Kite update
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# Which dairy system? USA, NZ or UK

By Mike Bray
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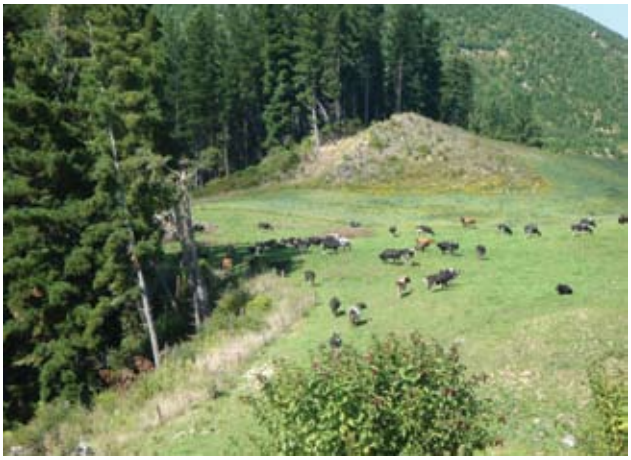
We are being constantly challenged by the debate over which dairy system we should adopt - the fully housed route, extended grazing or a combination of the two.

Having just returned from New Zealand and experienced their wonderful climate I now understand how they can run a system fully outdoors. The Waikato on the North Island where I spent most of my time has an annual rainfall of 1200mm with about 80-120mm on average each month. Temperatures range from lows of 7°C in winter to summer highs of 25°C, the soils are free draining and grass growth is all year round. The cows are grazed on a 21 day rotation, calved, served and dried off in blocks which all makes for a fantastic work:life balance. However, they lack a local town market for their milk and are therefore totally reliant on the world market for their product pricing. There is no supermarket milk pricing model to help reduce milk price volatility, it is boom or bust!

Equally, I have also seen the American system of dairying that is spectacular in a different way, more in terms of its scale of herd size and milk yields per cow. Although they have a much bigger domestic population they are still dependent on the world market and again their system is not immune to periods of boom and bust.

After much reflection I have come to the conclusion that as we are dairying in the UK then we should have a UK system which is our own. However, I believe it will be a composite of the two extremes from the US and NZ. We need to remember that our consumers need milk every day of the year so as a country we cannot operate on a totally seasonal production basis, but also that our climate does allow for periods out at grass to help to take some of the cost out of the system at certain times of the year. The mix is probably seven months of being fully housed and then five months of grazing, given “average” conditions.

## The UK system - key points to consider:



*New Zealand cows grazing on reclaimed woodland*

When housed: high quality minimum 70 D value well fermented forages, TMR or partial TMR feeding with at least 0.6m feed space and comfortable cubicles that allow cows to lie down for up to twelve hours per day. This level of cow comfort will minimise standing times and reduce lameness, which is our biggest challenge to cow fertility. We may even want to consider rubber matting in parlours, collecting yards and feed passage ways to reduce the impact of concrete during the seven months of winter.

At grazing: when we turn out tracks must be to a high standard to avoid any lameness from walking up to a mile. Access to plenty of water is essential and we should aim to create up to 21 paddocks from which we can run a true rotational grazing system. This program gives potential to increase the amount of grass grown as it allows the grass plant a chance to replenish its energy sources, unlike a set stocked system and therefore offers high volumes of grass of high quality before the seed head starts to form. Once these appear we have lost the battle and grass D-value falls and with it potential milk yield. Aim to graze the pregnant cows by day and night but the freshly calved pure Holstein may need to be housed overnight to ensure high dry matter intakes and therefore fertility.

With our large herd scale by European standards, a sophisticated affluent well developed local market and taking the best aspects of our competitors around the world we have the potential for a sustainable and profitable future.

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# The heat is on

By Tim Davies
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The concept of combining ambient temperature and relative humidity into a 'Temperature Humidity Index' (THI) was first introduced more than 50 years ago. Traditionally a THI of less than 72 has been assumed not to compromise milk production and animal welfare, but new work is suggesting that a level of 68 is more appropriate for modern high performance cows. A new table is being devised and will be available shortly, but a fresh look at the old one will give some idea of when cows will start to suffer.

