Number 1

FOCUS on New Farm Projects

Important considerations for lighting design

Lighting is an important part of dairy cattle management. Research has shown that an optimal light climate influences dairy cattle's vision, behaviour, welfare and performance. An optimal light climate can be realised by adjusting the different aspects of light to the vision and needs of the dairy cows.

Dairy cattle's panoramic vision (i.e. total vision) is 340°. This means that dairy cows can see things in all directions except for what is right behind them.

As you can imagine, they have a preference for their monocular vision, as this represents the majority of their total vision (Fig. 1).

Due to their relatively small binocular vision, it is more difficult for the cows to estimate distance, which limits their perception of depth.

When it comes to spectral vision, dairy cattle have dichromatic vision. This means that dairy cows only have two types of functioning colour receptors or so-called cones in their eyes. Their receptors are mainly focused on the green and blue part of the light spectrum. .

Light spectrum

The light spectrum or visible spectrum is the part of the electromagnetic spectrum that can be seen. The different wavelengths are perceived by the eyes as different colours. The visible spectrum of human beings and dairy cattle differs significantly, as you can see in Fig. 2. The visible spectrum of dairy cows reaches from about 400nm to 680nm with peak wavelengths at 451nm (blue) and 555nm (green). By adapting the provided light to the dairy cattle's visible spectrum, they are able to see better. This decreases stress and stimulates desired behaviour. The logical result of this is improved performance.

Light distribution

The light distribution – the spread of light throughout the house – is of key importance.

Since dairy cattle have poor depth perception, it is very important to make sure there are no dark spots throughout the house. When dark spots appear on the floor or in front of the cows, it is likely they will startle and stop moving. This negatively impacts desired behaviour and induces stress. By providing an optimal light distribution, dark spots can be prevented. This stimulates desired behaviour, makes the cows feel more at ease and reduces stress.

The correct positioning of the lamps plays a major role here. This can easily be realised by creating a light plan prior to the purchase of the lighting equipment.

Light flicker

Light flicker – the rapid change in light output of a lamp (Fig. 3) – may be perceived consciously and unconsciously. Dairy cattle perceive light flicker similarly to human beings. This means that they notice flicker at a similar frequency (amount of fluctuations per second).

For human beings, flicker can lead to headaches, eyestrain and loss of concentration. This may mean that the dairy cow's health is affected by flicker as well. As such, to improve dairy cattle well-being, it is important to take light flicker and its frequency into account when purchasing lighting equipment.

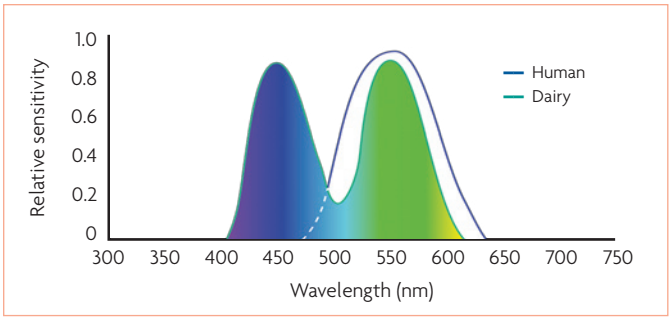

Fig. 2. The spectral sensitivity of dairy cattle versus man.

Light intensity

Providing the right light intensity – the amount of light measured at one place – will help to improve dairy cattle performance.

Research has shown that the light intensity influences the creation of melatonin, which in turn influences milk production. By making use of a higher light intensity, milk yield can increase. In addition, when providing a high light intensity and the correct distribution, the vision of dairy cattle will improve as well.

This makes the cows feel more at ease and makes it easier for them to go to the milking robot or parlour.

Also important: a high light intensity makes life easier for the people working in the dairy cattle house. It becomes easier for them to see their stock and they are able to notice when the cows are on heat or when there is something wrong earlier.

The photoperiod

The photoperiod – the period of time in which the lights are on – is also of extreme importance.

