

# BORE PUMPS

AUTUMN 2006

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A simple water level gauge will cost around \$150, but could save tens of thousands.

### TIPS TO MAXIMISE EFFICIENCY AND SYSTEM LONGEVITY

Groundwater is an important source of water for irrigation in Tasmania. Already there are more than 10 000 bores in the State, with

a further 200 to 400 being sunk every year. It is estimated that more than 20 000 ML of water are pumped from bores every year, and this figure is predicted to rise as surface water becomes more regulated.

Pumping from bores has some unique problems to be aware of, however, periodic maintenance will ensure your system runs as efficiently as possible and its longevity is maximised. (p.2)

## PRE-COOLING MILK REDUCING THE COST OF COOLING MILK IN THE DAIRY



**In a typical dairy 30% of the electricity used goes on cooling milk. It makes sense then to reduce the amount of energy the vats use to cool milk.**

The most cost effective way of reducing the electricity required to cool milk is to install a pre-cooler. Pre-coolers, situated between the releasers and the bulk vats, typically reduce the vat running time by 40%. The most common type, plate coolers, work by pumping cold water through a series of stainless steel plates around which

the milk flows. This causes heat to pass from the milk to the water.

Plate coolers are designed to cool the milk to within 2°C of the water inlet temperature when the water flow rate is three times that of the milk flow rate. For example, if your water inlet temperature was 15°C, then the plate cooler would cool milk down to 17°C. Without a pre-cooler, milk would be entering the vat at 37°C, making the vat refrigeration unit work long and hard to cool the milk down to the required temperature. (p.5)

## Save big bucks

BORE FLOW  
RATE TESTING

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## What was that?

FARMERS' MOST  
FREQUENTLY ASKED  
QUESTIONS

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# Bore pumps continued from page 1



## CASE STUDY

### BORE FLOW RATE TESTING



Cooling towers are cost savers for your dairy.

#### 1. ALWAYS ENSURE THAT THE WATER LEVEL IS MORE THAN THREE METRES ABOVE THE PUMP SO THE PUMP DOESN'T RUN DRY.

This also avoids vortexing of water into the pump, which can lead to cavitation issues. This is a very common problem, especially in summer when the pump may be removing more water than the bore can supply. However, it is easily monitored with a simple water level gauge.

#### 2. CHECK BOTTOM OF BORE.

Over time bores can silt up to the extent that pumps are sitting in mud, leading to overheating and pump failure. It is estimated that 30–40% of bore pumps in Tasmania are sitting in mud and this is a common cause of pump breakdown. The solution is to shorten the pipe so that the pump is hanging 2–3 metres above the bore bottom. Alternatively, hire a driller to blow the mud out of the bore; however, this can sometimes lead to blocking of pores and reduced flow rates into the bore.

#### 3. MAKE SURE THE PUMP IS NOT REMOVING MORE WATER THAN THE BORE CAN SUPPLY.

Consider installing an above-ground holding pond, sufficient for 2–3 days irrigation, that can be

continuously filled at a rate equal to the bore supply. This pond will be very useful for maintaining irrigation at times when the bore pump breaks down or requires servicing. It is also important that, when initially designing the system, the bore supply rate is tested accurately using a flow rate testing service.

#### 4. MAKE SURE THERE IS SUFFICIENT BACK PRESSURE.

If a pump is being used to deliver to an open discharge, for example when filling a dam, there will be very little back pressure in the system. Bore pumps need a minimum back pressure to operate safely, typically 20–25 psi. Below this the impellers move and wear away at the bearings, reducing pump life by up to a third. Install an automatic sustaining valve (and set the appropriate discharge pressure), or install a gate valve and a pressure gauge and adjust the gate valve to obtain the required pressure.

#### 5. EVERY 2–3 SEASONS (OR WHENEVER A REDUCTION IN PERFORMANCE IS NOTICED), CONDUCT A THOROUGH VISUAL CHECK OF THE SYSTEM'S CONDITION.

