Animal health and nutrition symposium

The 24th Alltech International Animal Health and Nutrition Symposium was recently held in Lexington, Kentucky in the USA and some 2,000 delegates from over 85 countries attended.

International Dairy Topics was present and in this review we focus on the papers that are of interest to dairy producers. These papers tended to look at green issues and effective, efficient production.

The impact of zinc

Reducing the impact of zinc on the environment was addressed by Alexander M. MacKenzie from Harper Adams College in the UK. While zinc is essential for the maintenance of health and productivity in dairy cows, this mineral can pass from slurry and manure and adversely affect water quality. Inorganic zinc in cattle diets can be poorly absorbed and, therefore, adversely affect the environment.

This can be overcome by the use of organic zinc and this can result in a lower dietary inclusion level being required.

Trial results were then highlighted that endorsed the merits of organic zinc. Cows supplemented with Bioplex Zn at the recommended level of inclusion had a higher milk than those that received inorganic selenium. No differences were seen in dry matter intake, milk composition or milk zinc content.

As part of its continued expansion and commitment to excellence in research Alltech recently opened its new Center for Animal Nutrigenomics and Applied Animal Nutrition. The centre is dedicated to the study of the effect of nutrition on gene expression and represents a 20,000ft² expansion of the company's existing research facility. The nutrigenomics laboratory employs the latest technologies to generate databases detailing the effects of nutrition on gene expression profiles in the tissues of various species. The databases will be analysed to determine the health and performance status of livestock and the best nutritional interventions for peak production potential. Picture above are the Governor of Kentucky, centre, and, to his left, Pearse Lyons of Alltech.

It was also shown that cows fed inorganic zinc excreted more of this element. Zinc also had positive effects on udder health by reducing somatic cell counts and milk amyloid A concentrations. He concluded that Bioplex Zn increased milk yield and reduced the urinary excretion of the mineral.

Bruce Woodacre, a consultant from the UK, then considered whether the future of dairy farming would be green.

He highlighted two main pressures on the food chain. Firstly, there is the western consumer's separation from the realities of food production which leads to a reticence to pay realistic prices for the foods he purchases. Secondly, there is the rapid inflation that is occurring in all of farming's inputs.

He cited the prices of cereals and proteins which, in some cases, has nearly doubled in a year.

This is partly due to the competition for them for biofuels production but, more importantly, it was due to meeting the food needs of a world population that will increase by 50% by 2050.

In reality, western consumers will have to accept that the days of cheap food are over.

In the dairy sector, survival in the short term hinges on improvements in efficiency. Yes, feed efficiency is important but in particular farmers must look at Total Farm Efficiency especially in terms of heifer replacements, herd depreciation and herd health.

It must be remembered that an improved FCR in the ruminant does not always equate to higher profitability because of the ruminants' ability to digest low value fibrous products such as forages and by-products from biofuels production and human food preparation which are significantly cheaper than cereals and proteins such as soybean meal.

Thus, the dairy cow has real green credentials as it can act as a 'recycling machine' thereby minimising its direct competition with man for food ingredients. This can be harnessed by the use of products such as Yea-Sacc and Optigen.

Soil phosphorus levels

Around the world soil phosphorus levels are becoming an increasingly important issue and this is especially so in those areas which have large numbers of confined animal production operations. Over the last five years more and more dairy farms have had to acquire more land for disposing of effluent or have actually closed down.

Byron Housewright from Texas A&M University highlighted that a cow can excrete close to 20kg phosphorus per cycle if consuming a diet with 0.4% dietary dry matter and this increases to almost 32kg if the dietary dry matter is increased to 0.6%.

Current dairy diet formulation practices of including phosphorus as a percentage of dietary dry matter can result in a significant overfeeding of phosphorus to most cows.

Many nutritionists cite the argument of bound phytate phosphorus as a reason for overfeeding but is this justified when numerous reports indicate that more than 90% of phosphorus bound in the phytate form is in fact hydrolysed by rumen microbes.

In fact phosphorus is probably overfed by 20-30% on most USA

dairy farms and the excess phosphorus supplementation fed to cows equates to $US10-15 per cow per year.

Thus, it will become increasingly important for individuals balancing dairy rations to more accurately predict phosphorus intakes.

Declan O'Rourke from the UK then considered calf health and immunity and whether we really do need in feed AGPs. He felt that it was amazing that farmers are happy to live with a 10% calf mortality rate.

