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# Dairy Pocket Guide 2011



**FarmBusiness**

Modern dairy cows are high performance animals, bred to run like Formula 1 cars. They can achieve high performance, but all too often results fall short of potential.

Such disappointing performance is often due to poor environment and management oversights. Viewed in isolation these factors often seem insignificant, but viewed in their totality they explain the gap between the top producers and the rest of the industry.

This booklet seeks to identify and describe how changes at the micro level can yield big gains at the macro level.

We know from Genus, for example, that each additional pregnancy can add £600 to the cow's gross margin. Similarly, data analysed by Promar International suggests that herds with a Somatic Cell Count of 300,000 could be losing more than two pence per litre in revenue – in many cases the revenue forgone would cover the wage of a full-time employee!

Feeding and diet formulation are central to enterprise performance, but its importance is often under-appreciated. Keenan, expert in diet presentation, and NWF, a feed supplier with a specialism in dairy nutrition, consider the components that make a cost-effective ration for high performance cows.

It is in everyone's interest that the UK has a vibrant and profitable dairy sector. We hope that the advice and insights in this booklet will enable all producers to secure a sustainable future.

Chris Lyddon, Editor, *Farm Business*



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# Technologies that deliver pregnant cows



Technological advances will come and go but some things remain unchanged.

As Genus ABS Technical Director **John Cook** explains, pregnancies are still the basic fuel of dairy farms, but technological advances can improve the efficiency with which they are achieved

Whatever else happens in dairy farming, cows still need to get in calf at regular intervals. While there has been some success in extending lactations at some time or other, cows need to get back in calf.

In the same way that a bonfire needs fuel, so a dairy herd needs pregnancies. Without pregnancies you just end up with a herd of less efficient stale milkers.

Over the past 14 years there has been a significant decline in the reproductive performance in the UK dairy herd. Heat detection, conception and pregnancy rates have all fallen (see Figure 1), adding up to a huge cost to the industry.

**John Cook,**  
Genus ABS  
Technical  
Director

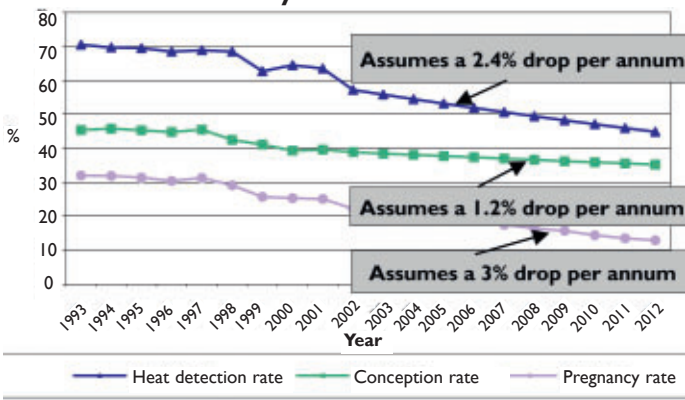


Addressing this fall in performance through increasing pregnancy rates can have numerous benefits:

- Increased yields
- Increased feed efficiency
- Fewer barren cows

Data from Promar indicate that for every additional →

**The fall in key performance indicators of UK dairy herds since 1993**



## ABS cause and effect chart for pregnancy production

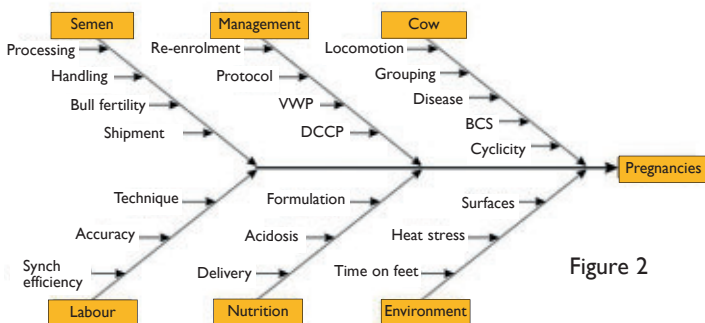


Figure 2

March 2007 ABS Global, Inc.

pregnancy gross margin performance improves by an average £600 per annum.

Getting cows back in calf is a multifactorial challenge (see Figure 2). Good management across all these areas will lead to better reproductive performance and technologies can play a significant part in achieving this.

Advances in semen processing have improved its quality while a better understanding of nutrition, particularly transition cow management, has contributed to higher conception rates.

An improved understanding of reproductive function has resulted in the development of veterinary protocols to influence and manage reproductive performance. Strategies such as ovsync and shortened eight-day modified ovsync programmes are becoming more widespread.

### HEAT DETECTION

To further improve pregnancy rates a range of technologies has been introduced to attempt to help farmers improve the accuracy of heat detection.

Pedometers and activity sensors can certainly highlight abnormal behaviour that might be associated with signs of heat, but overall the accuracy and effectiveness of all these aids

comes down to the ability of the person interpreting the results and selecting cows for service.

If we have the technologies, why are we still seeing a decline in national herd reproductive performance? All these technological advances look at part of the problem, but none addresses the whole issue and should be considered in that light.

### INTEGRATED APPROACH

To attempt to effect improvement across the spectrum of factors influencing the ability to get back in calf, Genus ABS has developed Reproductive Management Systems (RMS), an integrated fertility management scheme which places a skilled technician and the collection and interpretation of accurate data at the heart of the approach.

The service is based on daily visits from an RMS technician, whose sole objective is to maximise pregnancies.

