



# Borehole and well water for dairy farms

## The basics

The majority of dairy farms in Wales now have their own water supply, either by means of a borehole or water well, backed up by a mains water supply. A borehole used as a water well is completed by installing a concrete lining and well screen to keep the borehole from collapsing. Both of these methods allow access to groundwater in underground aquifers.

A total volume of up to 20m<sup>3</sup> may be extracted from the ground source per day. If your requirement is in excess of this then a water Abstraction Licence will need to be obtained from the Environment Agency (EA).

When water is supplied from a borehole or well, it may contain undesirable chemicals, biological agents, suspended solids and dissolved gases. If water does not come from a potable (drinkable) source its quality and value can be increased by filtration and treatment. Borehole or well water, when suitably treated can be used for plant washing in the dairy and will be safe for animals and humans to drink.

Various filtrations are available which when combined can remove everything from macroscopic (large) to microscopic (tiny) particulates. Treatment for bacteria can be done biologically or most commonly these days, by using Ultra Violet (UV) light.

## In practice

Firstly, filtration of water must be considered. Depending on end use, several filters are available from coarse cross-flow filters to cartridges, fine mesh and fine sand beds.

For bacteria, pathogen and virus control, UV units are the best option. Running costs are very low and apart from changing the UV bulb every six to twelve months, they are virtually maintenance free.

## CASE STUDY

The borehole water supply at the Gelli Aur college farm dairy unit uses a UV treatment system to allow the water to be used safely for cow drinking and in the milking parlour wash and cleaning system.

The borehole was installed in 2006 and included a filtration and treatment system. Prior to this the farm was supplied with mains water only – this would have equated to a cost of around £28,000 per year at today's prices. The farm is still connected to a mains water supply and this occasionally contributes to overall supply when bore-hole levels are low.



Removal of high levels of metals such as iron may also be necessary for both health and equipment reasons. Iron in the water can leave an unpleasant taste and colour the water a dark brown. It can also affect the efficiency and life of equipment such as plate coolers.



Other contaminating agents will also need to be removed, such as cadmium, lead, arsenic, chlorine, mercury and benzene.

Some buffering may be required to allow a steady flow through the filters and the UV steriliser. With constant flow throughout the day, a small filtration and sterilisation unit can get through a surprising amount of water – over 10m<sup>3</sup> for an 8 litre per minute unit.



In order for adequate water to be delivered efficiently to where it is needed, the following should be considered:

- water pressure
- the diameter of the pipe
- the friction of the pipe (pipe length and pipe diameter).

Consult a suitable agricultural engineer for advice on the effect of the above on water flow.

Regular testing of the water quality will be necessary for Farm Assurance and milk hygiene purposes.



## The bottom line... what are the running costs?

The cost of installing a borehole depends on a number of factors – including geology and drill depth and can range between £60 and £100 per metre. This, together with the total running costs must be factored in whilst calculating the pay back periods when comparing with mains water supply. A pump running for 20 hours per day providing 1.5m<sup>3</sup> per hour should be enough to supply a 300 cow dairy farm with all its water requirements.

Additional capital costs for installing a small water treatment system may be between £1,500 and £2,500.

When comparing water bought from the mains, every m<sup>3</sup> provided from a borehole will be worth around £1.30 at current mains prices.

If the borehole or well is located on a hill above the farmstead, this may effectively reduce the need for secondary pumps. There would also be a reduction in cost as it would be, to some degree, free draining to the area where the water was required.

According to DairyCo's Milkbench+ benchmarking tool water costs for dairy farms are on average 0.15 pence per litre of milk produced.

The table below shows some basic borehole/well running costs for clean water based on current electricity (day rate: 11.99p/kWh; night rate 6.5p/kWh) and mains water (£1.30/m<sup>3</sup>) prices:

Item	Average cost
Running cost	20p/m <sup>3</sup>
UV treatment	1p/m <sup>3</sup>
Filters and maintenance	10p/m <sup>3</sup>
Mains water cost saving	£1.30/m <sup>3</sup>
Net saving	£0.99/m <sup>3</sup>

**For more information on 'Borehole and well water for dairy farms' please contact:**

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