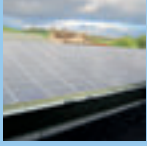


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The newsletter for the Welsh dairy industry



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Cronfa Amaethyddol Ewrop ar gyfer Datblygu Gwledig: Ewrop yn Buddsoddi mewn Ardaloedd Gwledig
The European Agricultural Fund for Rural Development: Europe Investing in Rural Areas



Canolfan Datblygu Llaeth
Dairy Development Centre

DairyCo



Llywodraeth Cymru
Welsh Government

Note from the Editor

With the winter firmly with us and the cows housed once again, on this page we take a look at the link between cow comfort and cow profitability. Indeed, now is the opportune time to assess the comfort of your herd and decide whether changes are needed before the next winter.

On pages 4 and 5 we turn our attention once again to renewable energy, but this time the focus is not on energy generation, but its utilisation. With significant savings to be made, we take a look at the ways and means of improving farm energy storage and utilisation.

Dairy expansion has become the norm for many over recent years but any form of expansion requires careful planning. On pages 6 and 7 we learn how one family puts the success of their expansion down to matching the right infrastructure to their expansion needs.

To find out more about up-coming events, take a look at the 'News in brief' section on page 7.

Precision livestock farming – or PLF – is the latest buzzword in farming, with interest in cow sensor technologies for disease and heat detection proving particularly popular. With this in mind, on page 8, DairyCo's R&D manager, Dr Jenny Gibbons takes a look at the emerging technologies that are evolving the way dairy cattle are managed, bred and fed.

Please continue to send us your feedback as well as suggestions for content in future issues.



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Cow comfort

A comfy cow is a profitable cow

Making minor changes to existing cubicles can improve cow comfort and increase milk yields. Spend this winter assessing your cow's comfort and make a list of what needs to be done next spring and summer when stock are out.

Comfortable cows will produce more milk. If you can achieve an extra 1-2 litres per cow per day across your herd by improving cow comfort, then that's an opportunity not to be missed!

Minor modifications with minimal expense, such as moving a neck rail, knocking out a wall or increasing bedding quantity, can lead to considerable benefits.

How comfortable are your cows?

Observing how your cows interact with their cubicles can provide clues to what changes are needed. Shiny metal on the underside of the neck rail, cows standing diagonally or perching are sure signs that your neck rail is badly positioned; simply moving it forward slightly can improve lying times. Cows lying diagonally, shiny partitions or cows lunging to the side, can indicate an obstruction to the cow's lunge space or the cubicle is too short. Check there is enough lunge space and that the

brisket board isn't too high. Remove any obstructions in the lunge area and move or lower the brisket board.

Do your cows have hock injury?

Hock injuries are an indicator of poor cow comfort. Research at the University of Nottingham has shown that 99% of cows in 77 herds had some form of hock injury. Nearly 90% suffered from hair loss, 12% had lesions and 100% had a degree of swelling on the hocks. These injuries are caused when there is a thin layer of abrasive (e.g. coarse sawdust) or wet bedding over a hard or abrasive surface (e.g. mat or mattress). If more than 10% of your herd has a hock injury, then consider increasing the amount of bedding used or change to a less abrasive material or both. Check the comfort of the lying surface by rubbing it with the back of your hand to make sure it does not graze or cut your skin.

To download a copy of DairyCo's troubleshooting guides on improving cow comfort visit:
www.dairyco.org.uk/hairloss and
www.dairyco.org.uk/swellings



Do your cows have enough bedding?

Whatever bedding you opt for, don't skimp on how much you use and there is no point in using poor quality. Overall, deep beds are the direction most farmers are heading or at least mattresses which offer very high levels of support and traction.

Deep sand has long been a firm favourite in the US and is widely accepted as the gold standard bedding material, primarily because it limits bacterial exposure to the teat end and provides cushion, traction and support for the cow during the standing and lying process. From a survey of 176 herds in Wisconsin, sand-bedded herds carried a benefit of 3.2kg milk per cow per day and 1,152kg rolling herd average milk. Sand bedding isn't for everyone and cows housed on mattresses with good coverage of bedding lie down for up to an hour longer per day compared with cows housed on hard rubber mats with little bedding. Lying time increases by 12 minutes for every additional 1kg of sawdust provided. This will come as no surprise, as it's well documented that cows prefer softer surfaces and spend more time lying down in well-bedded cubicles than those with little or no bedding.