The technician visits at the same time every day and follows a strict routine based on chalking cows and walking the herd. The principle behind the use of chalk is that it highlights cows that are in heat, even if they have not been actually observed. Any disturbance of the chalk is an



**The technician visits at the same time every day and follows a strict routine based on chalking cows and walking the herd**

indication of bulling behaviour and means the cow is checked. Based on the chalk marks, cows are inseminated by the technician and pregnancy diagnosed by the vet. The technician becomes another member of the farm team and liaises closely with all staff involved in heat detection and with the vet.

Progress is monitored using a 21-day pregnancy rate which gives a more accurate and timely assessment of fertility performance as it combines a measure of the ability to identify cows that

could potentially be bred (heat detection rate) and an assessment of the effectiveness with which they get in calf (conception rate).

RMS is already used by over 550 farms with 125,000 cows and comparison of results with a recent analysis of NMR herds shows the benefits of the approach (*see Table 1*).

Integrated approaches which combine the best of technological advances can deliver significant benefits in key business areas.

**Table 1 Pregnancy performance of cows monitored by NMR and RMS**

	NMR median performance	RMS median performance	NMR target	RMS top 25% current performance
Conception rate	32%	33%	40%	37%
Submission rate	27%	51%	37%	58%
Pregnancy rate	9%	16%	13%	21%

# Adrian and Tristan Jones, Hill Farm, Eccleston, Cheshire

Improving pregnancy rates is helping underpin herd expansion plans for one Cheshire dairy farmer.

The Jones's run a herd of 400 cows, milked three times a day and averaging 10,200 litres, and plans are in place to expand to 500 cows with all extra cows being bred on the farm. Accommodation is in place for the extra cows and the parlour will shortly be extended.

Although the cows calve all year round and are housed 365 days a year achieving high pregnancy rates is still a key business benchmark as they want to minimise cows sold barren so as to accelerate the expansion plans while retaining the closed herd status.

## PUSHING PERFORMANCE

Since May 2009 the cows have been bred using Genus ABS Reproductive Management Systems (RMS).

“At the time we were achieving a pregnancy rate of 16% but wanted to improve. It wasn't a case of rectifying a problem but using the system to push performance,” comments Adrian Jones.

Although the pregnancy rate of 16% was well above the



Tristan and Adrian Jones

national average, the combination of more rigorous heat detection and an extra pair of eyes has helped increase this to 21%. Culling rate is just 12%. Adrian argues there is no point selling cows if they are sound and producing well, especially as the plan is to increase numbers.

The RMS technician works closely with the farm's vet and all data collected is entered onto the farm's herd management system and used to generate the weekly vet reports.

All key fertility parameters have improved since RMS was introduced (*see table*) and the system is also used of heifers, helping to increase the success with sexed semen.

“The key to managing a large herd is to breed the correct cows, get them in calf quickly, keep them healthy and minimise replacement rate,” concludes Adrian Jones.

## Reproductive performance at Hill Farm

Heat detection rate	61%
Pregnancy rate	21%
Percentage of herd bred by 80 days in milk (target >80%)	90%
Percentage of herd bred by 100 days in milk (target >50%)	51%
Percentage of herd still open by 200 days in milk (target <15%)	15%

# Advances in semen technologies

Developments in semen technologies have underpinned major improvements in herd output and the trend is set to continue, as **Stephanie Whittaker**, UK and Ireland Business Development Manager (Genetics) explains

Since the introduction of semen freezing techniques by ABS over 50 years ago, large strides have been made in the quality of semen available as farmers strive to produce the cows best suited to their system.

We have seen developments in bull selection and genetic indices as well as methods to increase the availability of top quality genetics. The last few years have seen two of the biggest developments to help farmers develop focused breeding strategies. After years of development the holy grail of sexed semen is now a commercial reality and continued research into sexing techniques has led to better conception rates.

The use of sexed semen can underpin the rate of improvement in genetic merit as farms can use fewer, better cows to act as heifer replacement mothers. The rate increase is maximised if sexed semen is used on maiden heifers. Sexed semen also allows the production of more, higher value beef cross calves and a reduction in dairy bull calves.

The other big development is heterospermic semen which combines semen from different bulls in a single straw.

**Stephanie Whittaker, UK and Ireland Business Development Manager (Genetics)**



Pioneered and marketed in the UK by Genus ABS as Fertility Plus, it makes practical use of a natural variation that exists between semen from different bulls. When semen enters the reproductive tract of the cow it must undergo biological changes before it is able to fertilise an egg. Sperm from different sires goes through these changes at differing rates and then remains viable for different times within the reproductive tract. →



**Table 2 The benefits of heterospermic semen**

Mating type	Number of matings	Number of pregnancies	Conception rate	Difference in conception rate
Heterospermic	421	141	33.5%	+6%
Control	444	122	27.5%	

→ By combining semen from several bulls we can extend the overall fertilisation time window.

Field experience in the UK over the last decade, with several hundred thousand Fertility Plus inseminations, showed an increase in conception rates of around 6%, worth over £3,000 per 100 cows per year, and now this benefit has been confirmed in a large-scale controlled trial.

At an 8,000-cow unit in the US, over 850 Holstein cows were served with either semen from a single Holstein sire or heterospermic semen containing three Aberdeen Angus sires.

When cows were pregnancy diagnosed at 35-42 days after service, the results showed conception rates of 33.5% for the trial cows and 27.5% for the control group (see Table 2 on page 7) – an increase of 6% in conception rate. A strategy combining sexed semen to produce high merit replacements and Fertility Plus semen on all other cows to produce beef cross calves at a high conception rate would have a significant impact on dairy herd margins.

## GENETIC INDICES TACKLE CORE PROBLEMS

New developments in genetic indices will have a large role to play in developing the cow of the future. The new range of management traits now means that farmers can select bulls to

improve specific management areas of the herd.

