

# fact sheet



ECOSYSTEM  
SERVICES  
PROJECT

## Dairy Farms



Exploring the 'value' of ecosystem services on the milking area of irrigated dairy farms in the Goulburn Broken Catchment.

### Summary

Dairy farms in the Goulburn Broken vary significantly in terms of their intensity (eg. animals per ha) and reliance on external inputs such as irrigation water, supplement feed and fertiliser. How do these different farm types compare when ecosystem services are taken into account? Can dairy farms utilise ecosystem services better? This Ecosystem Service project uses a systems approach to help understand interactions and consequences of management, on the 'value' of ecosystem services on a range of irrigated dairy farm types.

### Background

Dairying is a key industry in the Goulburn Broken Catchment with 112 000 ha producing 840ML of milk annually at a gross value of \$453 438 000 (1996 estimate). Most dairying is carried out in the Shepparton Irrigation region and uses imports of water from the irrigation channel system which is applied either by regular flooding or from spray systems.

Ecosystem services that are recognised as being of particular importance directly to the dairy farm or indirectly to the downstream user or wider community include:

- Regulation of climate –particularly greenhouse gas emissions from cows;
- Provision of shade and shelter from trees - heat stress in animals has adverse effects on livestock, including reduced reproductive efficiency, decreased live-weight gain and reduced milk production;
- Maintenance of soil health - soil fertility is a major determinant of milk production through its effect on pasture yield;

- Waste absorption and breakdown and maintenance of healthy waterways. Dairy farms contribute to the nutrient loads in waterways through pesticide/fertiliser application and irrigation and
- Regulation of river flows and ground water levels. Dairy farms can contribute to the salinity problem as accession water from rain and irrigation beyond the root zone is added to water tables.

### Project components

The project has two major components.

Firstly a scenario development process was undertaken to identify major dairy farm types and to capture current knowledge. This was conducted through a workshop process with dairy researchers and farmers input.

Secondly, a simple model was developed capturing key biophysical processes, ecosystem services and management options.

### Project outputs include

- a model of the milk producing area on a dairy farm integrating milk production and other ecosystem goods and services.

### Key observations from workshops and analyses are that:

- The greatest variation between dairy management practises is in feed supplementation and water use efficiency;
- There is a trend among dairy enterprises for increasing water use efficiency;
- Water re-use systems on high input farms increase milk production and reduce nutrient runoff;

- Little is understood of the current state of the soil ecosystem and if critical thresholds are being approached;
- Increased herd productivity through provision of shade and shelter is offset by the cost of establishment;
- The impact of shade and shelter on milk production may be more significant in the future due to climate change and
- The role of natural pest control is unclear but it may be beneficial to production.



Shading can reduce heat stress in animals during hot weather.

**Key considerations are that:**

- Soil organism activity and fertiliser application are substitutable but their effect on fertility is not equal;

- Gaps in knowledge of processes, such as the role of organisms in nutrient cycling hinder improved economic and environmental returns;
- Both economic and environmental gains could be made in some situations through better management of some ecosystem services such as provision of shade through establishment of trees and
- Some ecosystem services, such as the maintenance and regeneration of habitat, are not provided by the milking area of a dairy farm due to the intensity of production. Such services need to be maintained at a broader scale. Other services, such as maintenance of healthy waterways, important to downstream water users, can be managed at the farm/enterprise scale.

**Contact us**

If you would like more information please contact:

**Jenny Langridge**

**Phone:** (02) 62421579

**Email:** [Jenny.Langridge@csiro.au](mailto:Jenny.Langridge@csiro.au)

**Mailing Address:**

CSIRO Sustainable Ecosystems

GPO Box 284

Canberra, ACT 2601

**Or visit us at:** [www.ecosystemservicesproject.org](http://www.ecosystemservicesproject.org)

Value of Output Goods	High input	Low input	High input + reuse	High input + shade + reuse
<b>Standard Product \$\$</b>				
Milk	316 119	158 970	319 711	323 160
P fertiliser*	14 930	7 204	14 930	14 930
N fertiliser*	3 254	0	3 254	3 254
Irrigation*	16 254	6 972	16 254	16 254
Total cost supplement	25 232	17 316	21 782	21 782
other costs (Topping, Harrowing, weed/pest control, channel maintenance, pasture renovation )	18 000	9 500	18 000	18 000
<b>Net income</b>	<b>238 449</b>	<b>117 978</b>	<b>245 491</b>	<b>248 940</b>
<b>Other "Goods" Ecosystem outputs</b>				
Biodiversity/conservation Value ?	?	?	?	?
Carbon store under pasture (tonnes/ farm)	37 600	18 500	40 400	40 400+?
CO2 discharge (tonnes/ farm/year)	100	52	100	100
methane discharge (tonnes/farm/year)	28	14	28	28
Total P loss (kg/farm/year)	530	300	130	130
Total N loss (kg/farm/year)	6 100	2 800	4 400	4 400

The value of output goods from the dairy model under four management scenario; high input and low input with no water reuse system and high input with a 60% efficient water reuse system and with the provision of shade.