presentation reviewed some of the factors that contribute to this excellent performance, the challenges faced by these high performance levels and the opportunities for further improvement within our business.

The Tegel operation is based in 'chicken

heaven' as New Zealand is completely free of IBD, virulent IB, NDV and AI. Broiler chickens receive no vaccinations at all.

Tegel operates a stringent total quality assurance program throughout the company. High internal biosecurity standards ensure that Tegel stock is also free of broiler diseases that are present within New Zealand, such as MG, MS, ILT etc.

The chicken sheds all have concrete floors and operate on an all-in all-out basis with total litter replacement at the end of each batch. As a result, salmonella is present in less than 2.5% of all flocks produced.

Tegel produces its own feed and sources its feed ingredients directly from reliable approved sources and suppliers and uses its laboratory to test many of these before use. The feedmills also perform NIR analysis of raw materials on arrival at the mill, and finished feed before this leaves the mill.

Their broiler feed is heat treated and pelletised to achieve Pellet Durability Index scores of at least 70% to improve feed intake and minimise wastage. A four phase diet is fed with digestible lysine levels at 99% of the Ross 308 standard in the starter and finishing with a withdrawal diet at 110% of the Ross standard diet. Tegel use the EFG model to determine optimal levels of energy, amino acids and the amount of feed per phase fed to provide maximum profit margin per m<sup>2</sup> of shed space per year.

Great emphasis is placed on achieving consistency in the delivered nutrient specification of the feed provided to chickens.

Ingredient delivery systems are monitored for weight variability for each batch of feed and a continuous improvement process ensures this variability reduces over time.

Chicks are internally sourced from their own breeder farms and hatcheries and are 100% sexed so that the relative FCR performance of the males and females can be optimally utilised to grow to the different terminal weights required to meet the liveweight profile required by sales mix.

New Zealand has a moderate climate operating in a temperature range between 0-25°C, with RH in a range of 75-90%. Broiler growing is contracted with the growing agreement designed to ensure required facility standards are met, facilities can be *Continued on page 13* 

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used completely flexibly and top performance is rewarded. Biological broiler performance could be better than it is however as Tegel operates under some performance constraints as a consequence of its relatively small scale and wide market product requirements. A continuous improvement process is standard to cost effectively address these issues wherever possible.

Growth rate related issues will usually be seen in New Zealand commercially before the rest of the world so the geneticists within primary breeding companies get an early 'heads up by being aware of New Zealand issues.

The performance impact of sub-optimal conditions in New Zealand are not masked by the major poultry diseases present in the rest of the world. The impact on Tegel performance is relevant to other operators and may provide useful information on cost/ benefit trade-offs of managing these drivers of poor performance in different environments.

## Standing on the genetic platform

### by Dr Santiago Avendaño, Director of Global Genetics, Aviagen Ltd.

The global system of food production for human consumption will be under unprecedented pressures in the next decades. The global demand for food will significantly increase to satisfy population growth, currently estimated at seven billion people and projected to grow to 9.3 billion by 2050.

This increased demand for food will be accompanied by a requirement of more sophisticated and higher quality diets.

The greatest demand for meat products is expected to come from expanding economies with the Asia/Pacific and Latin-America and Caribbean regions explaining 56% and 18% of the increase, respectively, followed by more moderate growth of 7-8% in North America, Europe and Africa. Meat production is expected to grow globally by 60 million tons by 2020 with poultry meat contributing 46% of this increase, followed by pork (35%), beef (14%) and sheep (5%).

Developing countries are expected to contribute 78% of the increase in global meat production. Critically, there will be competition for land, water and energy in a context where the effects of climate change are expected to become more evident.

High prices and volatility of feed and raw material supply globally is a common feature of global poultry production, with feed cost representing around 70% or more of total production cost globally. Hence, technological changes designed to increase the efficiency of feed utilisation are of prime interest. Improvements in feed conversion are also essential to mitigate the environmental impact of green house emissions through reduction of production resource requirements and the associate emission of pollutants.

In the context of global poultry production expansion, current and future broiler products will need to adapt and express genetic potential in a wide range of environments characterised by management practices, feed quality (form and density) and gut and immune challenges among other factors.

From a breeding perspective, the accurate estimation and management of the genetic by environment interaction is a key objective to ensure that broiler products express their genetic potential for optimal live performance in favourable environments, while at the same maintaining the potential to express robustness and adaptability to suboptimal environments.