Technological advances have made it possible to collect and analyse data to allow the assessment of heritability for certain core management traits which individually and collectively represent a major drain on dairy businesses, including:

- **Lifespan**  
Cows that last longer
- **SCC**  
Cows with lower cell counts and greater mastitis resilience
- **Calving ease**  
Reducing problems associated with difficult calvings
- **Fertility**  
Cows with better reproductive performance

Indices are available for each of these management areas, allowing an emphasis to be placed on health and fitness. Other management traits will be developed.

The financial benefit of selecting for management traits can be considerable. Table 3 compares the consequence of breeding using the average of the top 40 bulls selected on lifespan with the top 40 bulls selected for type merit. The high lifespan sires had a higher £PLI and produce daughters that live longer, with better fertility.

The developments in indices mean it is now realistic to select sires to improve key management areas and profit.

**Table 3 Trait selective breeding can deliver gains in all-round performance**

Traits	Top 40 for lifespan	Top 40 for type merit	Advantage
£PLI	£107	£65	£42
Lifespan	+0.5	+0.1	+0.4
SCC	-11	-7	-4
Fertility index	+1.8	-3.5	+5.3

# Sam Foot, Higher Ashton Farm, Dorchester

Sam Foot manages 650 cows split over four units with an average yield of 9,400 litres. The average replacement rate is 25% across the business but there is a considerable range in conception rates between herds. The best herds are achieving 46% conception rates while the poorer herds achieve 38%.

“This range in conception rates represents a significant cost to the business. As we improve conception rates we will make a substantial saving across the business,” Mr Foot explains.

“If I can choose bulls whose daughters are proven to get back in calf more quickly, then it is a logical decision to go with these sires.

## FERTILITY INDEX

“The Fertility Index tells me a lot about a bull’s daughters and I believe it is an indicator of the type of daughters I want.

“A good Fertility Index probably means they are good on their feet and aggressive feeders as well. The Fertility Index is now one of the first traits I look at when assessing bull proofs and I discount those with a low proof or where no data is available.”

Mr Foot first used sires selected on Fertility Index in autumn 2004.

“The bull which really convinced us that Fertility Index works was O-Bee Manfred Justice (FI +4.3). We are milking

**Sam Foot's cows yield an average 9,400l**



over 40 Oman daughters in total and all conceive quicker than average while producing above average milk yields. We are currently using bulls including Kings-Ransom Donario, Schillview Garrett and Regancrest RBK Die-Hard.

“On the flip side we are also now seeing the effect of milking daughters of poor fertility index sires, selected before the index was available. There is certainly a huge and significant difference between the best and the worst in the Holstein breed,” comments Mr Foot.



# Business performance begins with feed efficiency



The global race is on to produce more food from lower levels of inputs and there is a real drive for technological advances that drive efficiencies on farm. Keenan Systems Nutritionist **Mark Voss** explains how our understanding of diet formulation has resulted in technologies that can drive feed efficiency

If you want to improve dairy farm efficiency the obvious place to start is with feed. It is the biggest single cost of dairy farming, accounting for over 45% of the cash cost of milk production.

At any level of feed input there is a vast range in performance, with some farmers more effective at getting milk from cows than others. They are using feed more efficiently, producing more from less, and generating better margins as a result.

## WHAT IS FEED EFFICIENCY?

Feed efficiency measures how well cows actually use the ration, assessed as litres produced per kg dry matter intake. Compare a cow to a car. To assess how efficiently a car performs, the best measure is the miles per litre. More efficient cars go further per litre.

The same is true for cows. Instead of miles think litres, and instead of fuel, think feed.

In the same way that a more efficient car will do more miles per litre, so a more efficient cow will produce more milk per unit of feed input.

**Keenan  
Systems  
Nutritionist  
Mark Voss**



To increase feed efficiency we need to start with the rumen and our greater understanding of rumen function has led to technologies that can drive feed efficiency. Specifically, this has resulted in the concept of physical nutrition.

## PHYSICAL NUTRITION AND MECH-FIBER

While most research into dairy cow feeding has focused on the chemical composition of the diet, physical nutrition considers the importance of the structure of the ration.

The rumen requires a mix of different particle sizes to work effectively. If the diet contains too much long material then the rumen becomes congested and actually slows down, cows have problems digesting the diet, and



**Keenan's Mech-Fiber 340 in action**

nutrients pass through the rumen unutilised.

Conversely, too many small particles lead to a too vigorous fermentation, leading to problems with acidosis.

### BALANCE OF PARTICLES

If we can deliver the correct balance of particles to optimise rumen function, then utilisation of the diet will improve.

Physical nutrition sets out to do this by optimising the form of the ration so that once in the rumen the maximum amounts

of nutrients and energy can be utilised.

Research confirms that physical nutrition has two elements – delivering the optimum distribution of particle size and fibre while also ensuring the optimum bulk density, and this leads to the Mech-Fiber method of diet mixing.

Many systems of mixing diets work against rumen function by mixing in an over-aggressive manner, which leads to an over-processed ration with a lack of adequate structure and →

**Table 1 The performance benefits of the Keenan system compared with vertical feeders**

	Keenan	Vertical tub	Difference
Milk protein (kg/cow/day)	1.253	1.206	+3.7%
Milk yield (kg/cow/day)	40.3	39.3	+2.5
Time rumen spent below pH 6.0 (hours/day)	5.28	7.29	-28%

*Reading University comparison of Keenan and vertical tub mixers 2008*



**Loading and mixing**

→ a diet that is too dense.

The Keenan Mech-Fiber approach has been developed to overcome these limitations.

A gentle paddle mixing action thoroughly chops and mixes the ingredients using a non-destructive tumbling action. The feed material is lifted to the top of the mixing chamber before it falls back. An advanced chopping technology ensures bulky ingredients are chopped to the appropriate length using a scissor action.

