

# A 'seismic shift in ruminant feeding'

KEENAN, the ruminant nutrition specialists, recently launched a revolutionary Mech-fiber system of feeding cattle which offers major benefits through improved feed efficiency. Robert Irwin reports from the international launch event held in Scotland.

**A** NEW integrated approach to dairy and beef feeding focusing on the physical structure of rations to optimise their utilisation in the rumen can extract more production from less feed inputs by increasing Feed Conversion Efficiency by up to 30 per cent.

Underpinned by research from the Universities of Illinois and Reading and developed by ruminant feeding specialists Keenan, the new Mech-fiber approach is based on the concept of 'physical nutrition' with field results showing possible margin gains of £1.41/cow per day.

"We've known a lot about the importance of the physical aspects of the ration such as chop length, the importance of 'physically effective fibre' and the need for consistent mixing, but this new thinking takes this several significant strides forward," says Professor Jim Drackley from Illinois University.

"We now know the extent to which the combination of bulk density of the ration, uniformity of particle size distribution, physical structure and architecture of the fibre particles, affects physical consistency of the resulting rumen contents, and the importance of this on the cow's ability to utilise the ration more efficiently for milk production.

"Furthermore, we now have the knowledge of how to practically manipulate physical ration structure to optimise Feed Conversion Efficiency."

Early indications that the key to unlocking FCE was in the physical form of rations came from research at Reading University. Using identical rations in a vertical auger machine and a Keenan mixer, the Keenan-fed cows produced 1.0 litre more milk per day – 40.3 litres/cow/day as opposed to 39.3 litres/cow/day. The Keenan fed cows also produced an extra 45g/day of casein.

THE most obvious change is that new Keenan feeders now bear the Mech-fiber name. These are machines that through evolution of the established 'light touch' paddle-mixing system combined with precision chopping function, are able to process a variety of materials into specific Mech-fiber rations.

But to get the full benefits every day requires a level of precision in terms of materials, operation and monitoring that demands a new way of thinking about feed preparation. Beyond the machines, there has therefore been considerable investment of resources into developing an integrated support technology that makes delivery of Mech-fiber consistent and reliable on-farm.

Different combinations and types of feed materials and forages contribute to Mech-fiber in different ways. For the past 10 years Keenan system specialists have developed extensive know-how on best practices to process the best 'physical' mix in the Keenan mixer wagon – the correct loading sequences and processing times related to types of feeds and forages. In the past five years they have monitored how these best mixes have delivered in terms of feed efficiency ('burn', output of milk/beef per kg of feed input). Now all this information has been brought together into a special management-control system called PACE – Performance Acceleration and Control Enhancement. As its name suggests, PACE is designed to bring the benefits of Mech-fiber to producers quickly and efficiently so they see the benefits in as short a space of time as possible and then keep seeing benefits as the technology develops.



■ NEW: Keenan's Mech-fiber 340.

Furthermore, rumen conditions were more stable with the Keenan mixed ration – the time in which the rumen was considered to be significantly acidic (less than pH 6.0) was reduced by 33 per cent.

This research also explained the 15 per cent average increase in feed efficiency achieved within 12 months identified by Professor David Colman from Manchester University and President of the International Association of Agricultural Economists, in a study of 500 Keenan users in the UK and France.

"In the same way modern fuel delivery systems in cars create the optimum mix of fuel and air in the combustion chamber to increase the efficiency of the burn, Mech-fiber increases the efficiency of digestion by creating a more consistent distribution of feed materials, specific fibre types, enzymes and microflora throughout the rumen," says Professor David Beever, Keenan International Nutrition Director.

"The development of Mech-fiber represents a seismic shift in ruminant feeding and has genuine potential to revolutionise the way cows are fed in the future."

## Delivering Mech-fiber on-farm

In essence, PACE combines feed information, production requirements and processing control to produce and monitor optimum Mech-fiber rations that consistently deliver performance to agreed production targets. Output data is constantly fed back into the input equation, so production and cost efficiency are constantly being monitored and fine-tuned.

In 2008, the first detailed large scale commercial farm study of the benefits of the Mech-fiber approach took place at the world renowned Coopton Carse Farm in South West Scotland – one of five dairies owned by Wijnand Pon, who farms 4,000 cows and is the owner of Alta Genetics Inc. This has shown the massive potential of Mech-fiber and PACE technology.

Firstly, without any change of ration, replacing the unit's existing vertical mixer with a Keenan Mech-fiber unit produced more milk and more milk protein from less feed. The Keenan achieved improvements worth £0.32 per cow per day – all within four weeks.

Then using a full Mech-fiber ration, the results were even more dramatic with 1.9 kg DM/cow/day less feed consumed producing 0.9 litres more milk/cow/day and with a 0.34 per cent unit protein lift as well. This gave a total increase in margin of £1.03 cow/day.

With the introduction of PACE on the farm, this gain has now risen to a staggering £1.41 per cow per day.

In total this represents an increase in Feed Conversion Efficiency of 19 per cent – from 1.25 to 1.49 – in just 24 weeks, from July 2008 to January 2009, when the vertical auger mixer was replaced with a Keenan Mech-fiber feeder.

These results were achieved on a highly professional unit already achieving a high level of production efficiency with good nutritional standards. If results like this can be achieved on such a unit, the potential benefits for dairy enterprises around the world are immense.



