

## Five years in: The benefit to farmers of implementing the Trace & Save SWAN system

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Trace & Save's SWAN (Soil, Water, Atmosphere and Nutrients) system is used to evaluate the sustainability of agricultural production, in this context being milk production. Farmers are then supported to develop a strategy which aims to improve the sustainability of milk production. The Trace & Save website/online data platform provides farmers with insights into their farm-specific results via their unique log-in details, which helps them to identify opportunities to improve, and monitor that improvement over time.

The original farms which adopted the SWAN system have been participating for five years now since 2013. Later adopters have only been participating for one to two years. Below is an overview of how adopting the Trace & Save system has shown benefits to those farmers (8 in total) which have been participating for at least four years.

A summary of the major benefits are as follows:

- Soil carbon levels have improved on average by 20% on all eight farms, and by 70% on the top five performing farms.
- Water use efficiency has improved by an average of 23% on all farms, and by 37% on the top five farms. That is an equivalent saving of 100 litres of water per litre of milk produced for the top five farms, or an average of 667 092 133 total litres per farm per year.  
*Note: Water use data has not historically been accurately recorded by farmers. There figures are based on estimates provided by farmers. Over the years, water use data has been recorded more accurately, therefore it is assumed that part of the improvement can be ascribed to a previous overestimation of water use, and a part of the improvement can be ascribed to improvement water management. It is not possible to know what percentage to ascribe to each.*
- Greenhouse gas (GHG) emissions (which has been shown to be negatively correlated to profitability – Galloway *et al.* 2017) have reduced on average by 3%, with a reduction of 8.5% on the top five performing farms
- Nitrogen use efficiency (which has been shown to be positively correlated to profitability – Galloway *et al.* 2017) has improved on average by 14% on all farms, and by 52% on the top five performing farms.

The benefits are broken down in the table below.

**Table 1: The average SWAN scores, and levels of selected parameters, from eight farms using the Trace & Save system for at least four years**

Indicators	Baseline	2nd year	3rd year	4th year	Unit
<b>Soil score</b>	79.5		80.1	84.5	%
Total carbon (8 farms)	3.4		3.7	4.1	%
Total carbon (top 5 farms)	2.4		3.5	4.1	%
<b>Water score</b>	62.3	62.3	72.7	67.0	%
Water use efficiency (8 farms)	56.3	56.2	64.6	69.3	%
Water use efficiency (top 5 farms)	58.0	58.6	72.1	79.3	%
<b>Atmosphere score</b>	54.2	57.1	56.7	56.8	%
GHG emissions (8 farms)	1.83	1.76	1.76	1.77	kg CO <sub>2</sub> e/l milk
GHG emissions (top 5 farms)	1.89	1.78	1.74	1.73	kg CO <sub>2</sub> e/l milk
<b>Nutrients score</b>	54.2	57.5	57.7	56.8	%
Nitrogen use efficiency (8 farms)	29	28	32	33	%
Nitrogen use efficiency (top 5 farms)	23	25	32	35	%
Phosphorous use efficiency (8 farms)	45	40	41	45	%
Phosphorous use efficiency (top 5 farms)	31	29	27	41	%

The table above shows how there have been numerous improvements on these farms. There have been some areas which improved immediately in the first year (for example, a reduction in greenhouse gas emissions), and then have levelled off. Other areas have gradually improved each year (for example, soil carbon levels, water use efficiency and nitrogen use efficiency). Although the average of all eight farms has shown there has been overall improvement, the top five performing farms in each aspect of the SWAN system have shown significant improvements.

#### References:

Galloway C, Conradie B, Prozesky H & Esler K. 2017. Are private and social goals aligned in pasture-based dairy production? Journal of Cleaner Production. In Press. DOI:10.1016/j.jclepro.2017.12.036