The result is a homogenous mix that allows the rumen

microflora to work to their potential and release the maximum quantity of nutrients from the diet.

## PERFORMANCE

This knowledge of the importance of physical nutrition furthered understanding as to why rations, which appear good on paper, fail to deliver when fed.

Research at Reading University compared the performance of the same ration comprising maize and grass silages, energy and protein straights and straw when mixed using either a Mech-Fiber or vertical auger feeder (see Table 1 on page 11).

The chemical composition was identical but the results are significantly different and can be solely attributed to how the ration was presented.

Perhaps the most telling finding was that where the Mech-Fiber diet was fed, cows spent 28% less time with a rumen pH below 6.0.

Low pH is a sign of acidotic conditions and the better-presented diet was greatly improved rumen health by making conditions more stable.

The consequence of better physical nutrition is better feed efficiency.

Table 2 summarises the results of a commercial farm scale trial and shows the impact on feed efficiency and margins of better diet presentation.

**Table 2 The financial performance of the Keenan system compared with a vertical mixer**

	Week number	Milk kg/day	DMI kg/day	Feed efficiency kg milk/kg DMI	Margin £/cow/day
Vertical mixer	1	28.50	22.92	1.25	4.22
Keenan Mech-Fiber	24	28.96	22.17	1.31	4.54
Change		+0.46	-0.75	+0.06	+0.32

# Matt Bland, Hesket Farm, Dacre, Cumbria

Matt and Sue Bland run a herd of 150 cows just west of Penrith, but plans are well advanced to increase this to 300 cows. A new 98-cubicle house has been built and heifers are being purchased.

As part of the pre-planning, Mr Bland wanted to make sure that the ration mixing system was capable of handling the large volumes to be mixed daily. The feeder would have to cope with a mix of forages, including grass silage, whole-crop wheat and beans and, in some cases, a high proportion of straw. The Blands replaced a vertical tub feeder with an 8-tonne capacity Keenan Mech-Fiber 360.

“I wanted a feeder that could produce an even, consistent mix which the cows would eat in its entirety without picking through it. In this way we could reduce acidosis and improve intakes,” Mr Bland explains.

The machine had to be up to the job and have a low fuel requirement as it would be the workhorse of the farm.

“It was important that the feeder could work effectively across a range of diets. For

**Matt Bland replaced a vertical tub feeder with an 8-tonne capacity Keenan Mech-Fiber 360**



example, our dry cow ration can contain up to 5kg/straw/day, which can present a mixing challenge, especially when small quantities are being mixed.

## PROBLEMS REDUCED

The change of feeder to take account of Mech-Fiber technology has resulted in more consistent diets. Mr Bland believes calving problems have been reduced and that cows are entering the herd with a more stable lactation.

Since changing to the new system, yields have increased by over 4.5 litres per cow per day, which has fuelled a £1.25 per cow per day increase in margins due to the benefits of correct physical nutrition, and feed efficiency has risen by 0.28.



# Delivering consistency

What happens every time you change the diet? Does performance dip? Does dung consistency change? Cows crave consistency in the diet as consistent diet means a stable, productive rumen

Variation in feeding can knock cow performance and margins. The truth is that it is incredibly easy to make errors when feeding cows – the wrong quantities of ingredients, the wrong loading time, and incomplete or over-mixing of the diet are three common errors.

As with any other process, technology offers the opportunity to improve control of the feeding process to reduce variation and increase accuracy. The Performance Acceleration and Control Enhancement (PACE) system moves the Mech-Fiber feeder from a mixer wagon to a technology-based, precision processor.

### COMBINED INFORMATION

The sophisticated PACE system combines information on the feeds on the farm and the cows' production requirements to calculate the precise details of the mix required, including how much of which ingredient, the loading sequence and the processing time required.

The outcome is a diet produced to the optimum physical nutrition every time.

Once the feed information is

entered into the control unit the operator can follow clear instructions to produce the diet, eliminating errors caused by having more than one operator. Sensitive weigh cells accurately measure the ingredients into the chamber while a rotation counter means that the diet is mixed precisely down to the last revolution.

And as with every good control system there is a feedback mechanism to allow the effectiveness of the process to be monitored.

Details of feeds used is stored on a datastick and when production results are entered, a web-based system provides details on feeding accuracy and also calculates feed efficiency.

This allows the diet to be modified to increase feed efficiency further. A recent trial (*see Table 3*) shows that the benefits offered by PACE continue to improve year on year.

Technology in cow feeding has come a long way in the last 20 years and farmers can now utilise technology to produce consistent, rumen-friendly diets that improve efficiency of feed use and margins.

**Table 3 Long-term benefits of the Keenan system**

	Number of farms	FCE increase kg milk / kg DM	DMI change kg/day	Yield change kg/day
Year 1	180	+0.10	-0.43	+1.35
Year 2	43	+0.09	-0.08	+1.73

# Philip and Matthew Smith, Lower Castle Hayes, Staffordshire

Philip and Matthew Smith run a herd of 250 Holsteins, averaging close to 10,000 litres, at Lower Castle Hayes, near Tutbury. Their management philosophy is one of giving cows the conditions in which to achieve their potential.

In 2007 they built new cow accommodation for the 250 cows with a focus on cow comfort and optimal feed presentation. Feed troughs have raised floors to ease access and the use of troughs mean no pushing up.

The next objective was to ensure the diet was supplied consistently and in the correct form. The Smiths upgraded their feeder to a Keenan Mech-Fiber 360 with the PACE system to allow close control of feeding, especially as they wanted to add straw to the diet to improve rumen health and dung consistency.

“We got PACE in 2009,” explains Matthew. “We could have added it earlier, but



**Philip and Matthew Smith**

thought we could do without it. It really puts you in the driving seat and gives total control over inclusion rates and mixing times to ensure a consistent diet is presented to the cows.”

