



## ADAPTING TO A CHANGING CLIMATE: CASE STUDY 7

### SUSTAINABLE DAIRYING

# Reducing soil damage in high rainfall

#### THE FARM

- Worldwide Farms, near Winton in Southland.
- Consists of three properties with a total area of more than 1410 hectares.
- The farm has 707 hectares in a milking platform, and another 707 hectares of support land, including 160 hectares of forestry.
- Produced about a million kg milk solids in the 2007/08 year.



#### THE FAMILY

- Abe and Anita de Wolde.
- Began their farming career milking 40 cows on 26 hectares in Holland.
- Arrived in New Zealand in 1992.
- Won the Lincoln Foundation Farmer of the Year Award in 2007.



Photo courtesy of Rochelle Vermales.

*Worldwide Farms' mission statement: "To achieve solid returns, growth and progress in dairy farming through excellent, up-to-date farming practices and an innovative approach, while maintaining the highest standards of integrity and fair play. These practices should be sustainable in regard to people, animals and the environment."*

Abe and Anita de Wolde are confident that a healthy environment and a healthy dairy industry can both be achieved.

After several years of rapid growth and development, the de Woldes took stock in 2004. They were running three dairy farms managed by contract milkers, and had increased their total land area, both through purchases and leases, to support the milking platforms. But they started to consider the long-term sustainability – including social, environmental and economical aspects – of their farming system.

"We could see that a healthy dairy industry was potentially on a collision course with a healthy environment," says Abe. "We became more and more convinced that in order to farm in a sustainable manner, we needed to be sensible in all three areas."

They investigated the effect of wintering dairy cows under traditional brassica systems, as well as potential improvements. The farm had struggled to achieve good brassica yields for wintering cows and faced problems of soil compaction, erosion, pests and weeds, which had led to rising wintering costs.

#### WARMER AND WETTER CONDITIONS LIKELY

Current climate change projections have Southland likely to experience higher average temperatures and rainfall, fewer frost days, more hot days, and greater frequency of extreme rain events.

Higher average temperatures will be beneficial because a longer growing season will increase the amount of dry matter produced per hectare. Meanwhile, higher rainfall and more extreme rainfall events will present significant challenges to many in the region.

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The de Woldes can expect their farm's average annual rainfall to increase between 5 and 7.5 percent (48–72mm), on top of the current average of 960mm. Changes to projected rainfall distribution also means they may have much higher winter rainfall and extreme rain events.

Soil will become more waterlogged with more chance of pugging and soil damage. This will put more pressure on grazing management in early spring and late autumn, and will also lead to greater nutrient loss through runoff when irrigating wet soil.

## WINTERING SYSTEMS AIM TO INCREASE SUSTAINABILITY

After investigating various different systems, Abe and Anita built a wintering facility on one of their farms. This was part of their solution to support future environmental, economic and social sustainability.

They now have two wintering sheds – one housing 400 cows and the other 500 cows – situated on the milking platforms close to the dairy sheds. Their use during the wettest period of the year (between late autumn and early spring) has prevented soil damage caused when cows were wintered on crop, and also enabled more grass to be grown.

Manure scrapers installed in the milking and wintering sheds have reduced the volumes of effluent and nutrients lost.

In the milking shed, each cow now produces just 1.5–2 litres of effluent per day. This compares to 50 litres of water per cow typically used for yard wash down. Effluent is collected and stored in a bunker at the end of the yard, then emptied via a slurry tanker two or three times a season, when soil conditions are favourable.

In the wintering sheds, 50 litres of effluent is produced per cow per day. Effluent is collected in a bunker at the end of the shed, before being pumped into a storage pond, and emptied via a slurry tanker when soil conditions permit.

The wintering sheds were designed and positioned to take prevailing weather conditions into account. The shed's south end is closed and wind breaks are on the west, while a roof vent the length of the shed allows air to circulate.



The wintering shed.