Deep-bedded cubicles are by far the best at reducing hock lesions and rubber mats are the worst, with mattresses performing somewhere between the two. Bedding levels in deep-bedded cubicles decrease over days and lying time declines as the bedding material empties in the cubicle. Every inch decline decreases lying time by about half an hour per day. If your herd does lounge on deep-bedded cubicles, maintaining bedding so it is level to the curb will achieve optimum comfort.

Wet bedding reduces lying time more than any other feature of cubicle design or maintenance and significant reductions in lying time are seen when bedding drops under 60 per cent dry matter. Cows prefer lying in dry cubicles and to achieve this, good ventilation and



2-3 times a day cleaning and topping up with fresh bedding is necessary.

Is there one 'usable' cubicle per cow?

Cows are highly synchronised, lying down at similar times of the day, which can result in more competition for cubicles and reduced lying time when cows are overstocked. Each cow should have access to one usable cubicle. Broken cubicles or those situated next to the water troughs that frequently get wet should not be counted as usable cubicles.

Are your cubicles the right size?

A UK survey showed that Holstein/Friesian cows at pasture require a lying space of 2.4m long, 1.2m wide and an additional 0.6m length for lunging. When these parameters were considered, it was reported that 87% of cubicles in the study were too short and 50% either too wide or too narrow.

Once you have observed your

cows, the first step is to fix what is broken or make minor changes to the neck rail or brisket board. Then use a tape measure to assess the dimensions of your existing cubicles. Be sure to collect measurements for all types of cubicles in your shed. For example, the dimensions may be different for cubicles on the outside walls or if a different type of partition is used in one row. Once you have collected this information, compare your dimensions to the recommendations listed in the DairyCo *Dairy Housing – a best practice guide*. Optimal cubicle dimensions will vary according to the size of your cows and there will always be compromises but aim to cater for a typical third lactation cow.

Remember, lying surface is the most important aspect of cubicle comfort. Replacing old cubicles with new ones will not improve cow comfort or lying times if the basics are not right.



Further information can be found in DairyCo's 'Dairy Housing – a best practice guide'. To order your copy, call the DairyCo publications line on 024 7647 8702 or visit: www.dairyco.org.uk

Utilising renewable energy

While many farms have invested in renewable energy, such as wind and solar photovoltaic (PV) systems, few have looked closely at the utilisation of these energy sources. Wind and PV are, by their nature, intermittent supplies and while they are predictable to a degree on a monthly and annual basis, they remain relatively unpredictable daily or even hourly. Energy storage and improving utilisation is therefore worth considering.

It is important to realise that Solar Feed-in Tariffs (FiT) consist of two parts, generation and export. In order to maximise your return through the FiT, it is also imperative that you understand when you are most likely to be generating energy and when you will be exporting it.

To further increase your Return On Investment (ROI) and lower the payback period of any Capital Expenditure (CapEx), it would be prudent to use as much of the generated energy as possible on the farm, thereby reducing the need to purchase energy from the Grid.

Figure 1 shows the time in years whereby the annual cash savings made by reducing imported energy costs outweigh the cash income generated by FiTs for a typical 50kW PV system. This analysis assumes a 3% increase in FiT due to RPI and an 8% annual increase in imported energy cost and ignores the 3.5% FiT degeneration, which is subject to market status.

Simple changes to the workday routine can contribute to reducing energy costs. Switching on water heaters, ice builders, water pumps or electric slurry pumps to coincide with peak energy production can allow you to utilise PV energy at its time of production, thus resulting in reduced energy costs. This can be automated by installing simple time switches.

Figure 1

Utilisation % of solar PV energy	Number of years before savings are greater than FiT income
50	15
60	14
70	8
80	5
90	3

There are many ways to increase utilisation of renewable energy through the use of technology. While these changes will have a capital cost implication, they can deliver significant benefits.

