



✓ **Key features**

- Lincoln University Dairy Farm installed a soil moisture metering system in September 2007.
- The system transmits regular moisture readings to a computer, which allows better irrigation management.

✓ **Key benefits**

- Reduces the number of irrigation days.
- Reduces electricity and water use.
- Optimises pasture growth.
- Helps prevent the loss of soluble nutrients through drainage.
- Can be used to manage any irrigation system.

Taking the guesswork out of irrigation

Over-irrigating wastes electricity, but many farmers believe they have to pay the extra power costs associated with over-irrigating rather than risk letting their soil get too dry.

Peter Hancox, manager of Lincoln University Dairy Farm, is not one of those farmers. Thanks to soil moisture metering, he was able to avoid unnecessarily irrigating an 80-hectare block on the farm on at least 20 days during the 2008/2009 growing season.

Reducing the number of irrigation days saved approximately 38,000 kWh of electricity between September 2008 and March 2009, and cut the farm's power bill by \$6,750.

Soil moisture metering makes it possible for Mr Hancox to work out exactly when he needs to irrigate the 80-hectare block – and for how long. The system sends soil moisture readings by radio transmitter to a computer in the farm office. Mr Hancox uses the readings to decide when to turn on the centre pivot used to irrigate the block.

He says soil moisture metering is particularly useful during the spring and autumn, when the weather is less predictable.

“The real benefits are in the shoulders of the growing season, when it's harder to work out when to start and stop irrigating.”

Mr Hancox says that as well as saving electricity, soil moisture metering has other advantages.

- It saves water.
- It encourages optimal pasture growth.
- It helps prevent the loss of the water-soluble nutrients through drainage.

He recommends soil moisture metering for any farm that uses irrigation, including dairy farms, arable farms, orchards, and vineyards. Soil moisture metering can also be used to manage the irrigation systems on sports fields and cricket pitches.



If the soil is too wet it starts to cool down, which affects growth, and if it's too dry the grass starts to get stressed.

Why introduce soil moisture metering?

Lincoln University Dairy Farm is a 160-hectare farm which is committed to developing and demonstrating world's best practice in dairy farming. That includes finding ways of making dairy farming more energy efficient.

At present, about 80% of the running cost of irrigation systems comes from the electricity used to run irrigation pumps. However, without accurate information about soil moisture content most farmers tend to over-water rather than risk their drying soil out – and they waste electricity in the process.

“For many farmers it's a case of when in doubt, water,” says Mr Hancox.

Accurate soil moisture readings help take the guesswork out of irrigation, making it easy for farmers to decide when to irrigate, and for how long. It also makes it possible to keep the soil sufficiently dry that it can absorb any “free” irrigation available in the form of rain.

“You don't want to run your soil at 100% moisture, because that way you can't take advantage of any rain events which might occur.”

Mr Hancox says that as well as saving electricity, soil moisture metering also saves water.

“As a best-practice demonstration farm we want to be efficient in the way we use water.”

Soil moisture metering also promotes better pasture growth because it helps ensure the soil is neither too wet nor too dry.

“If you can keep the moisture at the right level you can grow more grass. If the soil is too wet it starts to cool down, which affects growth, and if it's too dry the grass starts to get stressed.”

Mr Hancox says that another advantage of soil moisture metering is that it helps stop the loss of soluble nutrients, such as the nitrogen which can take place when soil gets too wet. This helps farmers get the maximum value from their nutrients.

How does soil moisture metering work?

Soil moisture metering works by providing regular information about soil moisture levels in the plant root zone. It also provides information about soil temperature, which is particularly useful for dairy farmers because pasture growth is closely related to soil temperature.

Lincoln University Dairy Farm used a system known as Aquaflex. It involved setting up two measuring sites on an 80-hectare block on the farm.

Each measuring site cost \$3,500 to install, and consists of two 3 m plastic sensors which are buried parallel to each other 50 mm and 500 mm below the surface



An Aquaflex sensing unit, which is buried underground.

of the soil. Information from the sensors is sent by radio transmitter to the farm computer via a base station, which cost \$1,380. The information is constantly updated during the day.

Lincoln University Dairy Farm set up two measuring sites because it needed to measure the moisture content in two very different soil types. However, farms with only one soil type may require only one measuring site.

Mr Hancox points out that regardless of the number of measuring sites, it is important to install them in a position that is representative of the soils in that area.

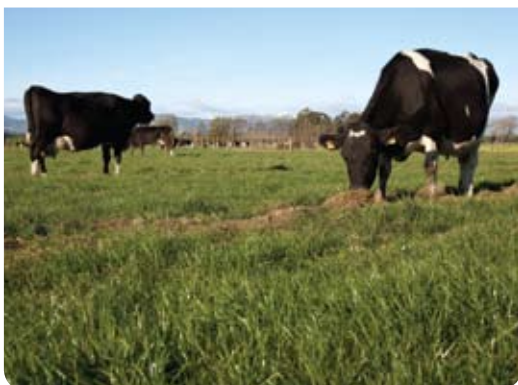
“You have to be very careful about where you do your measuring—if you put the system in the wrong place you won’t get representative information.”

He says that combined with other good farming practices, such as keeping a close eye on the weather, and monitoring soil temperature, soil moisture metering is a very effective tool for better irrigation management.

“As with any aspect of running a successful farm it’s important to take several different factors into consideration in order to make better management decisions.”



Viewing soil moisture readings, which are transmitted to the computer.



EECA enables organisations to increase their domestic and international competitiveness by adopting energy efficiency and renewable energy practices.


We work with businesses to identify the opportunities for energy management that are available to them and help them develop energy management action plans to make the most of these opportunities.

Good energy management has many benefits for businesses, including lower costs, increased productivity, reduced greenhouse gas emissions and a positive effect on the brand.

We have a particular interest in:

- encouraging new or under-used technology that can make processes more efficient
- projects that reduce greenhouse gas emissions, and
- developing the wood fuel industry.

For more information, contact us directly – see details below.

 For more information contact
The Energy Efficiency and
Conservation Authority:

EECA HEAD OFFICE:

PO Box 388, Wellington, (04) 470 2200

EECA AUCKLAND:

PO Box 37444, Parnell, Auckland, (09) 377 5328

EECA CHRISTCHURCH:

PO Box 8562, Christchurch, (03) 353 9280

or visit www.ecabusiness.govt.nz

JUNE 2009

www.eecabusiness.govt.nz

New Zealand Government

