Alltech look at game changers in dairy production

The recent 27th International Alltech Health and Nutrition Symposium took as its theme 'Game Changers' and was attended by some 2,600 delegates from 72 countries. Following the opening of the Symposium by Lexington's Mayor Jim Gray and Kentucky US Congressman Ben Chandler and the awarding of the Alltech Medal of Excellence to Prof. Inge Russell of Heriot-Watt University in Scotland, Damien McLoughlin from The National University of Ireland reflected on 'A time of Change in Agribusiness'.

He highlighted that there are currently some 1.5 billion consumers in the world and that this figure will soon double. Nowadays businesses need to be more than lucky and, to survive, a firm needs to reinvent its business over and over again. He gave delegates the following five take-home points:

Asian visitors at this year's symposium.

- **No fads or fashions.**

Just change and success can come from long term change based on continually renovating and innovating products in a response to consumer health and wellness issues. This is the basis of Nestlé's success.

- **Don't be first, just be different.**

A good example of this in practice is Zespri Kiwifruit of New Zealand. They used new technologies to develop new strains of kiwi fruit, including Zespri Gold. The company now sells 30% of the world's kiwi fruit but collects 70% of the value from this market.

- **Know where growth comes from and go where growth is.**

In 2005, JBS was largely unknown outside Brazil but today is the largest protein firm in the world. JBS saw the growth potential of being a global protein supplier and they also realised the importance of having a significant presence in Australia and the USA and so they made significant acquisitions in these and other countries. Today, JBS uses scale, market position and brand recognition to drive their global success.

- **Don't act now!**

Liuhe, which was founded in 2005, is now the number one animal feed company in China. Liuhe invests in management skills realising that this is where the greatest return is – not in technology. The company's philosophy is be positive and simplify issues, work hard and well, learn and reflect and harmonisation with self, users and competitors.

- **It's about you and what you do.**

KFC China is now larger than KFC USA and opens a new outlet every 18 hours. Founder Sam Su believes that incremental change is not enough if you want to be great and emphasises the importance of high quality decision making and for this he relentlessly pursues good people. He believes in making bold and innovative decisions.

Wealth of opportunities

In closing off the first session Alltech's founder and President Pearse Lyons focused on the wealth of great opportunities now being presented by the technological revolution.

Several speakers on the dairy programme then focused on key issues for their sector. Dr Judith L. Capper from Washington State University in the USA looked at the truth behind the carbon footprint of modern dairy production.

Today's global dairy industry faces the challenge of providing sufficient animal protein to fulfil requirements of the growing population, while reducing environmental impact per unit of dairy product. A deterministic model based on the nutrient requirements and metabolism of dairy cows was used to assess the environmental impact per kg of milk produced by the US dairy industry in 1944 compared to 2007.

Advances in nutrition, genetics and management facilitated an increase in annual milk yield from 2,074kg to 9,193kg over this time period, resulting in 21% of the animals, 23% of the feed, 35% of the water and 10% of the land being required to produce one kg of milk in 2007 compared to 1944.

Greenhouse gas emissions were reduced by 63% per kg milk. A similar model was used to evaluate the use of recombinant bovine somatotrophin to increase milk yield per cow by an average of 4.5kg/d.

When extended to the effects of supplying the US population with dairy products in the year 2040, the use of recombinant bovine somatotrophin reduced the number of animals required for equivalent milk production by 8%, whereas organic production required an extra 20% of animals and an extra 30% more land.

It is clear that improved productivity provides a means to reduce environmental impact through the dilution of maintenance effect, whereby the proportion of the total daily nutrient requirement attributed to maintenance is reduced.

Strategies to reduce the daily maintenance

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cost by using smaller bodyweight animals would also be predicted to mitigate environmental impact providing that productivity was not unduly affected.

Deterministic modelling of Cheddar cheese production from Jersey cows (454kg bodyweight, 20.9kg milk at 4.8% fat and 3.7% protein) compared to Holstein cows (680kg bodyweight, 29.1kg milk at 3.8% fat and 3.1% protein) demonstrated that the interaction between bodyweight and milk composition compensated for a reduction in milk yield, with reductions of 11% land and 32% water and 20% greenhouse gas emissions per kg cheese produced.

Using carbon emissions per kg milk as an environmental indicator, we see farming systems with high milk yields and high share of compound feed having the lowest emissions. In contrast, farming systems with low milk yields (1000-2000kg per cow) using mainly crop residues and feed base have 3-4 times more emissions per kg milk.

Using employment per kg milk as a social indicator, we see that dairy farming systems in developing countries create 100 times more employment per kg milk than larger farms in developing countries.

Defining suitable future dairy farming systems is a very complex task, just as a dairy farming system by itself is very complex. Moreover, the key drivers like milk/beef prices, input prices (feed, land, labour, etc) change dramatically and new requirements, like carbon footprints, arise. Defining the best-fit dairy cow system is a continuous challenge and for each dairy region requires the connection of different research disciplines interacting with dairy farmers and all players in the dairy chain.