##### a. Pipe

i. Visually check for pinholes, or block off an end and pressurise

with water. Pinholes will cause water to be recirculated, resulting in reduced efficiencies.

ii. Check insides for iron bacteria deposits. Iron bacteria are a problem in areas with groundwater high in iron, and particularly in the Circular Head region. The deposits will cause a reduction in flow and decrease pumping efficiency (see article in Electric Farm Spring 2004 at [www.auroraenergy.com.au](http://www.auroraenergy.com.au)). To remedy, flush with Clear Bore ([www.clearbore.com.au](http://www.clearbore.com.au)); install an anti-scaler that inhibits bacterial growth through electric pulses or the addition of a sanitising agent (e.g. [www.pumpmate.com.au](http://www.pumpmate.com.au)); or replace galvanised pipes with Wellmaster Flexible Hose that inhibit scaling ([www.wellmaster.com.au](http://www.wellmaster.com.au)).

##### b. Cabling

Check for chafing and replace if damaged. When in operation, the pump and pipe tend to vibrate in the bore and can chafe the cables.

##### c. Pump

Remove any stones from the intake screen, check for iron bacteria deposits and consider taking it in for a full pump service.

*For more information on any of the products described in this article, contact Irrigation Tasmania on (03) 6435 1073.*

Wally Elphinstone is one farmer who decided to get his bore properly tested once drilling was completed.

Growing potatoes, beans, poppies, and raising fat cattle on his 440 acre property at Boat Harbour, Wally sunk a 180 foot bore to supplement his dams.

"I run my bore pump over night using OffPeak power. I've got it on a timer; it comes on at 8 pm, fills the dam, then shuts off at 7 am. It looks after itself," Wally explained.

"I got the flow rate testing done as I want to keep my irrigation running costs as low as I can."

Wally installed an 11kW pump costing \$10 000 that is well matched to the bore supply, ensuring his running costs are as low as possible.

"The tests estimated the bore could supply 7500 gallons per hour and proved to be spot on."

He also knows that he didn't over-capitalise on a bigger motor.

"I reckon I saved \$1000 alone just on a smaller 3-phase power cable from the transformer compared to if I'd gone with a bigger pump. Not to mention the savings on the pump."



Wally Elphinstone at his Boat Harbour property.

# BORE FLOW RATE TESTING

## A SIMPLE INITIAL TEST COULD SAVE BIG BUCKS

With all the water restrictions currently being placed on most tributaries, more and more farmers are turning to groundwater for their irrigation needs. Pumping from a bore can be a convenient and cost effective means of irrigation, but to make sure your pump set is well matched to the bore supply, it is essential to get the flow rates properly tested.

Many farmers rely upon the drilling rigs to provide an estimate of potential water yield once the bore has been sunk. To do this, the rigs blow air down the hole forcing water to the surface, which is then used to estimate the water flow. However, there is the potential to greatly reduce water

flow by this method as the air pressures involved force small clay particles into the pores, blocking the subsequent flow of water. This will effectively overestimate the flow rate of the bore.

If the flow rate is overestimated, it may dramatically inflate the capital and operating costs of the system. For example, consider a bore at 250 feet, with one estimation at 15 000 gallons per hour and another at only 12 500 gallons per hour. *The costs associated in these two instances are outlined in the table below.*

Base this over a typical 140-day irrigation season and there is a

\$504 difference using the bigger motor, not to mention the \$2270 initial saving.

An alternative is to use a bore flow rate testing system that tests the bore under conditions similar to those it will actually operate under. Typically, the bore will be pumped for 36 hours while flow rate, water level and movement in the bore, and the kilowatts required to pump the water are all monitored. This test will ensure that the pump installed is well matched to the bore flow rate, resulting in highly efficient pumping.

*For more information about bore flow rate testing, contact Irrigation Tasmania on (03) 6435 1073.*

### Cost Estimates

#### Estimated flow rate at 15 000 gallons/hr

Electric motor	22kW
Capital cost	\$12 600
Running costs	\$1.66 per hour (OffPeak)

#### Estimated flow rate at 12 500 gallons/hr

Electric motor	18.5kW
Capital cost	\$10 330
Running costs	\$1.30 per hour (OffPeak)

## Contact Us

### Business line

1300 13 2045

(7 am to 7 pm Monday to Friday)

Call this number for all business enquiries regarding electricity. This includes advice and information on:

- heating and cooling
- hot water
- lighting
- payment options
- easements
- energy costs
- private powerlines
- pole queries
- new supply.