Calf scours

Calf scours are the commonest cause of morbidity and mortality and the prevention and control of calf scour starts well before the calf is born.

The calf is totally reliant on the antibodies it receives from consuming adequate quantities of colostrum in the first few hours after birth.

It has been seen that calves that came from cows supplemented with Bio-Mos for the last four weeks of the dry period had greater rotavirus titres at calving and 24 hours later than calves from cows that did not receive Bio-Mos.

The merits of high selenium milk products from cows fed Sel-Plex to promote human health was then considered by Frank Dunshea from the University of Melbourne in Australia. It is felt that the relatively low levels of selenium consumed by man in selenium deficient areas may contribute to an elevated risk from certain cancers such as bowel cancer.

Recent evidence suggests that some individuals may acquire more dietary selenium than others because of single nucleotide polymorphism in the genes encoding for some selenoproteins.

Such individuals may benefit most from dietary interventions, for example the consumption of selenium enriched milk.

James F. Roche of University College Dublin, Ireland then reflected on the greening of agriculture.

He considered that the future of green agriculture depends on the production of renewable energy on the farm and agriculture reducing its carbon footprint.

He felt that the use of corn based ethanol will be superseded by the use of other more efficient energy renewable biomass sources over time.

Greenhouse gas emissions

The three main greenhouse gas emissions are methane, nitrous oxide and carbon dioxide. Key sources of methane are rumination and the fermentation of animal manure.

At the Symposium Dr Ronan Power (centre) received the 2008 Scientific Medal of Excellence for his work in advancing the use of nutrigenomics and gene profiling as tools for improving animal and human nutritional strategies.

Reductions in methane production could be achieved by the use of more digestible diets that decrease methane production, manipulating rumen fermentation, manure management, the feeding of certain vegetable oils, developing an anti-methanogen vaccine and breeding animals that are better able to retain nitrogen.

The main sources of nitrous oxide are denitrification and the application of nitrogen fertilisers or manure to the land.

Emissions of this gas can be sought by minimum tilling techniques, direct placement of slurry into the land, the use of more legumes, breeding low nitrogen emission crops and improving nitrogen uptake efficiency from the soil.

Reducing carbon footprint

The carbon footprint can be reduced by increasing the efficiency of crop production systems, minimising the use of artificial fertiliser and better organic production systems.

James concluded by stressing that the importance of deforestation should not be underestimated.

Jean Magerison from Massey University in New Zealand then spoke on lameness. It was highlighted that the nutrition programme is one of several components of management that can give a beneficial impact on the incidence of lameness.

The provision of adequate levels of copper, zinc, manganese and cobalt is critical for the maintenance of good hoof resilience and various factors come into play here.

Zinc plays a role in hoof repair by influencing the rate of healing. Studies have shown that feeding complexed zinc improves a number of factors that reduce lameness such as claw integrity, heel cracks, interdigital dermatitis and laminitis.

John Baah from Agriculture and Agri-Food Canada then considered the topic of improving silage conservation.

He summarised his presentation by stating that microbial inoculants can influence the nutritive value of preserved forages and animal performance but that their efficacy depends on the microbial composition of the inoculants and the crop to which it is applied.

J. P. Jounay from INRA in France then reflected on strategies for lessening the impact of methane emissions on global warming.

His observations are summarised in the box below.

Jud Heinrichs from Pennsylvania State University in the USA then considered ways to improve the absorptive capacity of the small intestines.

Neonatal calf diarrhoea

Neonatal calf diarrhoea is often a persistent problem on dairy farms. Research with other species has shown that dietary supplementation with nucleotides improves intestinal morphology and decreases diarrhoea.

In a study, calves supplemented with purified nucleotides had higher dehydration and lower beneficial bacteria concentrations in faeces.

Feeding dietary nucleotides upregulated transporter mRNA abundance in the calf intestine; measuring nucleoside transporter (N1) expression may be a useful means to monitor intestinal activity.

Calves supplemented with NuPro had longer intestinal villi and a more beneficial intestinal environment due to higher concentrations of L. acidophilus and Bifidobacteria within the supplement.

Further evaluations of diet supplementation with yeast cell contents may lead to better calf health by improving intestinal morphology and function. ■

Possible ways to mitigate methane production

- Genetic selection of animals – Merits in improving FCR
- Intensification of production – Emissions per litre decline as productivity per cow increases
- Stocking rates on pasture – Very limited
- Use of feed additives – Ionophores useful but are they politically desirable?