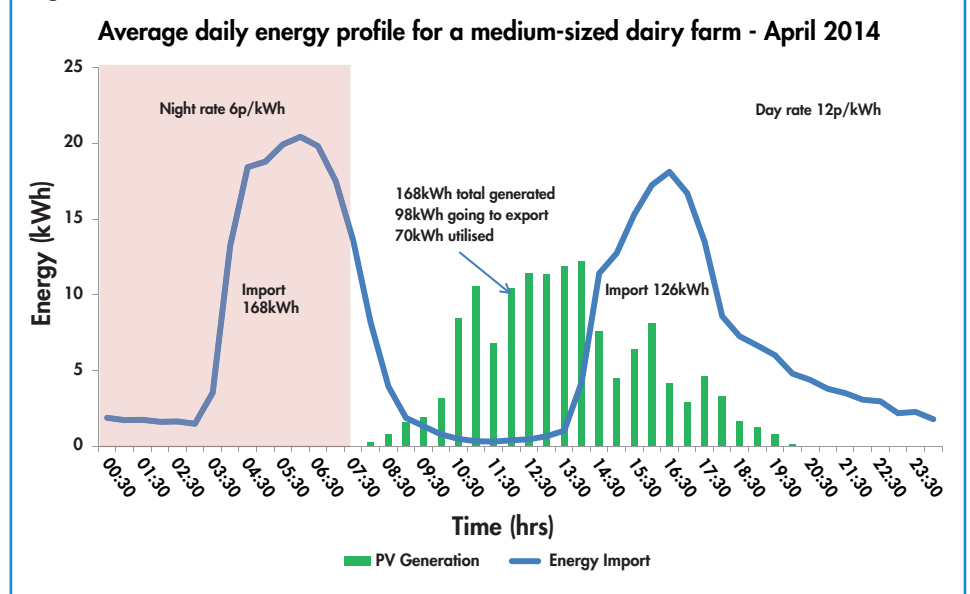
Farmers considering erecting new buildings should consider their orientation and roof pitch. Roof orientation is particularly important for dairy farms considering PV. While southern facing PV systems will yield the greatest energy, those facing the west may be preferential, as the PV system will continue to generate electricity later in the afternoon and therefore, may coincide with afternoon

milking times. The milking equipment would then effectively be powered by the late afternoon sun, avoiding the need to buy in energy from your energy supplier, especially during the summer months (see Figure 2).

The effect of facing a PV system south west rather than due south at a pitch of 15 degrees amounts to a typical reduction in annual energy yield of around 3%. The reduction is larger as the roof gets steeper, but even at a roof pitch of 45 degrees, this only equates to a reduction of around 6%. Often farms have several suitable sheds and splitting the PV system over two roofs may be worth considering, e.g. locating a 20kW on a south face and 10kW on a south west face would reduce annual yield by only 1% but the utilisation of PV energy would be greatly improved.

The shifting of the solar peak by facing the solar array towards the west rather than south can be seen in Figure 3. Based on simulated data for a solar system at a tilt of 45°, the peak power delivery is delayed by about three hours. The effect is less pronounced for arrays at shallower tilt angles.

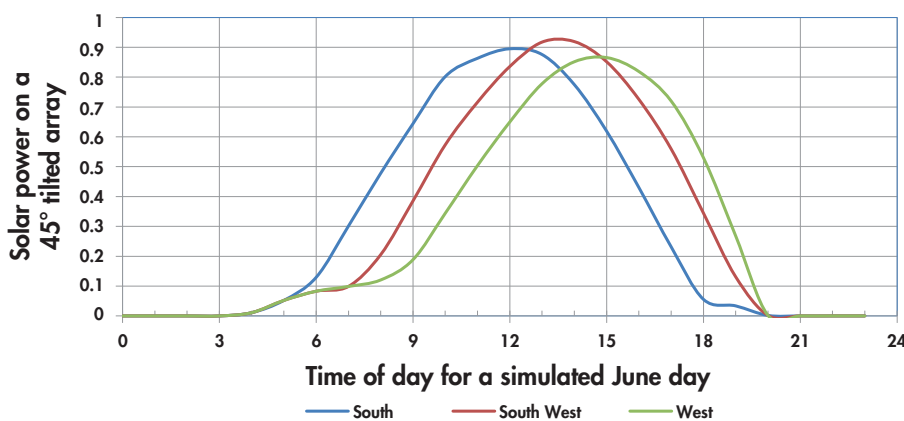
Figure 2



Energy profile for a medium-sized dairy farm with a 50kW PV system showing 42% utilisation of PV energy.



Figure 3



Facing solar arrays towards the west shifts the production peak to later in the day.

Storing electrical energy as thermal energy can also be a relatively inexpensive way of capturing renewable energy.

