



Evaluation of Biocel CF cleaning products for cleaning of milking equipment

Report 10/07/20

A wash routine was put in place at the Teagasc research farm (Kilworth) for the period from the 17/02/20 until the 23/06/20, which included Biocel CF cleaning products and a wash protocol as agreed with Biocel. The wash protocol was based on the Teagasc recommended cleaning protocol 3: https://www.teagasc.ie/media/website/animals/dairy/research-farms/Chlorine-free-wash-routines_2020.pdf

Milking plant:

The trial was conducted in a 20 unit Dairymaster mid-level milking plant. The plant contained electronic milk meters, automatic cluster removers, dump line, air jet to aid washing and an automatic washer for the cleaning of milking equipment. Automatic washer dosing pumps were calibrated to ensure the correct amount of detergent/acid was being used for the milking machine. The post milking rinse contained cold water and approximately 15 litres of the hot wash cycle was allowed to go to waste before the detergent was added automatically and the wash solution circulated. A single stage plate cooler was used to cool milk prior to entering an 11,000 litre direct expansion bulk milk tank and milk was stored at 3.5 ° C. The bulk tank cleaning was semi-automatic with the detergent bowl filled manually for each wash occasion. Detergent drum usage was monitored, regular checks of wash water temperature and a visual check on plant cleanliness was carried out weekly. Two plant adjustments were carried out during the trial period, 1) All wash jettors were replaced at the end of May as some milk liners had a tendency to fall out during the hot wash cycle; 2) element to the electric boiler was replaced.

Milk sample collection and analysis:

Milk samples were taken by both the milk processor (approx. twice monthly) and weekly by Teagasc personnel and measured for Total Bacterial Counts (TBC) and Thermotolerant Bacterial Count (Laboratory Pasteurisation Count - LPC). Milk samples were collected by research staff using 'dipper bottles' which allow for sampling via the sample lid of the bulk milk tank rather than the outlet pipe. Samples were taken directly to a laboratory and stored at 4 ° C until analysed within 6hrs. Milk samples taken by the milk processor were taken by the collection tanker driver when milk was being collected at 48h intervals. For those milk samples collected at Moorepark, samples were collected at random (milk holding time could

be 12h to 48h), tested in duplicate and were measured using Petrifilm (3M, Technopath, Tipperary, Ireland). Samples tested for LPC were pasteurised at 63 °C for 35 minutes, including time to allow samples to reach the required temperature. Afterwards samples were cooled to 10 °C in iced water before testing. The samples tested for TBC and LPC were incubated for 48h and 32 °C. The number of bacteria colonies was enumerated using a Petrifilm Plate Reader. A random number of samples were also tested for the chemical residue Trichloromethane (associated with chlorine). This test was carried out in the milk quality laboratory at Moorepark.

Milking machine Wash Routine:

The wash routine included Multisan CF (4 hot washes per week, AM) usage at 0.7% and Circo-Acid (3 hot washes per week, AM) usage at 0.7%. Multisan CF (7 cold washes per week, PM), usage at 1%. The Multisan CF product contained a new improved formula with additional extra cleaning agents to that previously tested. Serpent (peracetic acid) was applied at 0.2% in an additional rinse water cycle, applied twice daily, approximately 2 hours before the next milking occasion (13:00 and 05:00 hrs). Approximately 14litres of water per unit was used for the rinse cycles and approximately 12 litres of water was used for the detergent cycle.

Milking Machine Wash protocol- Kilworth Research Farm		
	AM	PM
Monday	Multisan CF (0.7%)	Multisan CF (1%)
Tuesday	Circo-Acid: (0.7%)	Multisan CF (1%)
Wednesday	Multisan CF (0.7%)	Multisan CF (1%)
Thursday	Circo-Acid: (0.7%)	Multisan CF (1%)
Friday	Multisan CF (0.7%)	Multisan CF (1%)
Saturday	Circo-Acid: (0.7%)	Multisan CF (1%)
Sunday	Multisan CF (0.7%)	Multisan CF (1%)
Serpent (Peracetic acid) used twice daily in an additionally cold water rinse		

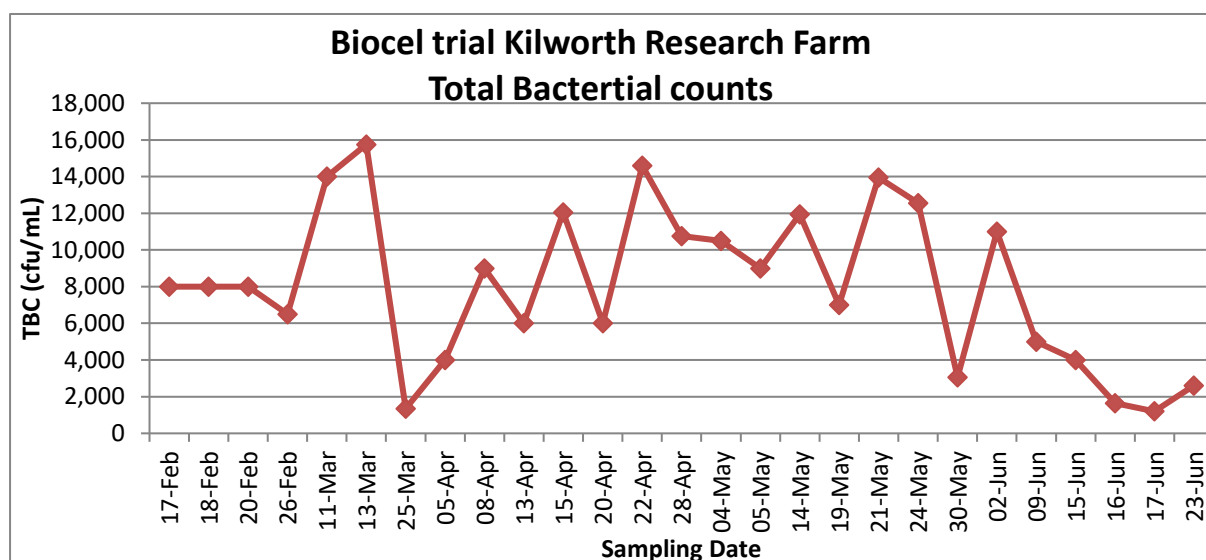
The hot detergent water start temperature was 77 °C and the cycle finish temperature was 42 °C for the period Feb to May. Improvements to the heater boiler at the end of May allowed for improved water temperatures resulting in a start temperature of 80 °C and a finish temperature of 47 °C for the month of June.