### WINTERING SHED SPECIFICATIONS (HOUSING 500 COWS)

Shed dimensions	122m x 30m
Holding capacity	6m <sup>2</sup> per cow
Feed laneway	5m wide
Cow lanes (eating/walking)	3.5m wide
Cow lanes (walking only)	2.5m wide
Cow cubicles	2.2m x 1.1m
Effluent storage	4000m <sup>3</sup>
Effluent volume	25m <sup>3</sup> per day

### WINTERING SHED CONSTRUCTION COST (PER COW)

Construction capital costs	\$1 870.00
Rubber matting in cubicles	\$ 100.00
Effluent pump to storage	\$ 30.00
<b>TOTAL</b>	<b>\$2 000.00</b>

Inside the shed, the cows are free to walk around, eat and socialise in walking areas, and individual cubicles are fitted with rubber matting that traps a cushioning layer of air underneath.

Establishing the first shed was a learning process for both farm staff and the cows. Initial stress on the cows was overcome by rotating them into the shed at night and outside onto pasture during the day. After about 10 days of this, the cows became used to sitting on the rubber mat in their own cubicle.

Because of the results of the wintering shed so far, Abe and Anita plan to have all their cows wintered indoors.

## FEED MANAGEMENT IN THE WINTERING SHEDS

Ad lib silage is fed out twice a day from a feed alley that runs the length of the wintering shed. Cows still being milked are separated by subdividing gates and are fed higher protein rations.

Abe says this housing system allows them to set individual drying off dates and safely increase the average lactation and therefore, the farm's income from milk.



Manure scraper on milking shed yard.

# Key points

The change to wintering sheds means brassica crops are no longer grown. However, the support land is now used to produce barley and silage for winter feed. Whole crop barley is undersown with a short rotation Italian ryegrass. Barley whole crop silage is harvested in early summer, and then silage is also made from the re-growth tetraploid ryegrasses which will last another year. Silage is stored in a bun next to the wintering shed. The support land is then used for grazing cows in late autumn.

## BENEFITS FOR THE DE WOLDES

- Farm soil doesn't become pugged.
- Soil characteristics and pasture growth has improved.
- Less tillage is needed.
- Nutrient loss is reduced.
- Less impact on waterways.
- Increased per cow production (60kg of milk solids per cow).
- Less feed wastage (two percent indoors compared with 53 percent outdoors).
- Cows eat less but have higher body condition scores.
- Intensification through higher per hectare production per cow winter day (6m<sup>2</sup> for winter



Rubber matting for comfort.

- 1 Abe and Anita believe a sustainable farm operation reaps its own rewards. They advise other farmers to focus on their farming inputs, and to do their own calculations and thinking to make sure any changes will suit their individual farming system and situation.
- 2 The de Woldes aim to achieve long-term sustainability by balancing the environmental, social and economic aspects of their dairy farming business.
- 3 Wintering animals indoors supports sustainability across all three aspects.
- 4 The move to wintering sheds reduced soil damage caused by high rainfall, expected to occur more frequently. The sheds also allow for future pasture growth and production.
- 5 Manure scrapers in the wintering and milking sheds reduce the amount of effluent produced.
- 6 The wintering sheds have realised economic benefits associated with longer lactation, higher per hectare production, reduced fertiliser cost and more efficient use of feed.
- 7 The wintering sheds have boosted staff loyalty and job satisfaction.

feed compared with 12m<sup>2</sup> in traditional crop wintering).

- Manure adds about \$23 000 worth of nutrients to the farm's budget.
- Estimated 22.5 percent return on capital investment (the wintering sheds will have been paid back in five or six years).
- Higher job satisfaction and staff retention.

## INTO THE FUTURE

Abe and Anita are considering extending the wintering shed's use to spring when the ground is still very wet, to further reduce pugging and soil damage.

### THIS IS ONE IN A SERIES OF CASE STUDIES CALLED ADAPTING TO A CHANGING CLIMATE

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## FOR MORE INFORMATION

- NIWA provides information and projections about climate change: [www.niwasience.co.nz](http://www.niwasience.co.nz)
- Read the booklet *Farm Dairy Effluent and information about land sustainability* provided by Environment Southland: [www.es.govt.nz](http://www.es.govt.nz)
- Find a large range of resources about sustainable dairying, effluent management and feed pads at DairyNZ: [www.dairynz.co.nz](http://www.dairynz.co.nz)
- Read a range of papers on subjects including wintering systems, soil management and winter feed management presented at the South Island Dairy Event (SIDE): [www.side.org.nz](http://www.side.org.nz)