■ ON SITE: Keenan's Mech-fiber 400 on the farm.

THE new science introduced by Keenans at its Mach Fiber launch is all about getting more production, be it milk or beef, from every mouthful of feed a cow consumes. Not achieved through complex chemistry or some super-supplement, but simply through a better understanding of the physical requirements of ruminant animals.

The results are astounding – 20 per cent or even 30 per cent greater Feed Conversion Efficiency. In other words, up to 30 per cent more production from feed materials we are all very familiar with. There are significant herd health and environmental benefits, too. Importantly, this is not necessarily about changing ingredients in the feed, but through manipulating and optimising the physical presentation of the ration so once it is inside the rumen, the maximum amount of nutrients and energy can be obtained from the feed and utilised for productive purposes.

In 2008 a study of 500 Keenan users in the UK and France showed they were averaging margin gains per cow of 260 euro in France and £90 per cow in the UK within one year of adopting the Keenan approach.

By looking at milk production and dry matter intake data, Feed Conversion Efficiency was identified as the key performance advantage for these producers.

At the same time as this study, research at the University of Illinois was showing considerable improvements in herd health in Keenan-fed cows. Key findings included more consistent intakes, less fluctuation in body condition, increased lactational persistency and less body fat accumulation in the liver. In particular, this

## Breakthrough brings results

work was focused on using lower energy:high fibre rations in dry cows processed through a Keenan feeder and the results were outstanding.

Research carried out at Reading University by Dr Chris Reynolds in 2008 identified an extra one litre of milk production/day, 0.06 per cent extra milk protein content and an extra 45g/cow/day of milk protein (as casein) when comparing a ration mixed in a Keenan with the same ration mixed in a vertical auger mixer. Furthermore, rumen conditions were more stable with the Keenan mixed ration – the time in which the rumen was considered to be significantly acidic (less than pH 6.0) was reduced by 33 per cent. That alone went a long way to explain the herd performance, health benefits and improved feed conversion efficiency seen previously.

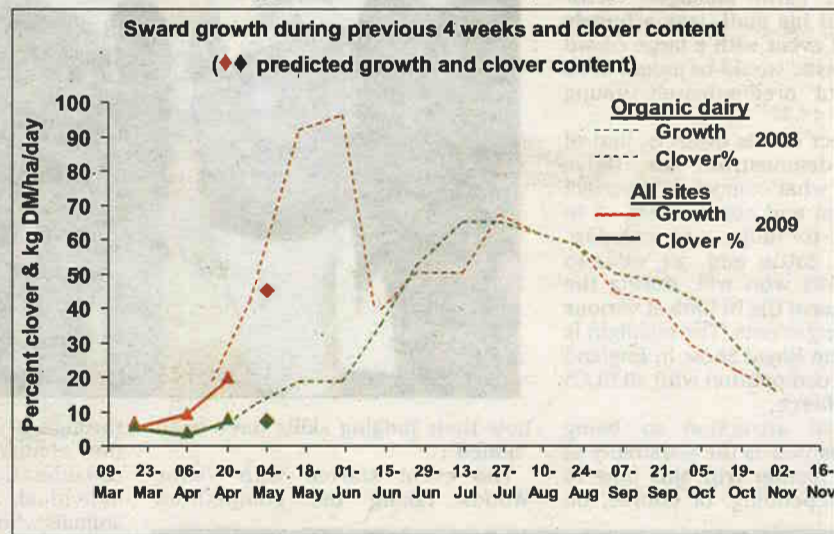
Combining all these results, one thing is obvious – there is a definite and statistically quantifiable machine effect in the physical presentation of identical rations. And it is this that has been the catalyst for a major re-appraisal of what constitutes the optimum ration for dairy cattle.

The breakthrough came with the discovery of the extent to which the combination of bulk density of the ration, uniformity of particle size distribution, physical structure and architecture of the fibre particles, affects physical consistency of the resulting rumen contents, and the importance of this on the cow's ability to utilise the ration more efficiently for milk production.



## CloverCheck

Growth and clover content of grass/white clover swards up to 20 April and predictions to 4 May



	Average growth to 20 April (kg DM/ha/day)	Average clover content (%)	Predicted growth to 4 May (kg DM/ha/day)	Predicted clover at 4 May (%)
Organic dairy (4 farms)	20	12	47	10
Beef/sheep (3 farms)	19	2	44	3

Plots on organic dairy farms have received slurry either in autumn or February. Those on beef/sheep farms have received either slurry and 30 kg N/ha as urea in spring or 60 kg N/ha if slurry was not applied. Growth at all sites is beginning to respond to the rising temperatures. Average air and soil temperatures averaged over all sites from 6 to 16 April were 8.4°C and 9.1°C, respectively.

The plots on beef/sheep farms have lower clover content than organic dairy farms at this time of year and so they lower the average clover content (see table).

Fuller details are available at: [www.afbini.gov.uk/index/services/services-specialist-advice/clovercheck-2009](http://www.afbini.gov.uk/index/services/services-specialist-advice/clovercheck-2009) or [www.ruralni.gov.uk/index/bussys/organic\\_production/clovercheck](http://www.ruralni.gov.uk/index/bussys/organic_production/clovercheck)