- Ice banks/builders are common on many farms and when combined with heat recovery units (HRU), can play a significant role in providing hot water for wash down purposes. Ice banks can be timed to use renewable energy.
- Farms with PV or wind can utilise any excess electrical energy directly via immersion heaters to heat water. Export energy diverters measure the amount of energy being exported to the grid and are able to divert it to a large buffer tank.
- Modern thermal storage tanks lose very little energy overnight (approximately between 0.5% -

1.0% per hour). The buffer tank will preheat water prior to final top-up by an existing water heater if required. While standby losses are low, maintaining or improving insulation levels and careful siting can contribute to energy savings.

Excess renewable energy can be stored using batteries, although these can be costly to install and complex to maintain. Storage of useful quantities of energy typically means banks of lead acid batteries with associated control and maintenance equipment. New battery technology such as lithium ion is now becoming more available, with a greater depth of discharge (DoD), meaning less batteries are required.

Batteries may last years, depending on their usage and technology, before needing to be replaced, although

typically 3-5 years of daily charge/discharge cycling would be a more accurate assumption. Some solar inverters can activate switch-on loads dependent on the generated power they are producing. This can be a cost-effective way of triggering pumps to turn on when renewable energy is available. Load sensing relays can also be used to switch equipment on or off, dependent on the source of energy available (e.g. motors and pumps).

With electric farm vehicles (e.g. ATV buggies and quad bikes, hybrid tele-handlers) becoming more readily available, it is becoming feasible to charge these vehicles using surplus renewable energy.

Conclusion

Renewable energy systems can provide a worthwhile income stream for all farmers. Ensuring that energy delivery is maximised is of paramount importance to protect this cash generator. However, as FiT values fall and power prices rise, more attention should be focused on increasing the utilisation levels of generated energy on farms. 'Time of Use' and 'Time of Generation' will become critical tools in reducing energy costs. Both passive and active methods can be employed and key to them all is a thorough understanding of the technologies and a knowledge of where, how much and when energy is being used.

Dairy expansion at Pentrefelin

A Welsh dairy farming partnership, which has significantly increased cow numbers, says the efficiency of the new system has been underpinned by matching the right infrastructure to expansion needs.

The Jenkins family milk 360 spring-calving cows at Pentrefelin Farm, a Farming Connect Demonstration Farm near Talsarn, Ceredigion.

Careful planning went into the infrastructure needed when cow numbers increased, including cow tracks, water supply and paddock sizes.

During a Farming Connect open day at Pentrefelin, dairy systems designer, Bertie Troy, joined Eurig and Irfon Jenkins and their father, Aeron, to advise farmers on steps they should take to ensure efficient and profitable expansion.

Mr Troy, of Grasstec, said planning and understanding a farm's capacity for production is fundamental. "In a grass-based system it is important to know how much grass a farm is capable of producing and to match that with future herd size.

"On all the projects we work on we first get an accurate picture of where the farm business currently is and where it wants to go in terms of cow and youngstock numbers. Once a plan is on paper it is much easier to build efficiencies into expansion.

"Modern farm infrastructure enables a business to be efficient and sustainable and that means more profit."

At Pentrefelin, a 44/88 parlour allows a throughput of up to 240 cows an hour. Maximising cow flow is important, advised Mr Troy. "Cows exiting straight into paddocks is relevant on any farm."

Handling facilities are important too. "If handling facilities aren't good, then insemination is going to be difficult and lame cows won't be pulled out for treatment," said Mr Troy. He recommends a herringbone crush for large, block-calving herds.

Cow numbers will dictate paddock size, as will the volume of dry matter a farm's grazing leys are capable of producing.

Between 35-40 cows can graze

one acre during a 24-hour period. "If you are milking 300 cows there will need to be 10 acre paddocks for 24 hour grazing or 15 acres for 36 hours. Work out the size of the grazing platform, as this will determine stocking rate," said Mr Troy. Twenty one paddocks are needed for a 21-day rotation in the grazing season, with Mr Troy favouring square paddocks with multiple access points. A series of cow tracks at Pentrefelin enable the grazing season to be extended. For a 250-cow herd, Mr Troy recommends five metre wide tracks, extending to six metres nearer to the farmyard. "Roadway design is key to efficient cow flow and comfort. Tracks must have a surface that you would be happy to walk on in bare feet."

The supply of water to paddocks should be sufficient to satisfy up to 50% of the herd's requirements in the first 90 minutes of cows entering a field. "Pump, pipe and valve sizes are important, if these are correct, trough size is not such an issue," said Mr Troy.

