

Cleaner Production Case Study

Cleaner production involves reducing the consumption of raw materials (including water and energy) and reducing the volume and toxicity of waste and other emissions.

Industry:

Dairy farming:
Adrian and Stella Drury.
Upper Landsdowne,
NSW mid-north coast.

Farm characteristics

Land area: 142 ha + 20 ha
Slopes: Alluvial river flats to low ridges
Elevation: 20–30 m above sea level
Soils: Alluvial flats to clay-based ridges
Water: Landsdowne River.
Irrigation to 20 ha using bike shift system. Farm also has a 45 ML turkey nest dam, filled from the river, as backup for irrigation, stock and domestic water.
Rainfall: 1400 mm/year average
Herd: 300. Stocking rate: 1½–2 cows/ha. Heifers run off farm, 50 dries on farm.
Feed: Pasture-based. Kikuyu base oversown with annual ryegrass and clovers. Excess pastures are greenchopped, fed to dries in the paddock and to milkers on feed pad.
Purchased feed: average of 2–2½ tonnes of pellets/head/year
Feed pad: built at the same time as gravel laneways, located close to the dairy. Feed pad is a backup to feed out silage or greenchop when the paddocks are very wet or there is no paddock feed.

Environmental successes

This is one of a series of case studies featuring companies that participated in the Department of Environment and Conservation (NSW) \$5 million 'Profiting from Cleaner Production' – Industry Partnership Program. NSW companies are discovering that cleaner production not only protects the environment but also reduces operating costs, streamlines processes, boosts profits and improves staff engagement and morale.

Dairy gains for the environment through increased productivity

The Drurys purchased their land in 1988 and have developed it as a dairy farm and built up the herd. Over time they have added laneways, irrigation and a stock watering system, as well as developing the pastures.

Building up a profitable business in dairy farming is a challenge. Most decisions on farm are made to improve production. However, when developing farm infrastructure, significant environmental gains can also be achieved through careful design and construction.

What did they do?

Construct farm laneways

The Drurys have established a network of gravel laneways connecting pastures to the dairy shed. The laneways are built up above ground level, using gravel quarried on the farm. They have also built a bridge across the river and four gully crossings, greatly improving the transport routes across the farm.

Install a stock watering system

Water troughs supplied by a pressurised pumping system have been located in all paddocks.

Why did they do it?

Poor laneways and poor availability of drinking water for stock on pasture were limiting the size of the herd. These improvements have enabled the Drurys to increase their herd size from 130 cows to over 300 cows.

Laneways were a top priority for the Drurys because the paddocks became boggy and inaccessible during wet weather. This was causing erosion and was posing a health risk for the herd. Mud had to be washed from the cows before milking, so wet periods imposed an extra burden on labour resources.

Boggy laneways increased the time taken to travel to and from the paddock (for cows and vehicles) as well as increasing the maintenance required for vehicles. Poor access to grazing pastures, particularly during wet periods, limited pasture use. By building laneways pastures can be managed to maximise harvested yields and to improve milk production.

Gully and river crossings were creating bottlenecks. The bridge and four culverts now minimise disruptions to cow flow and shorten travelling times to and from the dairy.

Access to high quality water is essential for high-productivity milking cows. The Drurys have located water troughs in grazed pastures to ensure that drinking water is available for even the most timid cows.

What are the environmental gains?

The farm environment has greatly improved, not only because erosion has been minimised, but also because the cows can travel faster to and from the dairy due to the improved surface area. Less manure is deposited on laneways and therefore there's a lower risk of nutrient entering drainage lines and watercourses. Reduced manure loads on laneways also means there are fewer odour and insect problems.

Laneways are built up above the surrounding ground level to allow good drainage off the surfaces. Run-off from the whole length of the lane flows into adjoining paddocks. This minimizes the risk of nutrients entering drainage lines, but also maximises the reuse of nutrients in the run-off onto growing pastures.

Locating water troughs in the paddocks reduces the impact of cattle on riparian zones. The creek banks suffer less erosion and natural stream bank vegetation can flourish. The water troughs have also minimised the cows' impact on river water quality.

Rather than spending hours standing directly in the creeks and rivers, they are contained in their paddocks so the nutrients from their manure stay in the paddocks where they help fertilise the pasture.

The estimated quantities of nitrogen (N), phosphorus (P) and potassium (K) that can potentially be prevented from entering watercourses, for a 300-cow herd, is:

N 1.5–3.5 tonnes/year

P 0.2–0.6 tonnes/year

K 1.4–3.4 tonnes/year.

What are the costs and savings?

One-off costs

Laneways:

Gravel for lanes	\$75,000
Laneway contractor	\$75,000
Bridge	\$25,000
Culverts	\$10,000
Sub-total	\$185,000

Stock watering system:

Pipework & tank	\$24,000
Pumps	\$3,000
Troughs	\$18,000
Sub-total	\$45,000

Total one-off costs \$230,000

(includes estimates to complete works)

Savings per year

Reduced labour	\$4,200
Tractor savings	\$2,200
Motorbike savings	\$5,500
Reduced mastitis*	\$300
Nutrient recovery	\$1,800
Reduced lane width	\$3,000
Total savings per year	\$17,000
Productivity gains per year	\$75,000

Total cost benefit per year \$92,000

(*10% attributed to this infrastructure)

Payback period

Three to five years.



Laneway after upgrading, and one of the paddock water troughs. Well-sited watering points and well-constructed laneways have a significant impact on farm productivity.

What are the productivity gains?

In addition to these direct savings, the construction of laneways and stock watering system has enabled the Drurys to increase their herd size and improve pasture utilization.

Before the laneways and trough system were developed the farm could handle 130 cows. Now the farm is capable of milking over 300 cows. The extra 170 cows produce approx 1.4 million litres of milk, worth \$168,000 at a gross margin of 12 cents per litre (gross margin = profit + fixed costs).

Before the farm infrastructure was built, pasture utilization was approximately 8,500 L/ha, it is now over 12,000 L/ha with similar inputs of seed, fertilizer and water. The improved pasture utilisation is equivalent to approx \$120,000 of milk per year (at 24c/litre).

The extra incomes of \$168,000 and \$120,000 can not be solely attributed to improvements in laneways and stock watering system. Other 'fixed cost' investments on farm were necessary to achieve these results, including extra cows, fencing, a higher level of management, upgrading the dairy shed, and larger machinery.

It's estimated that the laneways and stock watering system account for 10%–20% of the increased income, giving a total cost benefit of approx \$45,000 to \$75,000 a year.

Where to now?

The main source of cooling cows on hot days is the riverbank shade. The Drurys plan to supplement this with a centrally located group of trees in one of the well-drained paddocks, taking more pressure off the riverbanks.

Heat stress causes discomfort for cows and affects their milk production, and cows affected by heat stress are less likely to become pregnant. The long term aim is to cover the holding yard with shade-cloth to further reduce heat stress.

The big picture for the farm is about increasing its productivity and profitability, but there are many small details that will contribute to these broader goals. For example, as well as increasing the amount of shade on the farm, the Drurys want to extend the trough system and to refine the yard cleaning procedure at the dairy. While primarily aimed at increasing productivity, the Drurys appreciate these improvements will also have positive spin-offs for the environment.

More information

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