Slurry and dairy soiled water volume estimates

Year 1 of a 2 year study

Phase 1. July 2023-June 2024

Background

In late 2022, the Department of Agriculture, Food and the Marine (DAFM) requested that Teagasc outline a methodology to assess current volumes of dairy soiled water (DSW) and slurry produced on dairy farms. In response to this, a survey of 100 dairy farms was proposed. The farms would be selected to account for variability in location, climate, scale, stocking density and developmental stage and be representative of the wider dairy sector. This outline proposal was accepted and the resulting project was agreed to run from 01/10/2022 to 31/03/2025.

An initial phase was completed in winter 2022/23 to establish and streamline measurement methodologies and provide baseline data. Subsequently, a full-scale farm-monitoring regime was established on 100 farms spread nationwide.

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Current regulations

Current regulations require an allowance of 0.33 m^3 (330 litres) per cow per week for slurry storage while the accepted figure for soiled water storage is 0.21m^3 (210 litres) per cow per week. For all storage tanks, an additional allowance is required for rainfall runoff from any adjacent uncovered areas contributing.

Monitoring programme

The monitoring programme was put in place in full in the first half of 2023. On each selected farm, a number of surveys were completed to catalogue both the storage facilities and the typical management with regard to stock, parlour details, washing routine, uncovered areas and potential additional sources (rainwater, silage effluent etc.). In each independent storage tank, measuring equipment was installed to continuously monitor the volumes stored.

Measurement included the installation of sensors that measured height at hourly intervals. This information was transferred to a centralised database via the GSM network. The height information was converted to volume information based on the tank dimensions.

In analysing the data collected, tanks were categorised into those collecting slurry only, soiled water only or combined slurry and soiled water tanks. In each case, the records associated with management were used to establish the total known contributions to each tank and this allowed for an equivalent per cow figure to be estimated.

It should be noted that the total volume collected was recorded in every case, as such there is no capacity to itemise contributions as having originated from slurry or soiled water or rainfall runoff etc. As such, data is presented on an equivalent per cow basis, to allow for comparisons, and includes all potential sources.

Volumes collected

Slurry tanks

Data from slurry tanks are presented in Figure 1. The data is presented based on peak stock numbers contributing to each tank as equivalent average per cow per week figures. As such it illustrates the changes in housing rate over the year, as well as the influence of other sources outside of the housing period. From November to February, the mean volume collected was 413.8 Litres/cow/week, which includes rainfall runoff amounting to the equivalent of approximately 20-40 litres/cow/week on average. The contribution from rainfall runoff varies between farms and week by week.

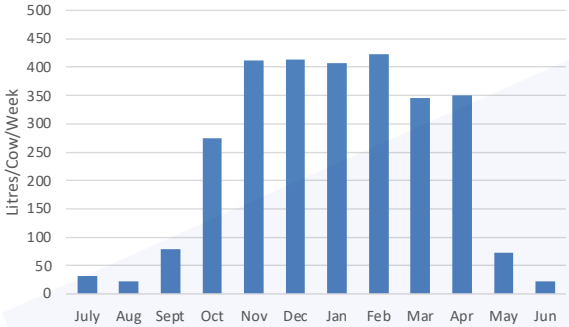

Figure 1. *Average litres per cow per week collected in slurry tanks for each month in the period from July 2023 to June 2024 (all sources included)*

Soiled water tanks

Data from soiled water tanks are presented in Figure 2. The mean volume collected in peak months, July-October and March-June was 300.0 litres/cow/week, which includes rainfall runoff amounting to the equivalent of approximately 20-40 litres/cow/week on average. The contribution from rainfall runoff varies between farms and week by week.

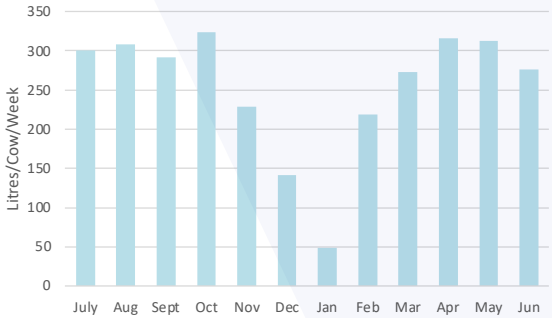

Figure 2. *Average litres per cow per week collected in soiled water tanks for each month in the period from July 2023 to June 2024 (all sources included)*

Slurry and soiled water tanks

Data from slurry and soiled water tanks are presented in Figure 3. The peak volume collected was in October at 626.7 Litres/cow/week. Total volumes collected include rainfall runoff amounting to the equivalent of approximately 20-40 litres/cow/week on average. The contribution from rainfall runoff varies between farms and week by week.

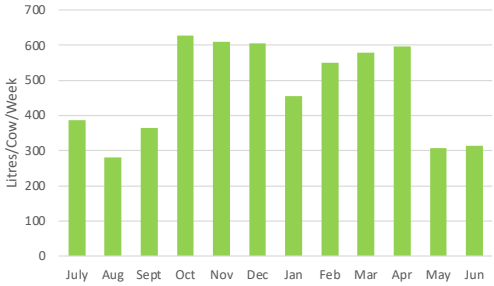

Figure 3. *Average litres per cow per week collected in combined slurry and soiled water tanks for each month in the period from July 2023 to June 2024 (all sources included)*

Tank sampling

As well as the focus on the volumes collected, a sampling campaign was undertaken to estimate nutrient content of slurry/soiled water on a selection of the study farms. A summary of these results is provided below (Table 1).

Table 1. *Nutrient content of samples collected from a selection of study farms*

	DM %	Total N (kg/tonne)	Total P (kg/tonne)	Total K (kg/tonne)
Slurry tanks	6.4	2.5	0.6	2.9
Slurry and soiled water tanks	6.2	2.2	0.5	2.5

1 tonne = 1 m^3

Summary

The current slurry volumes used to quantify the volume of slurry a dairy cow produces have been in place since the nitrates directive was implemented in Ireland in 2006. This is despite a dramatic increase in the productivity of the typical dairy cow in Ireland. Year 1 of this study suggests that the volume of slurry produced by a cow is underestimated currently, as is the soiled water produced on farm. It also suggests that there is a significant volume of water getting into storage tanks on farms, amounting to the equivalent of approximately 20-40 L/cow/week on average.

A second year of monitoring is required to provide a full understanding of overall volumes collected. The data presented herein is preliminary in nature and should not be interpreted as the final outcome of this work. While this project will provide data to DAFM to inform policy associated with the Nitrates action programme, any changes to current regulations will be dependent on the consideration of a range of associated issues by DAFM, in addition to this data.