The Jenkins' have extended the grazing season to maximise the



Left to right: Menna Williams, Irfon Jenkins, Charlie Morgan, Bertie Troy and Eurig Jenkins with clover

Targeting Youngstock

Don't miss the opportunity to brush up on your calf rearing knowledge at the 'Targeting Youngstock' event being held at Carmarthen Showground on Tuesday, 16 December 2014. The event, which is funded through the 'Improving the Welsh Dairy Supply Chain' project, will see guest speakers Owen Atkinson, Dairy Veterinary Consultancy Ltd and Tim Potter, National Youngstock Association, discussing topics that include colostrum management, scours, pneumonia, nutrition and suitable growth targets. There will also be numerous trade stands present at the event, displaying their calf related products.

So save the date and join us for an enjoyable and informative day.

For more information or to book your place at the event, contact Dylan Jones on 01554 748570 or e-mail: dylan.jones@colegisirgar.ac.uk.

Rural Affairs Conference

Wales YFC is holding their first Rural Affairs Conference in December, thanks to the generous support of Clynderwen and Cardiganshire Farmers. The one-day event will be held on Saturday, 13 December 2014 between 10am and 4pm on the Royal Welsh Showground, Llanelwedd and is open to past and present Wales YFC members.

The theme of the conference is 'Excellence and innovation to inspire our future' and speakers include Michael Eavis from Glastonbury; John Campbell OBE from Glenrath Farm, Scotland; Catherine Nakielny, an independent sheep consultant and Tom Allison, a technical engineering manager. The conference will also have a practical twist, as attendees will have the opportunity to 'get their hands dirty' while trying out some of the latest technology.

For more information, contact Sarah Price on 01982 553592 or e-mail: sarah.price@yfc-wales.org.uk.

potential of producing milk from grass.

Grassland and forage specialist Charlie Morgan advises all farmers to increase the grass production of their farms. "Grass is going to be your cheapest feed. When you are under pressure on price, this is what you can make work better for you," said Mr Morgan, a speaker at the open day.

Reseeding has many benefits, because plant breeding has generated grasses with a 1-2% year-on-year improvement in dry matter yields. Ploughing alone increases yields by 10% in the first year. "You can get 20-40% extra yield in year one," said Mr Morgan.

Grasses traditionally produced

3t DM/ha but new varieties made it possible to produce 13t from 200kg of nitrogen a hectare.

Digestibility is important when considering varieties, as a single D value point increase can boost a cow's daily yield by 0.3 litres. "There is a difference of five D value points between the top varieties so that is the equivalent of 1.5 litres of milk a day," said Mr Morgan.

He advocates a mix of diploids and tetraploids but with a greater emphasis on diploids. "Diploids are more persistent and last longer, they will give better ground cover and provide more autumn and spring grass, which is where the real value of grass is going to be."

Further information on managing grass cover can be found on the Farming Connect website: www.menterabusnes.co.uk/farmingconnect/resources

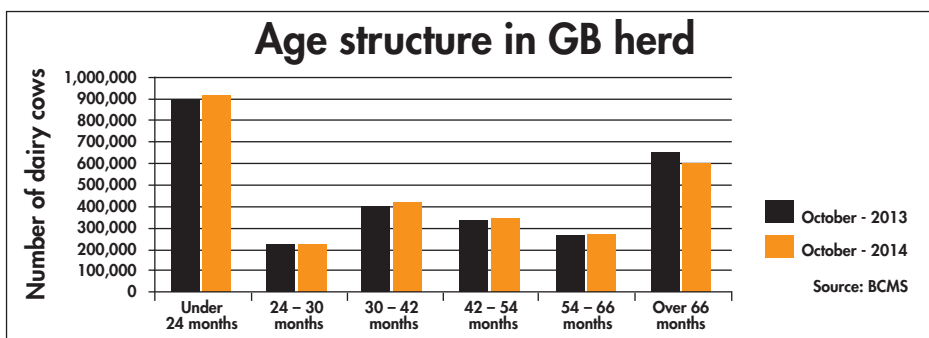
DairyCo has produced a Cow Tracks booklet that provides comprehensive information that can aid farmers in planning, designing, constructing, maintaining and using effective cow tracks. To order your copy call the DairyCo publications line on 024 7647 8702 or download your copy from the DairyCo website: www.dairyco.org.uk

Datum

Age structure of the GB herd

Recent BCMS data shows an increase in the number of dairy cows aged 30 to 66 months from October 2013 to October 2014. This, combined with a reduction in the number of cows aged over 66 months has resulted in a more productive herd, boosting milk production, as seen in 2014. Going forward, production in 2015 is likely to

continue to perform strongly as many of these cows will still be within their peak lactation years. In addition, there has been a slight increase in the number of heifers under 24 months old, signalling an increase in the number of potential herd replacements. However, a weather event or increase in culling could still impact future production.



