

Automated milking cluster flushing system:

Waging war on mastitis

The battle against mastitis in dairy cows continues. One of the latest developments to become available for UK dairy farmers is an automated milking cluster flushing system. Andy Collings takes a look at one way of tackling the issue of mastitis

Mastitis has been the bane of the dairy industry since, one suspects, cows were first milked. It's an ailment that continues to cost the industry many millions of pounds each year. Some estimates put the cost as high as £190 per cow which means that, for a national herd currently running at 1.9 million cows, the total cost amounts to a staggering £361m.

While these losses will vary for different herds, they can be apportioned to four main areas: loss due to milk quality, loss due to less efficient milk production from subclinically infected cows, loss due to wasted antibiotic-contaminated milk and vet bills, and loss from having to cull cows prematurely.

Mastitis originates from an infection in the udder, with the path for the 'invasion' of this infection heading through the teat end opening and up the canal. In the run of events, all cows have natural defence mechanisms against this invasion – one

is the muscle at the teat end opening, which closes up the teat when the cow is not being milked, and the second is the lining of the teat canal.

Machine milking – and the daily routines that accompany it – tends to compromise both these defence systems. The teat end muscles remain open for some time after

milking is completed, exposing them to infection, and there is some opinion that the action of the liner can also destroy the teat canal.

Despite the use of teat dips, improved hygiene and better management, mastitis still remains prevalent within the vast majority of herds – if not all of them.



Peracetic acid is added to the flushing system header tank – to maintain the required solution. The dosing unit can be seen attached to the pipe on the right.



The heart of the AirWash system is the pump that, on demand, takes the fluid to the parlour-based controller and then, when required, on to the clusters.

In the milking parlour, infection can only be spread from cow to cow by three ways – hands, cloths or liners. Most milking routines now include fresh paper towels for each cow and employ a hygiene routine that uses regularly disinfected gloves to eliminate contamination from hands. It should be noted, though, that individual paper towels can still spread an infection from one quarter to another.

With mastitis infection from hands and cloths understood if not totally controlled, there remains the problem of the liners. On this score it has long been recognised that one of the most critical factors in the spread of contagious mastitis throughout a herd is the cross infection that can occur when milking clusters are passed directly from one cow to the next. When a cluster is removed from a cow after it has milked out, the liner usually contains some traces of milk residue within its mouth. Depending on the particular design of the liner in question, these residues can amount to as much as 20ml when the cluster hangs upside down.

Placing the cluster on another cow causes this retained milk to run down the side of the liner and come into contact with the teat end where it can linger until the milk starts to be let down – spreading infection as it does so.

Cell counts in the liner can also be high, with infection just waiting to be passed onto the next cow: trials have revealed that a liner from one infected cow can infect the next six cows it is used on. It follows, then, that in an ideal world the liners would be properly sterilised before they were fitted to the next cow, and this would avoid the incidence of cross infection. The key point is that without having sterilised liners there seems to be very little point in sterilising the teats before the clusters are attached.

Over the years there have been numerous systems employed to create an effective cleaning operation between the milking of each cow in the herd. In its most basic form it was a bucket of appropriate disinfectant solution into which the cluster was dunked after each cow had been milked.

AirWash system

Advantages:

- + Can be used with all types of milk liners and cups
- + Milk liners are sterilised after each cow is milked
- + No ingestion of liquid into milk line
- + Liner kept in better condition
- + Can be retrofitted

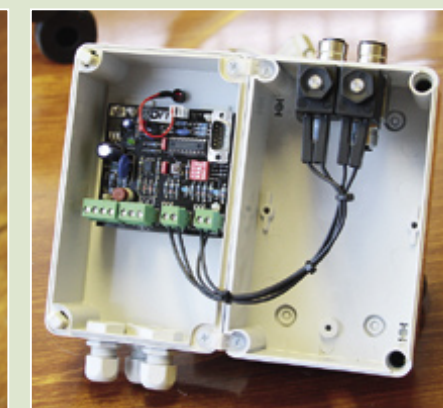
Disadvantages:

- Extra hardware in what might already be a cluttered parlour
- Cost of fitting is £475/point

Benefits:

- Reduced levels of mastitis
- Improved teat condition

Peracetic acid is a mixture of acetic acid and hydrogen peroxide and is considered to be an ideal anti-microbial agent due to its ability to oxidise and destroy virtually all types of micro-organisms. It breaks down to its 'safe' components and can therefore be used in rinse situations.



Left: Cluster with AirWash fitted. Flushing liquid passes into the liners via the small pipes joining the milk tubes. Middle: Here's the junction point between the small milk tube and flushing pipe. The junction has a one-way valve to prevent vacuum stability being compromised. Right: The flushing sequence of fluid and air is controlled by this box. Up to five rinse and air blasts are typically used within each rinse cycle.

This sounds simple and effective, but this was far from being the case. Like pushing an upended bottle into water, the trapped air limited the amount of liquid entering the bottle – or, in this particular case, the liner – which, of course, is not ideal when it comes to 100% disinfection.

It was also likely that after a few dunks the water would be contaminated with dirt from on the outside of the cups and would actually add to the contamination problem rather than reduce it. Even worse, if the tap for the main milk line was not totally off, there was a very

good chance that the disinfectant solution could be sucked into the pipeline to contaminate the milk.

No big surprise then that a flushing system was devised that used fluid flowing from within the cup, and so it was that some 20 years ago the Dutch-developed AirWash system was introduced.