Torsten Hemme from IFCN Dairy Research Center in Germany looked at farm sustainability and benchmarking.

Since 2006, we have moved into a world of highly volatile world milk prices with the situation that each country's milk price is driven by price movement on the world market. Moreover, we have moved towards a fluctuating price for feed. These changes have led to a very volatile milk-to-feed price ratio in each country.

In the dairy chain, the major share of costs, resources used, emissions created, and political challenges come from producing the milk itself. This means the dairy farming system has a significant impact on the overall performance of the dairy chain.

That is the reason why, since 1997, the IFCN (International Farm Comparison Network) has been benchmarking and comparing dairy farming systems worldwide.

To date its key results have been:

- **Cost levels:** Using the cost of milk production as an economic indicator we see small scale farms in Africa and parts of Asia as low cost producers and large barn farms in Western Europe as the farms with the highest costs. The range of producing milk is from US$ 0.1 per kg milk in Africa to US$ 1.0 per kg milk in Switzerland.

- **Time series trend:** A time series analysis shows, in the case of Poland, that changes in the political system, local factor prices, and exchange rate movements can increase production costs in four years from a level of US$ 0.15 to 0.55 per kg milk.

- **Milk yield vs. costs and carbon emissions:** There is an indication that from a farming system perspective production costs per kg milk rise with increasing milk yields and carbon emissions decline after yield increases.

- **Milk feed-to-price ratio and fitting farming systems:** Based on historic milk-to-feed price ratio levels and observed farming systems, the IFCN has developed the hypothesis that, in the case of low milk feed-to-price ratios, systems with lower yield are better than high yield systems.

- **Outlook:** Once milk feed-to-price ratios fluctuate and change levels over time, all stakeholders in the dairy chain face the challenge to develop the best future farming system for their specific region.

Richard Murphy from Alltech, Ireland, then reflected on 'the five myths of trace mineral supplementation'. There are many forms of metal complexes available in the marketplace for use in animal nutrition. These have

A chance for discussions between sessions.

been generically entitled 'organic trace minerals' by virtue of the fact that the trace elements in question are complexed or otherwise associated with organic molecules.

Terms pertaining to the chemistry of complexation, or chelation as it is commonly known, have created a great deal of confusion in the animal feed industry. Terms such as metal amino acid complexes, metal amino acid chelates, metal polysaccharide complexes and metal proteinates abound, yet official definitions remain vague and unhelpful.

As an added complexity, the mechanics of organic mineral chelation is a multifaceted and much debated subject. Many different laboratory techniques, including infrared spectroscopy, nuclear magnetic resonance, x-ray diffractometry and polarography have been proposed as suitable to assess the degree of chelation in mineral products.

Tests of varying scientific nature and credibility are widely claimed as having the ability to differentiate between 'good and bad' chelates.

Despite the confusion and often contradictory information that exists, mineral chelation is a relatively straightforward process governed by some fundamental chemistry basics. By carefully considering factors important in mineral chelation, one can begin to distinguish between the products on the basis of biological stability and thus biological bioavailability.

Marcos Neves Pereira from Universidade Federal de Lavras in Brazil then spoke on 'Optigen: A game changer for the Brazilian dairy industry'.

After considering individual cow work he then reported on the partial substitution, primarily of soyabean meal, by Optigen plus corn silage or corn grain, at the discretion of the herd nutritionist, which was evaluated in 16 Wisconsin dairy herds. Optigen supplementation at 114 g/d increased milk yield from 35.4 to 35.9kg/d and increased milk urea nitrogen from 12.4 to 13.2mg d/L.

Economic simulations indicated that the income over feed cost response to this strategy could favour the lower energy supplement based on Optigen prices and the higher soyabean meal and milk prices. The in vivo data suggest that the release of ammonia in urea is slowed by the Optigen coating technology.

Supplementation of Optigen to low protein, forage based diets may therefore be a tool to modulate dairy cow intake, without raising negative nitrogen-related environmental issues.

Martin Kaske from the Hannover Veterinary School then considered managing metabolic stress in high performing dairy cows.

He felt that a successful transition from late pregnancy to early lactation is critical for animal health and productivity in the subsequent lactation. Tools to manage this critical period are the feeding concepts throughout the dry period, including an effective peri-parturient paresis in all pluriparous cows and optimising calving management with a maximum of cow comfort in the maternity pen.

Efforts must be made to increase feed intake after calving and here the offering of an energy drink after calving is an option. Rumen function should be supported by offering sufficient forage and avoiding over-conditioned cows before calving is important.

Milking frequency is important. Martin concluded that multiple points of action are available to enable a high milk yield without compromising health and fertility at cow or herd level. ■