### Natural gas business enquiries

1300 13 2030

Call this number for sales and connections.

### Dial before you dig

1100

### Electricity (Aurora) emergencies and faults

(24 hours a day, 7 days a week)

13 2004

### Natural gas (Powerco) emergencies and faults

(24 hours a day, 7 days a week)

18 0211

### Electricity product sales and services

1300 13 2006

### New supply

1300 13 7008

### Web address

www.auroraenergy.com.au

### Correspondence

GPO Box 191, Hobart Tas 7001

### Payments by mail

Locked Bag 4, Hobart Tas 7001



Pre-coolers, the biggest cost-saver in any dairy.



## DAIRY COOLING TOWERS AT A GLANCE

### ADVANTAGES

- reduces electricity costs of cooling milk, by producing cold water for use in the pre-cooler
- cools milk quicker, resulting in higher quality milk
- can run tower at night on OffPeak power and store cold water
- large savings in water consumption.

### DISADVANTAGES

- initial cost – a 500 L unit will cost around \$6000 installed
- requirement to manage Legionella bacteria
- requires a large holding tank to make use of OffPeak power.

### APPLICATIONS

- where water for cooling is limited, or needs to be recycled
- where the temperature of the pre-cooling water is too high
- where the milk quality needs to be improved by faster cooling.

### MORE INFORMATION

For more information contact Tas Isle Refrigeration on (03) 6442 1555, or visit [www.lakesidect.com.au](http://www.lakesidect.com.au)

# COOLING TOWERS

## Saving water and energy

**Pre-coolers are the most cost effective way of reducing energy costs in the dairy; however, they can consume large quantities of water and do require the water to be cool for maximum performance.**

If water is recycled by storing in a tank or pond, the temperature can increase up to a point where it becomes impractical to use as cooling water. This is a particular concern over the warmer months.

One way of saving both water and energy is by installing a cooling tower. Water cooling towers are not new technology, but they have

only recently been adapted to the dairy industry to cool water used in pre-coolers. Cooling towers transfer heat from the water and release it into the air, by means of spraying the water onto a medium over which air flows.

Cooling towers are usually run in the early hours of the morning when wet bulb temperatures are at their lowest, resulting in the coldest possible water. This also enables OffPeak power to be used to run the small pump and fan on the cooling tower. The cold water is then stored for use the next day.

For example, if the ambient wet bulb temperature is 6°C, then we could expect to cool water down to 8°C. Once passed through the pre-cooler, this will result in milk going into the vat at 10°C.

Choosing siting of cooling towers is important, with a cool, shaded and airy position being most suitable.

It is a health requirement that measures are put in place to stop Legionella bacteria growing in the cooling tower. An automatic chemical dispensing unit will cost around \$1500.

open day  
and night

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# Pre-cooling milk continued from page 1



Rapid pre-cooling means fewer micro-organisms.

As well as the reduced energy costs, there will be added benefits in terms of producing higher quality milk. Micro-organisms grow rapidly in milk above 4°C, so the quicker it is cooled below that the better. In order to maximise the performance of your pre-cooler, you need to ensure that:

## 1. A SUITABLE HEAT EXCHANGER IS USED.

The number of plates will be determined by the maximum milk flow, not the average milk flow. As milk is released from the releasers, milk flow through the pre-cooler can vary greatly. Installing a variable speed drive on the milk pump and setting the flow to a rate matched to the water flow in the pre-cooler could overcome this.

## 2. WATER FLOW RATES ARE FINE TUNED.

The water flow rate needs to be at least twice the milk flow rate to obtain sufficient cooling and associated cost savings, while a 3:1 water flow rate is optimal. To avoid wastage, the warm water leaving the pre-cooler can be reused for udder washing, yard washing, or refilling the hot water cylinder. It can also

be recycled by pumping into a tank or dam, although a cooling tower may be required to avoid the gradual increase in temperature of the water. (See page 4.)

## 3. THE COOLING WATER IS AS COLD AS POSSIBLE.

The cooler the water, the lower the milk temperature will be entering the vat and the shorter the vat running time. If drawing from a tank or dam, take the water from near the bottom where it is coolest. Consider installing a cooling tower or cold storage system that can make use of OffPeak power (e.g. ice bank or chilled water storage).

