

INSTRUCTIONS

The kit includes

1. Instructions (this page)
2. Summary report 'proof of concept trial (2 pages)
3. Information about the trial
4. Green Cleaning farm trial data release consent
5. Green Cleaning farm trial data collection form

What do you need to do

✓ when completed

- | | | |
|---------|---|--------------------------|
| Step 1. | Find and make copies of the electricity accounts for the farm dairy for the last 12 months. It is important that the number of kWh used and the electricity costs per kWh are included (usually found on the back of the electricity bill). | <input type="checkbox"/> |
| Step 2. | Organise the completion of the data release consent form to be sent to the milk factory. This will allow your company and AgVet Projects to access milk quality and volume data only. | <input type="checkbox"/> |
| Step 3. | Complete the farm trial data collection form. This will provide us with information about the current dairy cleaning program so water, electricity and chemical savings can be calculated as the trial progresses. This will also give information about the cleanliness of the milking plant prior to the commencement of the trial. | <input type="checkbox"/> |

If you have any queries please contact Gabriel Hakim on 0407 358 399 or gabriel@agvetprojects.com.au

INFORMATION ABOUT THE TRIAL

What is the trial is trying to accomplish?

These farm trials are being conducted to allow the Industry Partners (IPs) to fine tune their commercial Green Cleaning System designs.

What information do we need?

Information relating to energy, chemical and water use will be collected both prior to and during the trial. Ongoing electricity cost and consumption data will need to be provided.

Data will be collected will allow the energy, water and chemical savings to be calculated and to monitor the cleaning effectiveness of the new system.

How will the information be used?

The information collected will be used to

- Assess performance of the Green Cleaning system and allow comparison with the existing cleaning system
- Support the registration of new low temperature cleaning chemicals
- Satisfy the conditions in the APVMA permit that allows the trial of new low temperature cleaning chemicals.
- Assist in promotion.

GREEN CLEANING FARM TRIAL DATA RELEASE CONSENT

I _____
(insert name) (position held)
of _____
(farm/business name)

(address)

Consent to the release of information relating to milk quality, milk volume and electricity usage

to AgVet Projects Pty. Ltd PO Box 1390, Warragul, VIC, 3820

(address)
gabriel@agvetprojects.com.au 03 5623 5583

(email address) (fax)

and _____
(name of company conducting the trial)

(address)

(name of company contact) (mobile)

(email address of company contact) (fax)

Milk data to be provided to AgVet Projects and company conducting trial via

- Milk factory to contacts above
- Web Access

(web address)

(details required to access data e.g. username and password)

Milk Factory Details

Factory _____
(milk factory supplied) (supplier number)

Factory Field Officer _____
(name)

(mobile) _____
(email)

Period of agreement

From _____ To _____
(date) (date)

Signed _____ Date _____
(date) (date)

Green Cleaning Farm Trial Data Collection Form

Enter your dairy particulars

Name of owner/manager:		
Farm address:		
Name of person completing this collection form:		
Number of clusters?		Clusters
What is the total volume of the hot water service(s) used to wash the milking machine?		Litres
What is the temperature of the cold water entering the HWS?		°C
What temperature is the hot water service thermostat set to?		°C
Which State does your electricity come from?		
Electricity cost for off-peak electricity		cents/kWh
Electricity cost for peak electricity		cents/kWh
Washes per day		
Days milking per year		

Look on the electricity bill for these costs

Enter your daily wash routine

AM wash	Quantity		Temperature	Notes
1st rinse cycle		Litres		
Wash cycle		Litres		
Final rinse cycle		Litres		
Additional cycle (if req.)		Litres		
Total AM		Litres		
PM wash	Quantity		Temperature	
1st rinse cycle		Litres		
Wash cycle		Litres		
Final rinse cycle		Litres		
Additional cycle (if req.)		Litres		
Total PM		Litres		
3 rd Wash (if required)	Quantity		Temperature	
1st rinse cycle		Litres		
Wash cycle		Litres		
Final rinse cycle		Litres		
Additional cycle (if req.)		Litres		
Total 3rd		Litres		

Calculation of daily electricity usage for heating water

1. Is there a separate HWS for washing the milk vat? Yes No
 - a. If yes, capacity of HWS used for washing the vat. _____ Litres.
2. Frequency of vat washing (only during the data collection period) every day skip a day
3. Total volume of hot water used per wash to wash the vat _____ Litres.
4. Identify the electricity meter(s) used for heating water. Is the meter dedicated to the hot water service(s)? Yes No Not sure
 - a. If Yes, please collect the following meter readings.