Relative Humidity

| Temperature °C | °F | 0 | 5 | 10 | 15 | 20 | 25 | 30 | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 24 | 75 | | | | | | | | | | | | | | 72 | 72 | 73 | 73 | 74 | 74 | 74 | 75 |
| 27 | 80 | | | | | | | 72 | 72 | 73 | 73 | 74 | 74 | 75 | 76 | 76 | 77 | 78 | 78 | 79 | 79 | 80 |
| 29 | 85 | | | 72 | 72 | 73 | 74 | 75 | 75 | 76 | 77 | 78 | 78 | 79 | 80 | 81 | 81 | 82 | 83 | 84 | 84 | 85 |
| 32 | 90 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 86 | 87 | 88 | 89 | 90 |
| 35 | 95 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 |
| 38 | 100 | 77 | 78 | 79 | 80 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 90 | 91 | 92 | 93 | 94 | 95 | 97 | 98 | 99 | |
| 41 | 105 | 79 | 80 | 82 | 83 | 84 | 86 | 87 | 88 | 89 | 91 | 92 | 93 | 95 | 96 | 97 | | | | | | |
| 43 | 110 | 81 | 83 | 84 | 86 | 87 | 89 | 90 | 91 | 93 | 94 | 96 | 97 | | | | | | | | | |
| 46 | 115 | 84 | 85 | 87 | 88 | 90 | 91 | 93 | 94 | 96 | 97 | | | | | | | | | | | |
| 49 | 120 | 86 | 88 | 89 | 91 | 93 | 94 | 96 | 98 | | | | | | | | | | | | | |

No stress
Mild stress
Heat stress
Severe stress
Death

*Source: University of Arizona (modified)*

## What are the signs of heat stress?

Heat induces lethargy in cows. This results in reduced feeding time and reduced DMIs, with every 1kg reduction in DMI reducing milk yield by 2 litres. We also see increased panting, less cudding and hence saliva production leading to rumen acidosis and animals standing for up to 2.5 hours/day longer. This results in reduced blood flow to the udder and more strain on legs and feet. Excess heat will trigger drops in milk yield and butterfat percentage and cause problems with infertility and early embryo death. Immune systems come under pressure leading to mastitis, high cell counts and other disease issues. If DMIs and milk yields drop by more than 10% during hot weather then check a sample of cows for further symptoms. If more than 70% of cows have respiration rates of >80 breaths/minute or 70% have a temperature of >103º F then there is a problem.

## Prioritising actions to minimise the effects of heat stress

- Ensure that plentiful supplies of cool, clean water are available. Cows will drink the majority of their water requirements immediately after milking. Allow at least 2' of trough space for each cow in a batch and ensure water flow is sufficient. A minimum of 3" water depth is required to allow for the cow's muzzle. Troughs should never be empty - more troughs or better flow rates may be required to prevent this.
- Provide some shade, especially for high yielders that have faster metabolisms and hence generate more heat. Keep cows out of the sun during the day and allow them to go out at night. Pressure points where cows are forced to stand together should be prioritised for attention (e.g. collecting yards)
- Alterations to the diet can also help to minimise stress levels. Reducing the forage:concentrate ratio increases the energy density of the ration thus mitigating some of the effects of the reduction in DMIs. It also reduces heat production as fibre digestion produces more heat. Potassium, sodium and magnesium levels in the diet should be increased to counter the loss of salts through sweating and increased breathing rates, and buffers and yeast should be added to minimise sub acute rumen acidosis.
- Dust and dirt on cows' backs significantly reduce evaporation rates and hence the ability to control temperature so provide brushes for cows to clean themselves and shave cows backs if possible. Dust can also reduce the effectiveness of fans by partially blocking them so make sure they are working effectively. Roof lights can create a greenhouse effect in sheds - painting the underside of these white can aid heat reflection and reduce temperatures. Ensure good ventilation - remove cladding from buildings to improve airflow and if you do invest in fans situate them correctly to move air in and out of the shed instead of just stirring it around.

The above actions can all help to make life more comfortable for animals, but are unlikely to be sufficient on their own in very hot weather. Reducing the cows' core body temperature through a combination of fans and water can lead to benefits lasting for several hours, but this needs to done in a way that avoids excess water reaching the udder and causing contamination. Target areas where maximum heat is generated first (collecting yards and parlours) and then, if cows are housed throughout the year, look at the options for cooling feed areas and cubicles. During the summer we will be measuring temperatures and just as importantly, humidity levels on a number of units to give us a better picture of the situation in the UK.

# Acid loading

By Tanya Coleman
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The acid loading on the rumen influences the performance and welfare of high performance cows and careful regard for the nutrition and management of the cow can prevent problems occurring.

The rumen is essentially a fermentation vessel that provides the ideal environment for millions of bacteria and protozoa. In return, these bugs produce microbial protein and volatile fatty acids, allowing the cow to make use of otherwise indigestible food sources.

In normal situations fibre-digesting bugs dominate fermentation. They break feed down into organic acids, which are absorbed lower down the intestine and rebuilt in the liver to provide glucose, with some 70-80% of the cow's energy derived in this way. When high levels of starch and sugar are fed, diets are unbalanced, or fibre levels are insufficient, there is an increase in acid production causing the pH to fall. This is turn causes changes to the fermentation pathways, with lactic acid producing bacteria replacing acetic acid producers and as the pH drops the fibre-digesting bacteria eventually stop working, less fibre is digested and intakes drop. If the pH continues to fall to 5-5.5 the rumen papillae and epithelial cells are burnt off, less nutrients and energy can be absorbed and in extreme conditions lactic acid can end up in the bloodstream. The pictures below show the impact of acidity on the rumen wall, with the picture on the left showing a healthy rumen wall, whilst the picture on the right shows considerable damage.This increase in acidity has three