## 4. THE PRE-COOLER IS WELL MAINTAINED.

The pre-cooler must be cleaned after every milking, ensuring the cold water is turned off and preferably drained, otherwise temperatures of the cleaning water are reduced and cleaning is inefficient. The plate cooler should be taken apart every so often and visually inspected for any blockages and scaling. Ensure that the plates are not over tightened – refer to manufacturer's specifications. To stop particulate matter from entering the small spaces of the plate cooler install and regularly check an in-line filter on the milk line. It may be necessary to install a filter on the water line as well.

*For more information, contact your dairy consultant or equipment supplier.*

# QUOTE

“”

# UNQUOTE

COOLING TOWERS

LACRUM FARM IS ONE DAIRY THAT HAS RECENTLY INSTALLED A WATER COOLING TOWER TO SUPPLY COOL WATER FOR USE IN THE PRE-COOLER. SITUATED AT SMITHTON IN THE STATE'S NORTHWEST, LACRUM MILKS 655 COWS, PRODUCING

15,000 LITRES OF MILK PER DAY. THEY INSTALLED THE COOLING TOWER PRIMARILY TO COOL THE MILK MORE QUICKLY, RESULTING IN INCREASED MILK QUALITY. FARM MANAGER LLEYTON STOKES EXPLAINS.

resulting in the milk entering the vat at 16°C.

We get a 3% bonus for quality milk, so cooling the milk quickly is very important to us. The energy savings from reduced vat refrigeration running times are a big bonus. While the cooling tower is now only used during milking to cool the circulating water, we plan to operate the cooling tower in the early morning and store enough cool water for the next days milking.

If we recirculate the water around the cooling tower five or six times during the early morning, I reckon we can get the water temperature down to at least 10°C even in summer.



King of cool, Lleyton Stokes.

Before we had the cooling tower, we stored water in three 20 000 litre tanks and would recycle from the pre-cooler. In summer the water temperature would get up to around 22°C, meaning we were putting milk into the vat at around 24°C.

Since installing the 500 litre Lakeside Cooling Tower, they typically cool water down to 14°C,

# VEGETATION OFFICERS



Aurora's Vegetation team.

**The management of vegetation around powerlines and power poles is vitally important. Proper management helps decrease the frequency of power interruptions to your farm and the surrounding community. It also prevents fires and the possibility of serious accidents caused by electricity.**

Over the past twelve months Aurora has formed an in-house team to better manage the vegetation program and its contractors. The team is also taking a more active approach in liaising with stakeholders including DPIWE, Natural Resource Management, Greening Australia, Tasmania Fire Service and peak rural bodies.

Mick Emmett, Aurora Energy Technical Leader Vegetation Management, says that the core message the team wants to get across to the rural community is this:

**IF YOU'RE PLANTING ANYTHING NEAR POWERLINES OR POLES GIVE US A RING ON 13 2004.**

## New supply needs plenty of notice

**IF YOU ARE DECIDING TO CONNECT A NEW POWER SUPPLY, BEAR IN MIND THAT THERE IS A SIGNIFICANT TIME LAG BETWEEN AURORA RECEIVING THE APPLICATION AND THE FINAL INSTALLATION.**

Make sure you contact Aurora as soon as possible. Design work can take up to six weeks and construction (following your agreement to proceed) can take up to eight weeks. If you are undertaking a subdivision or large scale project work, we recommend you contact Aurora's New Supply Group (1300 13 7008) as extended timeframes may apply.

Delays may be caused by a number of factors including:

- **BAD WEATHER**
- **SITES THAT ARE DIFFICULT TO ACCESS**
- **ANY REDESIGN WORK THAT YOU MAY REQUEST**
- **ENVIRONMENTAL CONSTRAINTS**
- **NEGOTIATIONS WITH OTHER AUTHORITIES.**

This is why it is important to contact us as soon as possible, so that we can make sure the work is completed by the date you require.

### HOW MUCH DOES IT COST?

Aurora Energy will provide a subsidy towards the cost of the power supply to your proposed site. This contribution is dependent upon the location of your installation and its proximity to the closest existing power supply. Aurora will determine the contribution required from you. For a new supply application form and further information contact Aurora's New Supply Group **1300 13 7008** Monday to Friday 7 am - 7 pm.