And now, after being given a completely new design, the AirWash system is back on the shelf and is being imported into the UK by milking equipment supplier, Cheshire-based Green Oak. It should be stressed from the start that AirWash isn't



Action – the flushing system uses about a pint of fluid and takes 30 seconds to complete the cycle.

Mastitis continues to be a significant problem on many of the UK's dairy farms.





Peracetic acid is metered out by this dosing system. The concentration can be adjusted to suit.

the only system of its type on the market. Vaccar's Clusterflush system, for example, is not too dissimilar, the main difference being that it introduces water or sanitising fluid into the long milk tube, along with compressed air, rather than directly into the cups.

Featured here, the AirWash system is designed to work on individual liners, with fluid/air entering the small milk tube via a 'T' junction. A non-return valve ensures that the parlour's vacuum stability is not compromised.

There is no need to purchase special liners or cups to accommodate the AirWash system: the only modification at cluster level is the insertion of the 'T' junction in the small milk tube. It's also interesting

to note that it is not deemed necessary to wash the claw part of the cluster which, if you think about it, is logical in that the teats are some distance from it. The fluid used to flush the liners can be straight mains water or, if from a borehole, used as a solution of peracetic acid.

Just how and when the liquid and air are called on is down to the settings made in a control box. Normally this would be set to a standard sequence of three seconds of water followed by just one second of air, which is repeated three times – and then a further sequence of two seconds of water followed by one second of air, repeated three times.

The whole sequence can be triggered at one time for all the clusters down one side of a herringbone parlour when the exit gate is opened for the cows on that side to leave. For any parlours with unit swing-over systems, the flushing cycle is activated after each unit is removed from the cow by the ACR system. There is also a manual start option. In total the cycle takes between 20 and 30 seconds to complete and uses about 400ml of water – or less than a pint.

Green Oak makes the point that having individual liner supply pipes means that the clusters do not have to be hanging up squarely for the liners to be rinsed. On systems where the liquid enters the claw it has to be separated equally into four flows and, if the cups are not hanging squarely, it is reasonable to assume that they will not receive their proper share of flushing fluid.

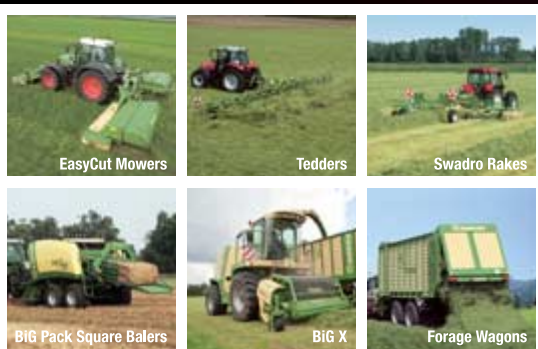
The installation of AirWash appears to be relatively simple: it fits in beside the automatic systems most modern parlours now have – ACR, milk recording and feeding, to name but three. The fluid is stored in a 10-litre tank and, where the peracetic acid is used, a dosing system automatically maintains the necessary solution strength as water is added to replace that consumed. Air is provided by a compressor and is sequenced into the system at a pressure of 7 bar – 100psi.

Summary: In terms of overall cost, there's no denying that the AirWash system does represent a significant investment. For a 20/20 herringbone, each point would cost about £475, and installation would take about six days.

That said, if our £190/cow/year cost for mastitis is to be believed, there is clearly some scope for investment if savings on this scale can be achieved.



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Case study 1 – the Whalleys

Tom Whalley and his son Dale run their 250-cow dairy herd at Tabley, near Knutsford and had the AirWash system installed to their 13/26 parlour about 18 months ago. For the past 12 months Tom reports that they have not been troubled with high cell counts and there has been a reduction of



The Whalleys have been using an AirWash system for the past 18 months. Both mastitis and cell counts are reckoned to be down on previous levels.

25% in the use of antibiotics. "Prior to the AirWash installation we were manually dunking clusters between cows, which put at least another half hour onto the milking time. "I suspect that when our relief milkers took their turn the manual dipping was not performed perhaps as diligently as it might have been," says Tom. "Which is something to be expected, but it does nullify the efforts we made at other milking times." As well as witnessing some marked reductions in mastitis levels, the cell count has fallen from 158 down to 143 during the past 12 months. "We have also noticed a dramatic improvement in teat skin condition – an indication that the sterile liners are also helping to prevent skin problems. "Overall, I am very pleased with the system and see it as a big stride forward in the control of contagious mastitis."

Case study 2 – the Shepherds

Mark Shepherd and his two sons, Andrew and William, run a 180-cow dairy herd at Willaston in Cheshire. The cows are milked through a 22/22 parlour, which replaced an old 16/16 set-up a couple of years ago. Last January the parlour was kitted out with electronic milk recording, along with a cow recognition system and, more recently, an AirWash flushing system.

Mr Shepherd reports that since the installation, which took three days to complete, the incidence of mastitis has reduced significantly and there certainly is not the element of cross

infection that existed previously. "I feel we may have eliminated at least one route mastitis was taking to perpetuate itself within the herd," he says. "There will always be sub-clinical cases and, if we can prevent them developing into contagious cases, then the AirWash will be doing a good job."

As at the Whalleys', there have also been some interesting improvements in teat condition – fewer scabs and other annoying growths.

"The big test is to put a finger inside a liner, and its condition can be felt as if it was a new liner – not the slimy texture you get with liners that have been used for a few weeks," he says. "The flushing must be keeping the liners in better condition, and the cows are benefiting as a result."



Mark Shepherd and his two sons, Andrew and William, run a 180-cow dairy herd in Cheshire and had their AirWash system fitted last year.

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