## INSTANT FEEDBACK

Last winter, accuracy of mixing varied by no more than +/- 1% per day and Matthew received instant feedback from the system to ensure that performance was as expected.

“Under our previous system we were averaging 8,600 litres with 60l peaks, but now we peak at 50l and are on target for 10,000l, so we are convinced the new approach is better for the cows.

“Feed efficiency had been around 1.3kg milk/kg DMI but has been consistently above 1.4 and peaked at 1.57. The combination of Mech-Fiber and PACE is certainly allowing the cows to express their potential.”



**The Smiths upgraded their feeder to a Keenan Mech-Fiber 360 with the PACE system**





# Huge advances in dairy cow feeding



NWF Technical Manager **Tom Hough** explains how new understanding of rumen function and feeding technologies is helping drive up yields and margins

Dairy cow feeding has changed beyond all recognition over the last 50 years, entirely fuelled by the development of new technologies based on scientific research and a phenomenal increase in our understanding of what actually drives production – the rumen.

We know how to make better silage, we know how behaviour and cow comfort affect intakes, we understand the importance of transition management and body condition scoring, and we know far more about the workings of the rumen and the importance of a whole host of factors, including pH and particle size.

The application of all these areas can help further drive production, improve cow health and welfare and potentially mean we can use feed more efficiently.

The rumen contains a vast population of microflora – bacteria, protozoa, fungi and archaea.

Although we know a lot more about rumen function, new genomic techniques suggest we currently only know about 5% of rumen microflora, and the amount we still have to learn about the rumen offers enormous potential to dairy farmers.

But how does this understanding of the rumen translate into practical systems on farm?

**Tom Hough, NWF Technical Manager**



## PROVIDING EXACTLY WHAT THE COW REQUIRES

When we feed the cow we feed the rumen and specifically need to provide substrates for rumen fermentation. The rumen is the key driver of dairy cow performance and 75% of the nutrients required by the cow are the direct result of rumen fermentation. The cow uses these fermentation end products for maintenance, milk yield and milk composition.

Traditional rationing systems such as Feed into Milk produce diets based on gross factors such as ME, crude protein, rumen energy and protein and bypass protein, but don't differentiate between the different sources of energy and protein and how they are utilised in the rumen and within the cow.

Different carbohydrate and protein sources are fermented at different rates and the rumen needs the correct balance of the various sources to operate →

## Feeding Principles

→ effectively. New generation rationing software such as NWF RPM offers better understanding of rumen activity and conditions by considering the rates of digestion of carbohydrates and proteins in the rumen, and thereby indicates whether the supply of energy and protein is synchronised. In addition, rumen pH must not be allowed to fall too far as volatile fatty acids are produced during fermentation. This means taking account of rates of fermentation, the acid load and the fibre content of the diet.

The RPM system classifies carbohydrates and proteins as rapidly or slowly fermented. Rapidly fermented feeds are fermented in under two hours. The current Feed into Milk goes some of the way to estimating fermentation rates, but does so on a 'daily supply' basis. RPM effectively looks at energy supply on an 'hourly basis', giving far greater precision.

By more accurately balancing the rates of fermentation diets can be prevented which have, for example, rapidly fermented energy and slowly fermented

protein. Synchronising the diet in this way will lead to improved rumen function and health, increased feed efficiency and confidence that the cow receives the correct supply of digestion end products for maintenance and production.

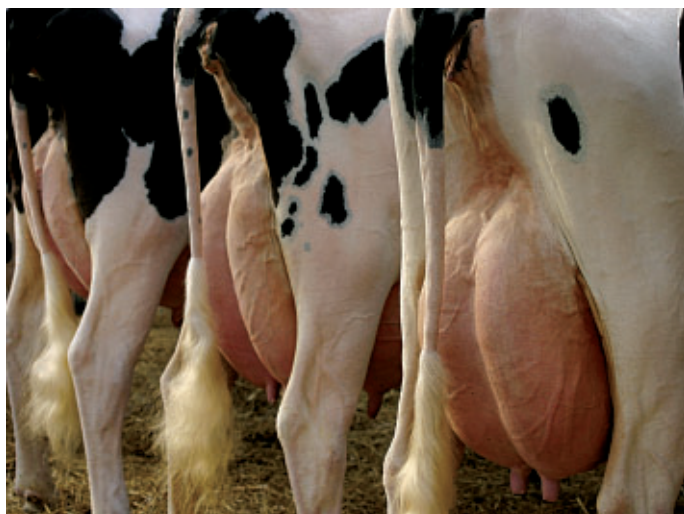
### NUTRIENTS AVAILABLE

The RPM model formulates diet based on the nutrients available from the end products of digestion which fall into three categories:

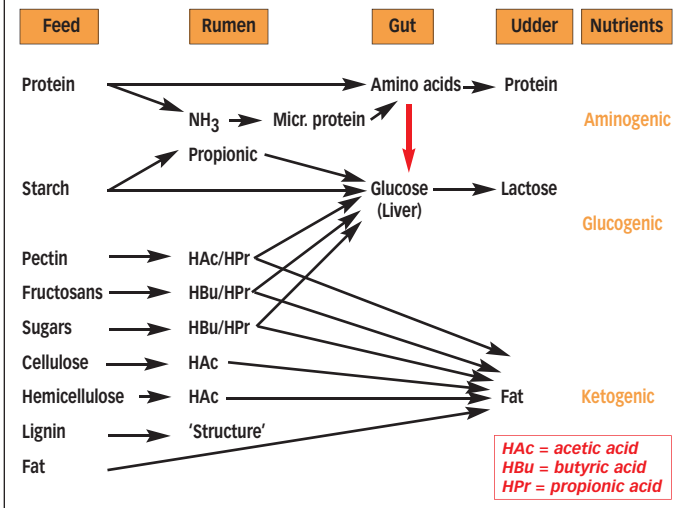
- *Glucogenic nutrients* derived from, for example, propionic acid and bypass starch which are essential for milk yield and milk protein
- *Ketogenic nutrients*, whose sources include acetic acid, butyric acid and digestible fat. These influence milk fat production
- *Aminogenic nutrients* are needed for milk yield and milk protein

A major glucogenic nutrient is glucose, derived principally but not exclusively from starch (see diagram on page 19).