*Healthy rumen wall*

*Damaged rumen wall*

potential outcomes with increasing degrees of severity:

1. Sub clinical acidosis (SARA). Symptoms include lower and variable DMI and milk yields, low butterfats and weight loss. Dung can be foamy and may contain undigested grain and mucosal tissue. Tail flicking and cud spillage will be seen and in the longer term this can lead to laminitis, increased infertility due to weight loss and increased mastitis as the immune response is compromised.
2. Clinical acidosis will result in very low DMI, reduced rumination, excessive weight loss and very sick cows. This will tend to lead to a host of other health problems such as ketosis, DAs, ulceration and ultimately metabolic acidosis.
3. Metabolic acidosis is the most serious of the three and will cause death.

## Risk Factors

There are a number of nutritional and management factors that will put cows at greater risk of developing acidosis:

- Diets that are high in readily fermentable starch and sugar, have inadequate long fibre or are overmixed.
- Slug feeding concentrates, either in the parlour or in TMR buffers with inadequate forage, along with an inadequate water supply and little or no buffering.
- Wet silages with low pH levels (we have seen wet maize silages at pH 3.4 by late winter) and samples with more than 100g/kg Dry Matter of lactic acid should flag up potential danger.
- Poor dry, transition and fresh cow management. Feeding cows with high energy density TMRs or lots of cake in the parlour too soon after calving will cause problems and cows should be built up gently over a period of 2-4 weeks.
- Cow comfort is crucial in mitigating problems. Ensure that cubicles are comfortable, feed barrier design and space availability are correct and that heat stress is avoided.

## Prevention

To prevent acidosis problems it is important to feed a rumen friendly diet. As a starting point you should try to make silages that carry a lower acid load and this can easily be achieved by increasing the dry matter. With the machinery now available it is possible to get grass silages to 30% DM very quickly and by being patient and letting maize silage mature, or by using an earlier variety, very low pH levels can be avoided. The pH, Potential Acid Loading (PAL) and the VFA breakdown on the silage analysis will act as guide to how the forages will behave. There is also the option of using alkalage in the ration to counter acidity if problems are anticipated.

When the ration is being prepared it is important to remember that it is the level of 'effective' fibre that is important so the chop length of the silage, the inclusion of hay or straw and the avoidance of over-mixing the TMR are crucial. A minimum inclusion rate of 11kg forage dry matter should form

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the basis of a rumen friendly diet.

A well balanced diet will include feeds to provide digestible fibre (sugar beet, citrus pulp, soya hulls) as well as cereals and the way that the starchy feeds are presented will also play a part. Caustic treated or coarsely ground wheat will behave very differently to finely milled cereals.

A check on the predicted NDF and ADF levels of the ration will give an idea of how it will perform, but the cows will deliver the final judgement. We now have a profusion of rumen buffers like yeast, limestone, bicarb and salt available on the market to counter the effects of acidosis and these products are extremely important in the fine tuning of the diet for high performance cows.

## Summary

- Make drier silages with reduced acid loads
- Ensure correct chop length
- Use a range of energy sources to provide digestible fibre
- Do not over process the mix
- Avoid slug feeding
- Optimise cow comfort

# Kite link up with Liverpool University

By Neil Blackburn
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Apart from our farm work, Kite get involved with a wide range of projects and a recent example is working with vets and lecturers from Liverpool's Faculty of Veterinary Science.

Ros Hughes and I head up the Kite delivery team, and are working closely with Rob Smith from Liverpool on a 5 year, £18 million Rural Development Programme in the North West of England. The programme involves a support package for farmers in the region, of which one element is improving animal health and welfare planning and where appropriate accessing capital grants for new equipment. Other support packages include help on nutrient management and resource efficiency.

*Cow housing at Wood Park Farm, University of Liverpool*

Kite and Liverpool's role is to train advisors and vets within the region on animal health planning best practice and provide on-going technical support over the 5 year programme. Working with Liverpool has lead to other joint work opportunities being explored as there are many synergies between the two organisations.

As part of Kite's ongoing programme of improving our own technical expertise, the team recently visited the Faculty's Wood Park Farm. The unit incorporates both teaching and research facilities but is also run on a commercial basis. Recent research work on cow fertility was hotly debated at the meeting as it is an area which can still be improved on many farms. Wood Park Farm is also trialling new rumination monitors. These are an exciting prospect for the UK as they can potentially alert farmers to cows that are off colour before they become sick and also give guidance on underlying herd rumination levels, which are critical to cow health and performance.

## RPA update

The RPA are currently updating the Rural Land Register and therefore will be producing new maps for every recipient of Single Farm Payment and Rural Development schemes. You have 28 days from the receipt of the maps to confirm whether they are correct or notify the RPA of any changes. Please check these as soon as they arrive as they will be using the information as the basis for future payments and also farm inspections.

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