The different life phases of cattle have different requirements when it comes to the photoperiod. Young cattle and dairy cows need long photoperiods to feel and perform at their best. During winter, making the days 'longer' through lighting will make a major difference, as seasonal effects can be reduced in this way.

During the dry period it is recommended to provide shorter photoperiods to simulate winter.

Studies have shown that using the right lux levels and photoperiods can significantly improve milk yield and fertility. ■

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Fig. 1. A cow's panoramic vision.

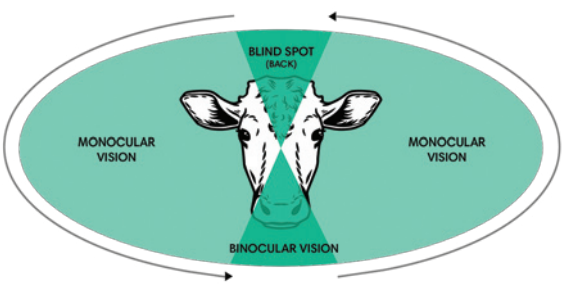
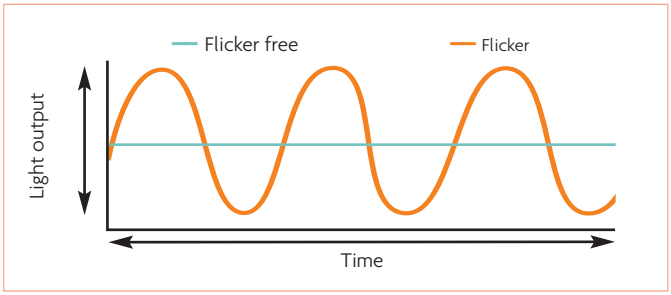


Fig. 3. Light flicker vs flicker-free lighting.



Number 2

FOCUS on New Farm Projects

Milking parlour systems to meet all requirements

In this article Waikato Milking Systems showcases two ends of the spectrum – one new project in Cornwall, England, and one existing project that is still going strong in North Wales.

Working to the conditions of the land is a top priority for Tom Jones and his family who enjoy running Trelay Farm on the elevated terrain of Davistow in north Cornwall, England. "We are about 1,000 feet above sea level, we get high rainfall, we catch the wind and it is very much like we are working in the clouds. But all that rain allows us to grow a lot of grass, to grow our cows, which are outdoors from February to the end of October, early November. We produce what we can off the grass and just like to keep things simple."

Keeping it simple was the key when the family came to upgrade the farm's 20x40-point herringbone milking system in 2021. Tom is a third generation farmer on Trelay Farm and he works the property with his father Chris, mum Jackie and his wife Clare.

"We had an odds and sods kind of parlour, really basic with no ACRs. We were picking cows for AI and it ended up being a nine-hour day. Everyone was getting a bit fed up and it was a case of something having to change," Tom noted.

The farm moved from 300 to 450 cows when an opportunity came to rent some extra land. "It was then we decided it was a good time to take a leap and look for a new parlour."

Tom shopped around to see what the options were. "The big thing for us was efficiency, something that could reduce milking time and be easy to operate. "I am not a fan of over complicating things and we did not want a system with loads of technology."

The one piece of tech that was a must however was automatic cup removers. "We wanted a parlour that could milk with just one person if needed and so ACRs were a must. We would normally milk with two people but if there is someone sick or away, I needed to be sure I could do the job on my own and ACRs would cover that worry."

Tom said ACRs also eliminate the possibility of over milking the cows. "We had a look at a few companies but I really liked the look and finish of the Waikato Milking Systems parlour."

Work on installing the farm's new 32x64 Waikato Supa4 inline milking system was completed in August. Its key automation component was the ECR-S, an efficient automatic cup remover which can be adjusted to detach according to set parameters. Retraction speed adjustment makes for a gentle disconnect from the cow's udder.

The stalls were designed by Simon Hoare, the UK Sales Manager South for Waikato Milking Systems. They are much more robust, heavy duty, non-weld on site concept with the Waikato Milking Systems logo laser cut into the components. The first milking in the new system was held mid-August and the team managed to get through 380 cows in 1.5 hours, meeting Tom's expectations.