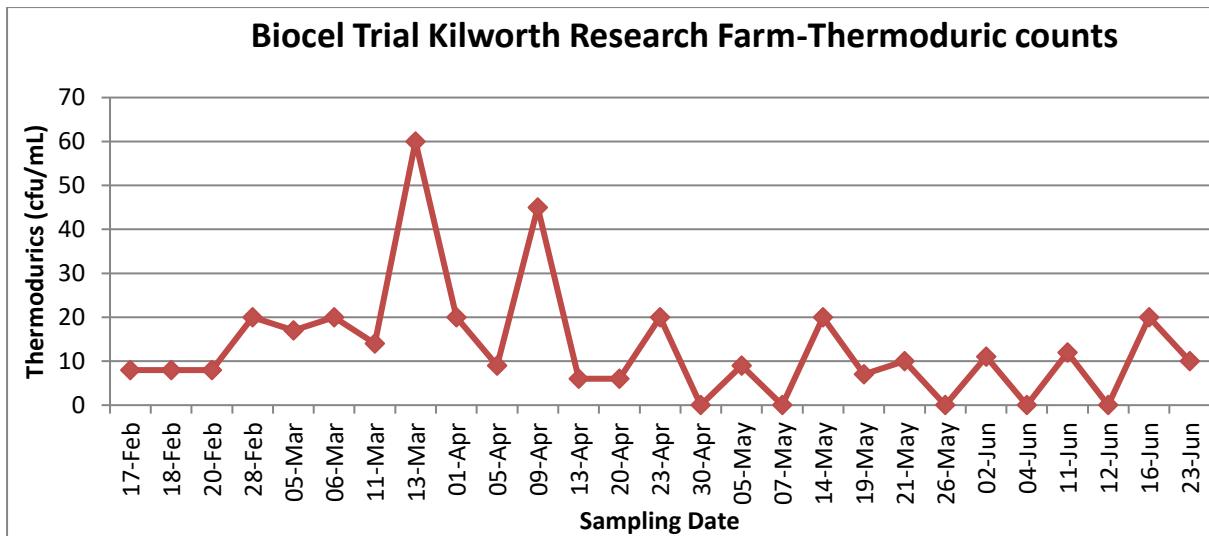
Bulk tank:

Two detergent washes followed by an acid wash: Multisan CF (800mls), Circo-Acid (800mls):

Results:

Thirty three milk samples were analysed for TBC and the average count over the test period was 8,054 cfu/mL with a median figure of 8,000 cfu/mL. The TBC figures ranged from 1,200 to 15,750 cfu/mL. Twenty nine milk samples were measured for thermoduric bacteria with an average count of 13 cfu/mL and with a median figure of 10 cfu/mL observed. The Thermoduric figures ranged from 0 to 60 cfu/mL. Graphs of all results for both TBC and thermodurics are shown below. Bacterial counts for both TBC and thermoduric counts were very good over the trial period. Thermoduric bacterial counts throughout the study were very consistent or not detected with no thermoduric count exceeding 60 cfu/ml. The addition of Serpent in the rinse water is critical in achieving these low thermoduric counts. While the average TBC levels were very good across the test period a reduction in TBC was observed for the last four weeks of this study and this may be accounted for with the increased wash cycle temperature. The average TBC for the first four months of the study was 9,155 cfu/ml, with little variation between months, whereas for the last month the average TBC was reduced to 4,570 cfu/ml. While jetter cups were replaced during this latter trial period, the reduction in TBC counts is more likely as a result of the increased water temperature. This is an indication of the importance of water temperature when using CF products or indeed any CF wash routine. It is more difficult to maintain plant cleanliness with larger plants such as the one used in this study which contains milk meters and receiver vessels (not made of glass or stainless steel). The protocol and products used in this study were very effective in maintaining good plant cleanliness (no build-up of residue on plant surfaces such as on milk meters or claw-piece covers or on bulk milk tank surfaces), and in maintaining milk of good microbiological quality. No cleaning issues would be expected with plants where axillary equipment such as milk meters are not present. Furthermore, no chemical residues for Trichlormethane were detected in milk samples.





The combination of Biocel CF products if used in conjunction with the protocol tested, with an adequate number of hot washes and correct water temperature, can be recommended for CF cleaning of milking equipment.

Regards,

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