Glucose is required for the



## Feed sources of nutrient classes



production of lactose in the udder. Under normal conditions, milk has a constant lactose concentration of typically around 4.6% for black and white cows.

As more lactose is produced, more water is drawn into the udder and so milk yield increases.

Therefore, if we can increase the supply of 'metabolic glucose' it should be possible to increase milk yields.

A cow yielding 50kg actually needs 3.6kg glucose per day.

Recent advances in rumen understanding have led to improved ration formulation programmes, meaning we can produce increasingly nutritionally sound diets to allow cows to meet their potential.

Take fresh calved cows as an example. Our understanding of the different end products of digestion means diets can be developed with the right balance of energy sources.

High yielders fed a greater

proportion of glucogenic energy as a percentage of total energy milked better and also showed improved fertility. So new glucogenic energy ratios have been developed to ensure the correct balance is fed through lactation.

As increasing glucogenic energy sources can mean feeding more starch, new developments have been made to better predict the effect of this on rumen health and so reduce the risk of acidosis.

### TOTAL DIET DIGESTIBILITY

New research is also giving a better understanding of total diet digestibility.

While the diet may appear to supply adequate energy, what matters is how the ration is digested.

Lignin is a dietary characteristic that significantly impacts digestibility and recent developments have led to greater account to be taken of its impact.

It is usually the shortage of →

# Rob Bell, Ullard Hall Farm, Knutsford, Cheshire

The 200-cow all-year-round Ullardene herd at Ullard Hall Farm, Knutsford, Cheshire run by Rob Bell averages 9,500 litres at 4.2% fat and 3.4% protein and is run as a single group. This, plus the fact there is only one silage clamp for a range of forages, makes diet formulation a challenge.

The cows are fed a partial mixed diet twice daily and concentrate is fed through a 10-point out-of-parlour feeding system.

### NWF RPM PROGRAMME

When diets were checked using the NWF RPM programme, with NWF Feed Specialist Clayton Barber, changes were identified which allowed a significant improvement in performance.

“The initial diet we had formulated looked fine and the

**Rob Bell's 200-cow herd is run as a single group**



cows were milking well, but when we ran the diet through RPM we found a number of areas that could be modified,” explains Mr Bell.

“The diet was low on the glucogenic precursors which drive milk yield so we decided to increase the starch and sugar in the diet with a focus on by-pass starch. We were able to stop feeding fats and changed the concentrate from a high fibre product to one with higher starch.

“Overall the starch levels were pushed further than we would have considered in the past, but we have seen a yield response and no signs of acidosis. RPM has helped explain the things we previously haven't been able to put our finger on,” Mr Bell continues.

“By achieving better rumen synchrony we have been able to reduce the diet cost and reduce overall protein content by 1% from 18% to 17%.

“RPM gave a new insight to the ration and the cows are now averaging over 30l per day and fertility is greatly improved.”



→ specific end products of digestion which causes disappointing performance. But the understanding of the importance of different nutrients means it is also possible to develop blends to influence production in different ways.

Feeds can be described in terms of the group of nutrients they provide to the cow.

In the past, blends were formulated to meet broad parameters based on energy in the form of starch, sugars and fat and protein *per se*.

However, we can now formulate blends with specific patterns of precursor production to balance the supply from different combinations of forages.

Glucumix blends are formulated to supply high levels of glucogenic precursors and may prove beneficial in predominantly grass silage rations, while Ketomix and Aminomix blends can help balance diets based on maize and wholecrop. Equamix blends provide a balanced supply of the nutrient types.

Farmers who exploit these developments in feeding and the technologies that deliver research into practice are able to feed more effective diets resulting in higher yielding, healthier cows.



### DELIVERING NEW INGREDIENTS

The better understanding of rumen function provides a huge opportunity for the development of new ingredients to improve dairy cow performance. We know how to make better quality, more palatable forages and need to ensure that supplementary feeds deliver the correct nutrient balance.

The science of rumen protected products is not entirely new. For many years, before its use was banned, fishmeal was →



# Nigel Broom, Logshayne Farm, Colyton, Devon

Nigel Broom runs a herd of 300 all-year-round calving Holstein cows and plans to increase numbers to around 350. Rolling yield is approaching 8,500 litres at 4.1% fat and 3.15% protein.

Last winter, although feeding what looked at first glance to be a balanced diet based on a 50:50 grass and maize silage and moist citrus pulp supplemented with soya and rapemeal, cows were not performing. Against an expected daily yield of 27l actual performance was closer to 22l.

“The energy density of the diet looked adequate with a good balance of energy sources,” explains NWF Sales Specialist Andy Essex. “Crude protein looked a little low but evaluation of the diet using the RPM system showed a problem with sources of protein. While rumen degradable protein requirements were being met, there was a shortage of undegradable protein.”

Based on this information the protein content of the ration was re-engineered with

**Nigel Broom reduced his feed costs by 4p/cow/day**



1.3kg of NWF Ultra Soy, a protected soya meal replacing the original soya and rape. This increased the supply of by-pass protein and reduced feed costs by 4p/cow/day.