He has some advice for others looking to redevelop their milking systems. "You need to find a parlour that will fit with your farm system. If you have a big herd with high yielding cows in a housed system, you'll probably want technology like electronic milk meters to find out what each cow is producing. And that is fine but for us, on a grass-based system, we just wanted a much more simple system, something that is going to be easy to operate and reliable to use every day."

Happy customers on Trelay Farm, Cornwall, UK, after their first milking through the new Waikato Supa4 milking system.

Giles and Leo Rowland in front of the Centrus Composite Rotary System installed on their farm in North Wales in 2018.

Easing the pressure, lifting production

Reliability combined with the right level of technology was at the top of the list for Leo and Giles Rowland when they installed the first Centrus Composite Rotary System in the UK.

The 50-point rotary was commissioned in 2018 replacing a 25-year-old, 25/50 swing-over herringbone.

The new Centrus is fitted with a high level of Waikato Milking Systems automation options. It included SmartECRs, automatic cup removers with settings to customise the milking routine; SmartSPRAY, an automatic teat spray system; SmartD-TECT for udder health detection and pulsation as well as Electronic Milk Meters, which provide an accurate picture of how each animal milks at every milking.

Heavy duty bails keep the larger-framed Holsteins in order at milking time, while the NaviGATE Sort Gate automatically manages the cows out of the parlour. More than three years since first milking, Leo Rowland said the Centrus is living up to expectations on their 250-acre farm in Denbighshire, North Wales.

"We have had remarkable performance with very few problems. The cow-to-bail animal ID is proving to be valuable, as are the Electronic Milk Meters, recording data on each cow to help make better decisions for the herd."

The Centrus also has bail displays at each point which show real time milking information, alerts and manual options to draft or retain cows. "We are still milking around 370-380 cows but we are looking at going up to 450," Leo said.

The farm is milking three times a day, each time it takes under two hours, with two people. Milk production has increased since the farm switched over to the Centrus and interest in the system was keen when it was first installed.

"Waikato Milking Systems was considered a bit of a wildcard but people were very surprised when they saw the Centrus working and its capabilities.

"We had a few people working a grass-based system come and see the Centrus to think about how far they could use a milking system like this. We always say of all the things you could want to spend money on, it would be the Centrus deck, because it will outlast anything else."

The Centrus deck is lightweight but very strong, which means there are fewer maintenance costs over the life of the system.

The deck operates very quietly, reducing noise in the parlour helping the animals settle in quickly. It is also chemical and effluent resistant, and washes down easily.

"We could give the deck a good wash down today and it would come out looking brand new again," Leo noted. ■

www.waikatomilking.com

Number 3

FOCUS on New Farm Projects

Fast and efficient milking action

Dairy farmers around the world are facing a rapidly changing industry with pressures on labour, animal welfare, environmental restrictions and rising consumer expectations. Regardless of the size of the dairy or farming techniques, all dairy farmers are searching for a solution to these many challenges that will enable their operation to remain sustainable for a future generation.

LR Gehm, LLC has spent the past few years researching and testing new milking technologies to enable dairy farmers to be in a position to address the many challenges they face. This research has culminated in the development of a new product, TridentPulsation, that incorporates numerous innovative patented technologies that have been proven on dairy farms large and small in the US, Canada and Europe. The early on-farm trials optimised design parameters and features to maximise both performance and benefits to the dairy.

The goal of this product was to improve milking speed and efficiency with a highly reliable pulsation system that includes an integral pulsation functional monitor. The results achieved exceeded expectations, while yielding added benefits of improved udder and cow health through a consistent and superior milking process. Data from the farm trials formed a basis for the product being a recipient of a 2021 ASABE AE50 award for innovations in agriculture.