Electricity meter readings

Try to read the meter at the same time each day, preferably when no heating is taking place. For example, the meter could be read at 8:30am each day after the morning wash.

Take readings for at least seven days.

Day	Date	Time meter is read	Meter reading (kWh)	Milk vat HWS heated in this 24hr period (Yes/No)
0				
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				

Chemicals used for cleaning the milking machine

Category	Brand name	Dose rate used (ml/10 l or g/10 l)
Pre-rinse additive		
Alkali		
Acid		
Sanitiser		
Other		

Water Quality

Date of test:/...../.....

Water source(s):

pH iron: ppm hardness: ppm (CaCO₃)

Plant Equipment Hygiene

Date of inspection:/...../.....

Component inspected	Clean	Dirty ✓ or ✖	Deposit Found	Condition	Comments & actions required	Pass ✓ or ✖
Claw bowl						
Liner						
Receiver						
Milk line						
Sanitary trap						
Filter(s)						
Vat outlet(s)						
Vat 1						
Vat 2						

LETTER OF AUTHORITY

TO WHOM IT MAY CONCERN

Please be advised that:

Client name _____

ABN _____

hereby authorises

Company AgVet Projects

Contact Jen Williams

admin@agvetprojects.com.au

03 5611 1020

to procure energy and related information from

Electricity Company _____

regarding electricity supply and pricing for its site(s) located at

Company name _____

Site Details 1. Account number : _____

2. Account number : _____

Signed for and behalf of

Client name _____

Position _____

Signature _____

Date _____

Suitability checklist for a Green Cleaning trial site

Below is a checklist to help assess the suitability of a farm as a trial site for a “Green Cleaning” system.

Farm Details		
Contact Person		
Farm Address		
Contact phone numbers	Home :	Mobile :
Milk company supplied		
Milking machine brand		
Dealer who services milking machines	Contact name & address :	Contact phone number :

Water	The requirement is to use high quality water for all cycles of the wash. Similarly, high quality water is preferred for use in the thermal storage tank which circulates through the heating coils inside the chemical tanks. Rain water/town water or similar quality with hardness <150 ppm (CaCO ₃) & iron level < 0.5 ppm. A clean closed tank that collects rain water is preferred. Quantity requirements: initial setup ~ 1800 l, then ~600-800 l/day.	Yes	No
	Are there sufficient volumes of water available throughout the entire milking season?	<input type="checkbox"/>	<input type="checkbox"/>
	Is there suitable quality of water available throughout the entire milking season?	<input type="checkbox"/>	<input type="checkbox"/>

Floor Space	A “Green Cleaning” system requires three tanks (600 l capacity). Each tank occupies ~1m ² . The specific design of the system to be installed will dictate the actual space requirement. Consideration must be given to the storage requirements of the chemicals. An area of 3.5 x 1.5 m is the suggested minimum space requirement.	Yes	No
	Is there sufficient “floor space” to accommodate the new cleaning system?	<input type="checkbox"/>	<input type="checkbox"/>

Milking Machines	<i>The milking machines should meet the minimum requirements for milking machine performance as determined by the AMMTA milking machine test procedure. A regular maintenance program should be in-place with scheduled replacement of milk contact rubberware</i>	Yes	No
	Do the milking machines satisfy ALL the minimum requirements for milking machine performance as determined by the AMMTA milking machine test procedure?	<input type="checkbox"/>	<input type="checkbox"/>
	Do the milking machines have a scheduled maintenance program?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the milk contact rubberware is replaced as per manufacturer’s recommendations?	<input type="checkbox"/>	<input type="checkbox"/>
	Do the milking machines drain completely?	<input type="checkbox"/>	<input type="checkbox"/>