## IMMEDIATE RESPONSE

“We made the change gradually but saw an immediate response,” recalls Nigel Broom. “Yields soon started to recover and we were soon averaging 26 litres per cow per day, which is where we needed to be. I didn’t appreciate the impact that changing protein sources would have on rumen activity and yields and it shows the precision that can be used when formulating cost effective rations,” he adds.



→ known to deliver benefits to dairy cow diets because a proportion of the protein was protected from digestion in the rumen, so providing a supply of DUP (dietary undegraded protein), now often referred to as microbial protein bypass (MPB).

While microbial protein synthesis in the rumen contributes around 75% of a cow's requirements, the balance comes from MPB.

As yield rises so MPB requirement increases (*see graph*).

## PROTECTED PRODUCTS

It is possible to protect feeds from degradation in the rumen and the inclusion of protected products in diets can improve performance and increase the nutritional value of ingredients.

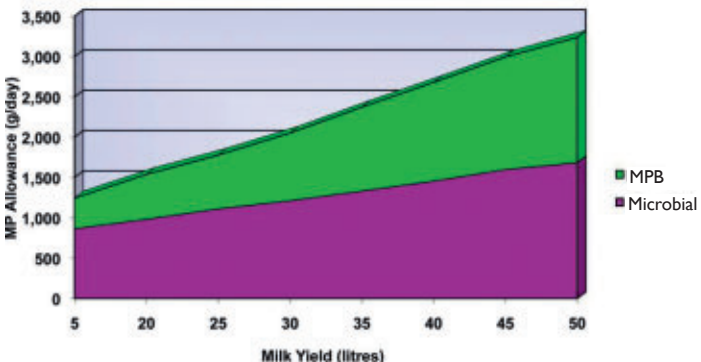
For example, protecting rape seed turns a basic protein source into a valuable source of DUP. Equally, protecting starch feeds such as wheat can allow an increase in starch fed while moderating the risk of acidosis.

While there is a range of protection methods available, the effectiveness of the protection will vary so it is important to check the values of the feeds produced.



The inclusion of protected feeds combined with our advanced understanding of rumen nutrition suggests that farmers will benefit from new technologies to ensure higher performing and healthy cows.

## MPB requirement changes as yield increases



# Is technology always the answer?



Farmers are besieged with information about new developments, which it is claimed will boost performance. But is technology always the answer? Promar International Principal Consultant **Emma Thompson** offers some pointers to achieving good results with new technologies

There is no doubt that dairy production has benefited phenomenally in recent years from technological advances across all aspects of the business – milking equipment, feeding strategies, and developments in cow comfort that have benefited the whole cow environment. The rate of progress needs to develop and there continues to be a steady stream of research and development that promotes new ideas and innovations, with new products often supported by substantial claims.

It is equally true that not all investments are applicable to all businesses, so how do you assess its potential contribution to your business?

Broadly speaking, technologies are normally considered beneficial if they:

- allow changes in the farming system that improve efficiency;
- address a problem within the business that hinders development;
- allow better resource use, or
- a combination of all three

But will they? And will the investment be cost effective? Before investing in any technology it is vital to ask some searching questions and to do your homework.

**Promar  
International  
Principal  
Consultant  
Emma  
Thompson**



### WILL THE TECHNOLOGY DELIVER THE SOLUTION YOU ARE LOOKING FOR?

Research the press and the internet for information about the product and speak to people who have already invested.

Have they got the anticipated benefits?

Have there been problems and, if so, how did they overcome them?

For example, one of the quoted benefits of robotic milkers is that they save labour, but a common observation from people who have invested is that this saving does not always materialise.

Granted, you don't have to spend time in the parlour twice a day, but other management aspects, such as reacting to cows that have not visited the robot, can consume the released time. Always find out as much as you can about the investment before making the commitment.

### WILL IT DELIVER A FINANCIAL RETURN?

What is the cost benefit of the investment? Complete a detailed budget for the new system, incorporating all changes to the system.

Build a buffer into the project as fulfilling time, cost and quality targets often takes longer than anticipated to achieve. The better the data and assumptions used in the budget, the more likely the project is to come in on cost.

Fully reconciled management accounts will mean your plan is based on more fact and fewer assumptions so it will be more robust.

### WHAT IS THE TRUE COST AND RISK?

The cost of the technology may be only part of the total cost. Are building changes needed?

Does cow flow need to be reviewed? Is more feed storage required? Will the existing equipment and resources cope?

You need to understand the total investment and how it will be financed.

Will the business be able to carry the finance charges on any additional borrowing?

What is the effect on net worth?

How sensitive is the plan to different levels of interest, milk price and technical performance?

### DOES THE BUSINESS HAVE THE NECESSARY SKILLS AND CAPABILITIES?

New technologies often require new skills if their potential is to be harnessed. This might mean investing in training to gain the necessary skills to operate equipment, the ability to analyse the results from computer systems or the management skills to integrate the new approach into the business. Many investments fail to deliver because of a lack of skills and training. Also, what is the level of support available to help you get the most from the investment?

### HOW WILL YOU MONITOR PROGRESS?

The investment is made, the technology arrives, but how do you know if it is delivering the results? How do you fine-tune performance?

An implementation plan with realistic performance benchmarks and a timescale for their achievement will help ensure the investment delivers. The use of a regular outside independent consultancy, such as Promar Dairy Excellence, can help everyone remain objective.

There is no doubt that dairy farmers must continue to embrace technologies.

The key is to ensure the investment delivers improved business performance.



# Fletcher Partners, Stapleton, Leicestershire

Greg and Annette Fletcher run a herd of 190 Holsteins at Woodview Farm, near Stapleton. The herd was housed all year round and in 2006 a significant investment was made in a new cubicle building and an upgraded parlour with pedometers, yet the anticipated improvement in performance failed to materialise at the planned rate.

