Alltech symposium – focus on dairy health

Recently Alltech held their 23rd international Feed Industry Symposium in Lexington, Kentucky, USA and over 1,500 delegates from 78 countries attended. Various papers were presented in the beef and dairy sessions and the key points from these are summarised in this article.

In an interesting presentation Aloysius E. Ibeagha and colleagues from McGill University in Quebec, Canada and the University of Mashhad in Iran, looked at selenium and its impact on immune functions and the health of dairy cattle.

Selenium is an integral part of a variety of proteins or enzymes known as selenoproteins and, as such, functions in the body as an antioxidant, in thyroid metabolism, redox reactions, improves the efficiency of reproduction, immune functions and it has anti-carcinogenic properties.

Thus, selenium and selenoproteins are vital players in dairy health and because the selenium is passed on through the milk and meat it is also important for human health. Forage is often short of selenium.

The influence of selenium on the cow's immune system is positive and the effects of this are transferred to the calf. Specifically, the ability of neutrophils to kill off invading pathogens is enhanced when the selenium content of the blood is adequate (see Table 1).

The presenters of this paper felt that there was still a need to further elucidate the roles of selenoproteins in immunity and to define the best ways to coordinate the administration of vitamin E and selenium.

On a similar theme Flavio T. Silvestre and colleagues at the Universities of Florida and California reported on the effect of selenium source on production, reproduction and immunity of lactating dairy cows.

Florida is a selenium deficient area and lactating cows are exposed to periods of heat stress. Analyses of pre- and post partum feeds showed a significant difference between the two states in selenium concentrations, with the feeds from California having more selenium.

In Florida (a selenium deficient environment) virtually all the selenium in the feed was from supplementation. Under such conditions Sel-Plex given at 0.33mg per kg of feed from 26 days pre-partum onwards elevated plasma selenium concentrations, increased neutrophil function at the time of calving, improved the immuno-responsiveness in multiparous cows, improved uterine health and increased second service pregnancy rate during the summer months.

In California the Sel-Plex supplementation gave a substantial increase in milk production in early lactation. This milk production effect in early lactation was not seen in the Florida study.

Table 1. The impact of the level of blood selenium on cattle health.

Blood selenium (µg per mL)	Effect
0.044	Clinical mastitis
0.045	Subclinical mastitis
0.071	Healthy
0.10-0.15	Reduced incidence of treatment for mastitis
0.10-0.15	Reduced incidence of retained placenta

Corn distillers grains

Michael F. Hutjens from the University of Illinois looked at the prospects of a future based on dwindling corn (maize) supplies. The use of corn distillers grains is becoming more attractive. When using distillers grains in dairy rations Michael highlighted key issues to be considered.

These include:

- Corn distillers grain must be regarded as a protein source and not a corn substitute.
- The recommended levels are 10-20% of total ration dry matter for high production cows and the distillers grains should be viewed as a source of rumen upgraded protein, and therefore, it has the potential to replace other proteins in the ration. One approach is to blend 50% soybean meal and 50% distillers grains. For older heifers, dry cows and low production animals distillers grains could be the only source of supplemental protein.
- Several factors define the risk of feeding too much distillers grains which causes a drop of 0.3 points or more in the milk fat test, for example, from 3.8 to 3.5%. These include a lack of total or functional fibre, too much starch, high levels of unsaturated fatty acids and/or ionophores.
- The quality of distillers grains is critical and risks that must be anticipated and managed include mycotoxins, the level of solubles added back, heat damage and the effects of storing wet distillers grains.
- The nutrient variation in distillers grains can be large.

Additives such as a yeast can enhance starch fermentation in the rumen and stabilise the rumen environment. Increasing fibre digestion by using enzymes and/or direct feed microbes would increase rumen volatile fatty acids while not increasing starch levels. Thus, dairy ration formulation in the future will focus on high digestible forage/fibre sources to optimise yield, milk components and cow health.

Heifer management

Zanton and colleagues from the University of Pennsylvania looked at a new approach to heifer management that focuses on reducing the age at first calving so as to reduce the costs associated with the non-productive heifer period.

It was shown that by feeding higher concentrate rations in a restricted manner from four to 22 months resulted in a similar growth performance in terms of weight gain and structural growth. It was concluded that providing the level of intake is restricted to allow for an optimal average daily weight gain, high concentrate rations can be fed to heifers resulting in reduced feed costs and less nutrient waste.

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David R. Davies and colleagues from the UK's Institute of Grassland and Environmental Research reviewed the causes and controls of aerobic deterioration of silage. They emphasised that although there are no substitutes for good clamp management, additives can be used to limit aerobic spoilage.

In one study maize silage was ensile either untreated or treated with the inoculant, Sil-All, or with an inoculant plus Fireguard (a mixture of sorbate and benzoate salts). Samples were tested after a 100 day ensiling period.

The results indicated that silage fermentation was similar irrespective of treatment but the silage that had had the Fireguard added had significantly improved aerobic stability. However, it should be noted that the chemical inhibitor has activity against all bacterial groups including the beneficial lactic acid bacteria.

Precision feeding

In an interesting presentation William Chalupa of Global Dairy Consultancy Co Ltd, USA, looked at precision feeding of lactating dairy cows. In particular he looked at the effectiveness of one of only two additives (Optigen II) that have been conclusively shown to improve rumen microbial growth. It was shown in continuous culture fermentors that the use of Optigen II increased the capture of ruminal microbes by 5%, leading to 6% more nitrogen in milk and 7% less nitrogen in urine.

That is, by capturing more dietary nitrogen in ruminal microbes, the quantity of urinary urea can be reduced, together with the level of ammonia emissions.

In terms of maximising the ruminal production of microbial protein, a 35% improvement in nitrogen efficiency was demonstrated by using a ration that contained a highly digestible source of rumen degraded protein that was balanced for methionine and lysine in metabolisable protein.

With improved amino acid balance, metabolisable protein is used more efficiently for the synthesis of milk protein.

Alleviating heat stress

Changing tack Rosemarie Zimbleman and colleagues from the University of Arizona reflected on nutritional and management strategies for alleviating heat stress in dairy cattle which costs the dairy sector in the USA some $800 million a year because of reduced production and increased disease incidence.

Since the 1950s the milk production of cows in the USA has doubled and this has been accompanied by a downwards shift in the cow's thermoneutral zone making the cow more heat sensitive and cold tolerant.

The two primary strategies to maximise the performance of dairy cows during hot weather are managing the environment or changing the nutritional management to maximise feed intake and substrate utilisation.

Recent studies have shown that reduction in dry matter intake may only be responsible for half the decrease in milk production and that the remainder is due to other changes induced by heat stress. Niacin supplementation has been studied in this context. It was found that cows fed supplemental niacin had higher sweating rates and lower core temperatures during acute heat stress.

Fescue toxicosis

Finally, David W. Bohnert and colleagues from Oregon State University in the USA looked at the infection of tall fescue with endophytic fungi that produce an array of bioprotective alkaloids, including ergopeptide alkaloids which can cause fescue toxicosis. This syndrome costs the North American dairy industry some $600 million a year.

Various studies have indicated beneficial effects of Mycosorb in countering the negative consequences of fescue toxicosis and it would appear that 20g of Mycosorb per day is normally adequate to reduce the consequences of fescue toxicosis. ■