Rob Krijnen, an owner of Krynen Holsteins in Ontario Canada, upgraded his 2x10 parlour to milk the 400 cows at his dairy. While this dairy is not recognised as organic, the treatment of the cows meets organic practices as no antibiotics are used. The introduction of TridentPulsation yielded an average unit on time of 3.6 minutes with average flow rates of 4.4kg/min and peak flow rates up to 9.8kg/min. 70% of the milk (9.9kg) is yielded within the first two minutes which is well above the industry goal of 50% or 6.8kg.

Rob sums up the milking speed as "visitors watching the cows state that they have never seen cows milk so fast." Rob also noted that with the reduced milking time, consistent liner attach and milking efficiency that udder health is improved such that no antibiotics are used as cows yield high quality milk very quickly.

Casey Roest of Modesto California also upgraded to TridentPulsation and shares the same experiences as Rob. He also noted the rapid milking speed, so fast in fact that the herd was finishing in record time. Casey said that the 1,100 cow herd has much healthier udders with the improved milking efficiency.

The pulsator with the regenerative blower that provides the positive pressure fresh air.

Kirk Arnold and his mother operate a 140 cow organic dairy in upstate New York. Their experience in their 2x12 parlour is also similar. A few months after upgrading and discovering that the milking speed is so fast, Kirk stated, "had I known about this product before building the parlour I would have built a smaller one."

Cows routinely milk out in 2-4 minutes with gentle detaching leaving dry, soft teats with excellent teat ends. Kirk discovered that his replacement rate has fallen from 43% to 29%, a common experience as the much shorter milking durations result in less teat and udder stress. Krijnen made a similar claim with only 103 of 477 cows leaving the herd (21.6%) over a year.

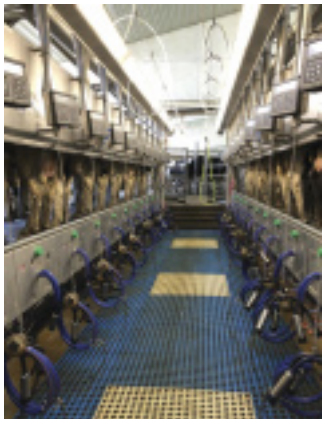
As similar stories and experiences continue to grow, the question arises as to what is different in the technology that has enabled this quantum leap in milking performance after so many decades.

The answer lies in the packaging of several innovative technologies, each of which is a contributor to the final result. TridentPulsation uniquely holds the liner fully open at time of attach to ensure that each liner is properly pulled up onto the teat, thus avoiding those often-observed incomplete attaches.

This is then followed by a brief stimulation period in which the canal is fully opened and first milk flow initiated followed by milking pulsation that allows for three user selectable rate/ratios.

Liner action is ensured to be consistent and optimal from not only start to finish but regardless of liner age, vacuum level and hose length as an integrated positive pressure fresh air system aids in the liner action.

The result is nearly immediate peak milk flows following attach that are sustained throughout milking. Detach is always gentle as the TridentPulsation pulsator coordinates with the detacher to hold the liners fully open during detach to not stress the teats by avoiding dragging a closed liner off them. TridentPulsation incorporates other innovations such as solenoid



The Arnold parlour.

timing integrated with the positive pressure fresh air system to minimise the sucking of milk or wash water up into the pulsator in the event of a failed liner. The product also has an integrated functional performance monitor that continuously verifies pulsation performance and notifies of a failure.

The combination of an on/off feature with the detacher, the positive pressure fresh air and a patented long-life solenoid feature provide superior reliability and life to minimise maintenance.

In a world in which dairy farmers now face growing restrictions on water use, carbon emissions, stricter animal welfare guidelines and labour shortages it is becoming obvious that changes must be made that provide real and substantial improvements in the milking process.

Those changes must reduce replacement rates to 25%, reduce death rates to under 1% while improving general udder/animal health and reducing the labour required to milk the herd.

TridentPulsation technology has proven that the path to that future success is not only achievable but now available as demonstrated by those dairies who have embraced this technology evolution. ■

Visit tridentpulsation.com to see data and videos from dairies being milked with this product.

www.tridentpulsation.com