In 2008 yields were around 8,500 litres per cow, but feed rate was above average at 0.4kg/l and the replacement rate was close to 30%. The pedometers had not been used. While the margin achieved was better than average, the increase did not reflect the investment in improved cow facilities.

### TIME FOR ACTION

The Fletchers joined the Promar Dairy Excellence service, with a full appraisal of the system performed in October 2009. The principal objective was to simplify the diet while increasing milk yields from forage with a return to grazing.

Several feed supplements that had been introduced in an

**Greg Fletcher joined the Promar Dairy Excellence service**



attempt to improve performance were removed to reduce diet cost. By focusing on basic management and attention to detail it was possible to improve performance while realising the anticipated benefits from the investment in cow comfort and the milking facility. Better rumen health has led to healthier cows, and fertility is improving while mastitis cases and cell counts are in decline.

### RESULTS

Herd performance is summarised in the table below. Milk yields have increased with a far greater proportion coming from forage. The extra margin of nearly £400 per cow means the farm is better placed to meet the costs of the investment.

## Herd Performance

	October 2009	May 2011
Herd size	188	190
Milk yield per cow (litres)	8,557	9,390
Milk price (p/l)	28.2	28.2
Feed rate per litre (kg/l)	0.4	0.29
Yield from forage(l/cow)	1,451	3,525
MOPF/cow (£)	1,796	2,169



# Low cost investments can deliver

There is a common conception that new technologies come with high capital costs, but it's not always the case, as Promar Principal Consultant **Richard Hooson** explains

Mastitis is still one of the major causes of losses on UK dairy farms. Foregone cell count bonuses, reduced production, the cost of treating clinical cases and avoidable culls cost the industry dear.

For a typical 1.2 million-litre producer with a rolling cell count of 300,000 the cost of lost bonuses could be 2.1p/l or more – a staggering £25,200 per year. But simple cell count monitoring systems can help reduce this cost and give a good return on investment.

There is broad agreement that it is important to identify and deal with persistent problem cows.

While tests carried out at milk recordings can spot offenders, the data generated is often too

**Promar  
Principal  
Consultant  
Richard  
Hooson**

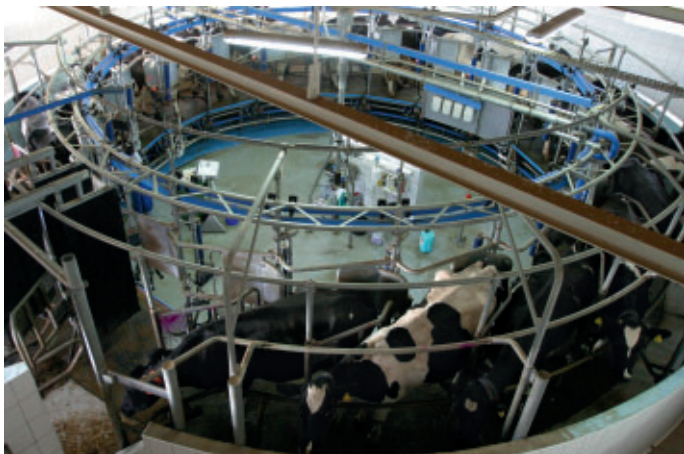


little, too late. Effective management requires more regular sampling.

## WEEKLY TESTING

Research suggests that weekly testing is a more effective way to provide an early warning of a developing cell count problem and allows for corrective action to be taken.

Effective control means en-





asuring 90% of cows are monitored two to three times a week and at least 99% are monitored once a week.

This frequency of analysis requires an automated system operated at milking.

The Promar CellSense is an automated test for cell counts based on the California Mastitis Test. It can be quickly fitted to any configuration of milking parlour and allows speedy assessment of individual cell counts with no disruption to milking routines. If the unit is fitted on every third cluster, on average, each cow will be tested every other day.

### TRAFFIC LIGHT SYSTEM

A small sample of milk is diverted into the unit and analysed with the result displayed using a traffic light system so the user receives an immediate warning of high cell count cows.

The system has been extensively trialled in both the UK and New Zealand, and both reliability and accuracy are excellent,

with results 92% accurate compared with laboratory testing.

The running costs, including capital repayment, work out at less than 2p per test.



# David and Eileen Wallbank, Tills Farm, Wyresdale, Lancs

“If we want to keep on top of high cell count cows, we can’t wait for the monthly milk recording statements before making management decisions,” explains David Wallbank.

“Cellsense gives up a much faster warning of any problems, allowing us to take action quickly to preserve bonuses.”

David and Eileen Wallbank and their son Alan run a herd of 240 Holsteins averaging over 9,000 litres per cow and produce over 2.2million litres of milk every year. Milk is sold to Arla Tesco and the payment scheme includes a bonus of 0.6ppl for cell counts below 250,000 cells/ml.

### CELL COUNTS

Cell counts at Tills Farm average around 150,000-160,000 but Mr Wallbank knows that it would only take three to four problem cows to move this over the threshold.

“Milk records do identify high cell count cows, but each month it can be a different group of cows which means we could have been adding high cell count milk to the bulk tank for several weeks and not



David Wallbank with son Alan

known it. We need to keep on top of problem cows and so needed accurate data more quickly and without additional work. With Cellsense we know immediately a cow has a raised count and can tail tape them and stop milk going into the tank immediately. The technology allows us to take faster actions to preserve the bonus.”

Cellsense was fitted to the 17:34 parlour in March 2011. Installation was easily fitted around milking so there was no disruption to routine. Four test units were fitted, meaning that 24% of the herd are tested each milking.

“We just get on with the milking and the traffic light system clearly indicates any problems, allowing us to act in a timely manner.”



Promar's CellSense can be quickly fitted to any configuration of milking parlour

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