Get all the latest statistics and news on the UK, EU and World Dairy Markets. To sign up for weekly and monthly updates visit: www.dairyco.org.uk/sign-up-to-emails

Precision farming

Precision livestock farming – or PLF – is the latest buzzword in farming, with interest in cow sensor technologies for disease and heat detection proving particularly popular. DairyCo’s Dr Jenny Gibbons (right) reports on the highlights from two scientific conferences held recently.

Many of the emerging technologies evolving the way dairy cattle are managed, bred and fed, are variations of technologies used in manufacturing sectors, such as the motor industry. But it’s clear that from wherever these technologies are emerging, bringing research to practice will be critical. This means the dairy industry and farmers will have a key role to play in interacting with the scientific community to ensure that innovative research remains both practical and cost-effective for implementation on-farm.

Rumination predicts cows at risk of transition disorders

Certain technologies have the potential to improve the management of cow health and wellbeing, boost efficiencies, reduce cost, increase product quality and give dairy farmers the tools to be more objective managers, said Professor Marcia Endres from the University of Minnesota.

Marcia and her team conducted research with sensors that record cud chewing time, rumen temperature and resting time. They are interested in whether feeding, lying and rumination during the close-up to calving period has a relationship with transition cow health disorders early in lactation.

In a preliminary study, Marcia fitted rumination collars to 296 Holstein cows from 20 days before to 20 days after calving, and found a reduction in cud chewing time in cows diagnosed with metritis. More research is needed but this preliminary study indicated that cud chewing may be used for diagnosis of subclinical hypocalcaemia and retained placenta. The next stage is to

test the rumination sensors with cows at pasture. Cows housed in groups at pasture are often difficult to evaluate so sensors can act as 24 hour surveillance, seven days a week.

“A cow’s cud chewing will often drop 24 hours or more before the appearance of physical symptoms such as depressed feed intake or reduction in milk yields. The use of rumination and activity sensors during the transition period can be a valuable tool to predict cows at risk of transition health disorders – and also to evaluate the successful transition of cows on your unit.”

Integrating robots and grass

The uptake of robotic milking machines is accelerating fast. A three-year, large-scale EU-funded project will be carrying out research on how best to integrate robot milkers with grazing, and to ascertain whether this integration is an economically, environmentally and socially-sustainable option for the future of dairy farming in grass-based systems. This project should yield interesting results, but grass management is likely to be key in its successful application on-farm. For more information on this project, watch our webinar with Dr Valérie Brocard (www.youtube.com/user/DairyCoAHDB).

Calf cough monitor

Researchers are developing and testing a system to detect early signs of calf pneumonia from the sounds of calf coughing recorded in the calf house. Dr Bernadette Earley from Teagasc assessed calf health on a daily basis and recorded signs of illness, including calf pneumonia, scours and blood parameters responding to infection.

When an increase in coughing was detected, there was a corresponding increase in circulating white blood cells in calves, which indicated a potential infection. The calf cough technology can flag up pneumonia-related infections and has the potential

for earlier identification and treatment of groups of calves.

Cow sensor technology – how to make it pay on the farm

Dr Jeffrey Bewley from the University of Kentucky focused on the economics of precision dairy farming from the farmer’s point of view.

Jeff challenged scientists and engineers to ensure their technologies were cost-effective for farmers. “This should include the provision of budget tools so the yearly economic benefit of investing in precision livestock technologies can be calculated.

He also warned that care should be taken in transferring results from research environments directly to commercial farms. “More large-scale commercial field trials and demonstrations are needed to ensure that the biological significance of the data is interpreted correctly.

“Additional efforts need to be directed toward implementing user-friendly software and computer interfaces that ensure the information gained from these technologies can be fully utilised on-farm.”

Jeff and his team have been involved in testing an overwhelming number of commercially-available technologies, both on the University’s research farm and on commercial farms. Some of the lessons they have learned are:

1. Be cautious about buying early stage technologies
2. Take the time to thoroughly learn how to use the technology and interpret the results
3. Integrating the data from the various on-farm technologies takes an expert
4. Having qualified customer service available is crucial
5. Give priority to buying devices that will have the largest impact on profit.