Aviagen has incorporated a broad range of selection environments in its global breeding programs as a strategy to accurately estimate genotype by environment interactions and predict genetic values in a wide range of production circumstances. The incorporation of FCR records from contrasting environments in evaluation of selection candidates and the characterisation of feeding behaviour and its genetic basis has been a primary focus in the last 10 years. At the same time, a balanced breeding strategy with broad breeding goals has been implemented including not only traits related to production but also traits related to liveability, skeletal and metabolic support, reproductive fitness and welfare characteristics.

This strategy provides the foundation for sustained genetic improvement and provides benefits for the industry as a whole.

Sustained and significant long term investment in R&D is a prime necessity in a highly competitive market.

Aviagen has led the development of novel selection tools to enable the incorporation of genomics information in routine selections. The use of genomics information in selection for broiler and breeder performance adds a significant milestone to the already vast portfolio of selection tools.

Genomics technology is also being used to help unravel the relationship between gastro-intestinal microflora and gut functionality, host immune response and live performance in contrasting environments.

This presentation described Aviagen's R&D strategy for developing global broiler products to perform optimally in a wide range of environments in the context of the current and future global requirement for broiler products to satisfy an increasing demand for healthy and affordable poultry meat.

### The antioxidant bottom line

by Surinder Chauhan and Dr Frank R. Dunshea, Professor and Head of the Department of Agriculture and Food Systems, The University of Melbourne, Australia.

Research in the last two decades has clearly identified important roles for antioxidants, in particular selenium (Se) and vitamin E, in maintaining optimum animal health and production. The antioxidants Se and vitamin E are essential micronutrients and share common biological activities impacting on animal production, fertility and disease prevention. Recently, there has been increased interest

in the biological importance of Se and vita-Continued on page 15

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min E when supplemented at levels above those required to satisfy the basic requirements, with some of these studies resulting in improvements in animal performance and immune function. Vitamin E has long been recognised for its role as a chain-breaking antioxidant, primarily because of the capability to directly scavenge free radicals and/or reactive oxygen species (ROS) and thereby prevent oxidative damage to lipids at cellular level. Similarly, selenium is recognised as an essential component of the antioxidant cycle and is an integral component of the glutathione peroxidase (GSH-Px) family of enzymes. Recent research has allowed a better understanding of the multiple actions of vitamin E and Se, which now appear to extend beyond simply antioxidants and into regulators of immune function. Identification of more than 30 selenoproteins is an important component of this improved understanding.

This paper reviewed recent research providing insights into the multiple actions of Se and vitamin E supplementation at systemic, cellular and molecular level.

In particular, there are clear roles for Se and vitamin E supplementation for the amelioration or prevention of oxidative stress and inhibition of inflammatory cascades under crucial physiological and environmental conditions, such as heat stress and enteric disease challenge.

### Programmed to succeed

#### by Dr Peter Ferket, Professor in the College of Agriculture and Life Sciences, North Carolina State University, USA.

Genetic selection is continually changing the 'playing field' of production potential for the poultry industry, but it is the expression of this genetic potential that will drive performance and profitability.

Particularly, early-life programming can turn on 'thrifty' genes that permanently reprogram normal physiologic responses to survive environmental stressors, including moderate nutrient deficiency, and thus increase the chances that genes are passed on to the next generation.

Poultry can be programmed to succeed with the desired phenotypic traits by modifying nutritional modification during the perinatal period: the first 3-4 days before and after hatch.

Based on the concepts of epigenetics, imprinting, and adaptive conditioning, several experiments have been performed at the Alltech-University of Kentucky Nutrition Research Alliance Coldstream Farm and Alltech's Center for Animal Nutrigenomics and Applied Animal Nutrition to test various nutritional programming strategies by manipulating in ovo and post-hatch feeding.

By evaluating the expression patterns of key functional gene groups, dietary amounts of nutrients that affect homeostatic balance were discovered to depend on the form of the nutrient, levels of and interactions between nutrients, and the timing of administration. Feeding chicks a specifically formulated diet during the first 96 hours post-hatch can 'condition' the gut for better nutrient utilization and program metabolism that ultimately affects production efficiency, carcase composition, and meat quality.

Chicks that have been fed the appropriate conditioning diet, followed by a complementary growing and finishing diet, can have improved growth performance and feed efficiency through to market age and over 70% higher calcium and phosphorus digestion compared with controls.

A programmed nutrition strategy can literally change the nutrient requirement and production efficiency and may yield a response greater than any single feed additive on the market.

Not only can programmed nutrition increase production efficiency that is so important to poultry producers, but also there is evidence that it can improve meat quality, thus potentially yielding greater profits from the poultry products produced.

Broilers that have been raised on a programmed nutrition strategy have been shown to have reduced carcase fat and to produce breast meat that has more appealing colour, less drip loss during storage, improved oxidative stability, and lower cooking losses.