		Yes	No
Renewable Energy Sources	<i>The most likely forms of renewable energy will be solar or heat reclaim. Whilst products such as heat pumps can be used, they are grid connected and the energy supply is from non-renewable sources. Likewise, adaptation of existing HWS could also be considered but again, their energy source is typically non-renewable.</i>		
	Solar Hot Water Systems		
Solar hot water systems are better suited to some geographical areas than others. Having access to an unobstructed north-facing roof for the solar collectors is paramount. Consultation with a solar hot water specialist to determine size & performance characteristics is necessary.			
Is the orientation for solar hot water service correct?		<input type="checkbox"/>	<input type="checkbox"/>
Is there sufficient "floor space" to accommodate the water storage tank(s)?		<input type="checkbox"/>	<input type="checkbox"/>
Heat Reclaim Systems			
If a heat reclaim system on the milk tank refrigeration unit is a considered possibility/option then a farm with a minimum daily production of ~7,000 l is preferred. On smaller farms a year-round or split calving farm is best suited to achieving the minimum daily production volumes. It is important to note that many factors are considered when calculating the minimum milk production requirements. Such factors include:			
<ul style="list-style-type: none"> Type & performance of the pre-cooling system; Type of refrigeration system (different refrigerant gases have different evaporative temperatures); Type and performance of the heat reclaim system. Volume of chemical wash solutions to be heated. Temperatures to which each chemical wash solution must be heated. How the rinse water will be heated. 			
Is there sufficient "floor space" to accommodate the heat reclaim system?		<input type="checkbox"/>	<input type="checkbox"/>
Is the heat reclaim system close enough to the chemical wash tanks to minimise heat losses?		<input type="checkbox"/>	<input type="checkbox"/>
Can the heat reclaim system and the chemical wash system be connected without pipework causing obstructions?		<input type="checkbox"/>	<input type="checkbox"/>

		Yes	No
Milk Quality	<i>The farm should be able to demonstrate a record of good (premium) milk quality. The quality parameters should include BMCCs, Temperature, TPC/Bactoscan & thermoturics.</i>		
	Are all parameters for good milk quality met?	<input type="checkbox"/>	<input type="checkbox"/>
	Are the results consistently good throughout the year?	<input type="checkbox"/>	<input type="checkbox"/>

		Yes	No
OH & S	<i>The farm will be a workplace & demonstration site and so a safe environment should exist at all times. A risk assessment should be undertaken and any identified risks mitigated.</i>		
	Does the site provide a safe workplace?	<input type="checkbox"/>	<input type="checkbox"/>
	Is the site safe?	<input type="checkbox"/>	<input type="checkbox"/>
	Have identified risks been mitigated?	<input type="checkbox"/>	<input type="checkbox"/>

For further information contact

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Green Cleaning Systems

low temperature • re-use • energy efficient

Summary report – ‘proof of concept’ trial

A ‘Green Cleaning’ prototype unit was designed, installed and operated on a commercial dairy farm in Gippsland between March 2009 and June 2010. The trial was conducted to determine if a low temperature, re-use system could be used successfully to clean the milking plant.

A range of different chemicals and operating parameters were trialled on behalf of our Industry Partners through the fully automated Green Cleaning trial unit. During this time a large quantity of data was collected from sensors and by logging the computerised control system. Physical inspections were carried out periodically to verify cleanliness of the milking plant and supported the excellent (factory) milk quality results seen over the trial period.

Analysis of the data showed a:

- >75 % reduction in electricity used for heating water for cleaning the milking machine;
- >65% reduction in electricity costs associated with heating water for cleaning the milking machine;
- 63% reduction in water used in cleaning the milking machine; and
- 10-30% reduction in chemical use.

The full report of the trial¹ is available from AgVet Projects on request.

The unit

The trial unit comprised of a system controller and software, three 600L storage tanks, heating elements, valves, sensors and pipe work to connect the unit to the milking machine wash lines. The trial unit was also linked to a separate commercial solar hot water storage system for its source of renewable energy.

Energy efficient principles were applied in all aspects of the design with the major energy savings coming from the low operating temperatures (35-50°C); capturing, storing and re-using the warm chemical solutions; and excellent insulation to reduce standing heat losses.

Renewable energy from the solar system was utilised to heat the chemical solutions, further reducing power consumption during summer by an average of 6-15%.

Rain water was used to fill and top up the tanks and ensured variable water quality did not influence cleaning performance. A conductivity sensor located in the wash return pipe monitored the chemical concentrations of the wash solutions. The stored wash solutions were automatically dosed with chemical to keep the solutions within the concentration range specified by the chemical supplier.