## WHY DOES AURORA TAKE VEGETATION MANAGEMENT SO SERIOUSLY?

1. Vegetation that causes faults not only affects the power reliability on your property but also that of your neighbours and surrounding community.
2. Fire safety. Plant matter near a power pole can act as fuel for a fire that may bring a pole down. Also, sparking from lines may touch off a brush fire.
3. Electric safety. If crops are grown too close to powerlines, machinery may touch the powerline causing serious injury or the death of the operator.
4. The Office of the Tasmanian Electricity Regulator makes Aurora legally responsible for enforcing effective vegetation management practices around powerlines and power poles.

**FALLEN POWERLINES** 

**FOR A FREE COPY OF THIS BROCHURE CALL AURORA ON 13 2004**



# Q&A

HERE ARE HALF A DOZEN OF THE MOST FREQUENTLY ASKED QUESTIONS, WHEN AURORA STAFF MEMBERS TALK TO PEOPLE IN THE TASMANIAN RURAL COMMUNITY.

## 1. In Tasmania, night rates (OffPeak) are from 8 pm (EST) –6 am (EST). Victoria has all weekends and all public holidays. Why don't we in Tasmania?

The very different characteristics of the Tasmanian hydro system do not enable the mainland OffPeak arrangements to apply. A hydro system such as Tasmania's, unlike thermal systems, does not offer a cheaper time of day to generate electricity.

## 2. It is inconvenient if my irrigation system needs to be reset or restarted during the night. Can the time clock be set to change over to the cheaper rate during the day?

In Tasmania, OffPeak is a reflection of demand on the distribution system and, therefore, applies only in night time periods.

## 3. What are SMS mobile phone capabilities for irrigation?

At Agfest in 2005 Datacall displayed their SMS technology on the Aurora pump display. The pump display simulated what farmers would do



to monitor and control their pumps without being on-site. The contact details for Datacall are (03) 6229 7692 or web address is [www.datacall.net.au](http://www.datacall.net.au)

## 4. Is there a call centre telephone number for farmers?

Aurora has a dedicated business contact line which is **1300 13 2045**.

## 5. What is the Extended Hour OffPeak contract, and if I am interested how do I change my irrigation to those hours.

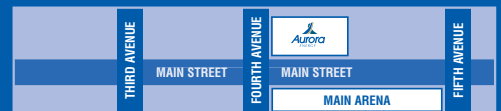
The extended hours contract offers 11 hours on the night rate instead of the standard 10 hours. To go onto the extended hours contract you need to contact the Aurora Business Line on **1300 13 2045** and they will be able to forward you a contract to sign. Once that contract has been mailed or faxed back to Aurora we will organise one of our field officers to change your time clock. Your new hours for the night rate will then be 8 pm EST (9 pm during daylight savings) to 7 am

EST (8 am during daylight savings). There is a cost associated with this change (\$58.00).

## 6. Can I request the time clock to change onto the night rate earlier than the 8 pm EST (9 pm during daylight savings)?

No. The night rate can only be applied during the hours of 8 pm EST (9 pm during daylight savings) to 7 am EST (8 am during daylight savings), in line with the demand on the distribution system.

# Save your energy at Agfest



If our feedback from last year is anything to go by, visiting our tent on the corner of Main and 4th Avenue should be very worthwhile. See you there!

At our Agfest tent you can learn about how to save money that you spend on energy, and lots more. Just pick up one of our many brochures written specifically for agribusinesses or have an in-depth face-to-face discussion with one of our expert consultants.

### Find out about:

- the best tariff for your business
- techniques for increasing energy efficiency in irrigation
- energy efficient dairy practices
- how other farmers have come up with energy efficient solutions
- how Aurora's website can help you better manage your power
- safe growing of trees & shrubs near powerlines
- safe working near powerlines – Look up, Look out.

But it's not only business, you can also find out about:

- a massive interactive exhibition that will take you from the Hydro dam to your farm gate and beyond with a fully operational variable speed drive
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**REGISTER NOW**

To register as a new online user [click here](#). This is a free service to all Aurora customers.

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Fact sheet: Energy efficient irrigation

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Combined account application form



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