The trial unit was installed on a 300 cow commercial dairy farm near Yarragon in Gippsland. It was situated in the milk room, in parallel with the existing milking machine cleaning system so the farmer could revert to his original ‘hot wash’ cleaning system with ease if required.



¹ The development and ‘proof of concept’ trialling of a low temperature re-use system (Green Cleaning System) to clean milking machines on a commercial dairy farm in Victoria. AgVet Projects (July 2010). PO Box 1390, Warragul Victoria, 3820, AUSTRALIA. www.agvetprojects.com.au

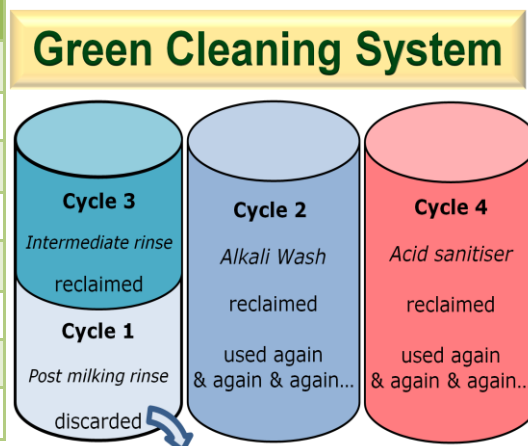
Operation

The Green Cleaning trial unit used three programs; milking, heating and washing. The wash program controlled the equipment associated with the cleaning process; delivering a four-cycle wash regime after each milking:

- Warm pre-rinse (30-32°C);
- Warm alkali wash (40-50°C);
- Warm intermediate rinse (30-32°C);
- Warm/cold acid sanitiser (20-50°C).

Four commercial dairy chemical manufacturers formulated chemicals and tested them through the trial unit. The operating concentrations, cycle times and temperatures were varied according to the manufacturers' instructions. These unregistered chemicals were used under a permit issued by the APVMA. The farm also had approval from their milk factory and Dairy Food Safety Victoria to participate in the trial.

Green Cleaning System
Uses low temperature cleaning solutions
Uses chemicals to sanitise
Used again and again and again...
Low water use
The same chemical wash cycles am/pm
Low heat losses
Low electricity use
Use detergents designed for low temperature, re-use



Sensors in various parts of the system continuously logged data which was analysed to determine energy, water and chemical use. The milk factory was asked to increase the frequency of milk quality sampling to daily testing. Milking machine cleanliness was assessed using regular visual inspections and by monitoring the milk quality test results undertaken by the milk factory.

What we found

This 'proof of concept' trial demonstrated that it is possible to successfully clean milking machines using low temperature, re-use cleaning systems.

The cleanliness of the plant was generally very good but modifications of some existing chemical formulations were necessary to achieve consistent results. Bacterial levels in milk (TPC, thermoduric and thermophiles) were well within the 'premium' milk levels.

Daily electricity consumption (for heating) was estimated from analysing cleaning solution temperature losses from sensors located in the storage tanks as well as the total time that the electrical heating elements were switched on in the storage tanks. Electricity use averaged 24 kWh per day over the trial period excluding renewable energy. These figures were compared to the original 3 cycle cleaning regime that used 1,350L of hot water daily (heated to 90°C), consuming an estimated 113kWh per day.

The farm's original cleaning system used off-peak power to heat water at 12.23 cents per kWh. The Green Cleaning trial unit used a mixture of peak and off-peak power, so the annual cost savings of around 65% were slightly less than the 75% savings in electricity use.

We found that approximately 60-70% of the water used by the Green Clean system was captured and re-used each day. However this included tapping off wash solutions to clean test buckets and for other uses in the dairy. Chemical savings were much less at 10-30%, and depend largely on the operating parameters stipulated by the chemical manufacturers. We expect larger savings in chemical use as the Industry Partners develop their products further.

Where to from here

Results from the trial are being used by the Green Cleaning project's Industry Partners – Campbell Cleantec, DairyMaster, Daviesway/DASCO, DeLaval, Milka-Ware, Tasman Chemicals and GEA Farm Technologies (Westfalia Surge) to develop commercial systems for release in 2011.

Further information about the 'Green Cleaning project is available from AgVet Projects:

P: (03) 56111 020; E: admin@agvetprojects.com.au; W: www.agvetprojects.com.au