

M. I. Khalil<sup>1</sup>, J. Muldowney<sup>2</sup> and B. Osborne<sup>1</sup>

<sup>1</sup>UCD School of Biology & Environmental Science and UCD Earth Institute, University College Dublin, Dublin 4, Ireland;  
<sup>2</sup>Department of Agriculture, Food and the Marine, Port Laoise, Ireland. (E-mail: ibrahim.khalil@ucd.ie; Tel: +353 (0)85 785 9546)

## Introduction

- Emission of GHGs & air pollutants from livestock systems have major atmospheric and ecosystem-related impacts.
- Identification of emission hotspots and the estimation of EFs are keys for national inventories and Tier 2 reporting.
- Assessment of emissions reduction needs data on manure production across livestock and management practices.
- Thus, methodologies were developed for their estimates through proper use of available agricultural activity data.

## Results & Discussion

The % slurry over solids was higher for pigs (99:1) than the cattle (61:39).

Solid manure produced mostly from loose-bedded houses.

The proportions estimated using no. of farms and livestock varied (Fig. 2).

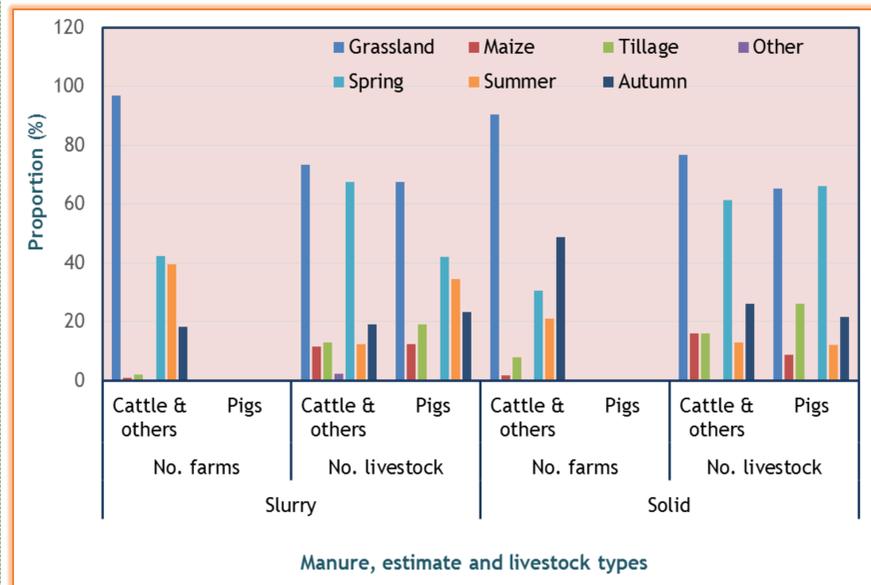


Fig. 2. Proportion of slurry and solid manure applied to various land uses & seasons

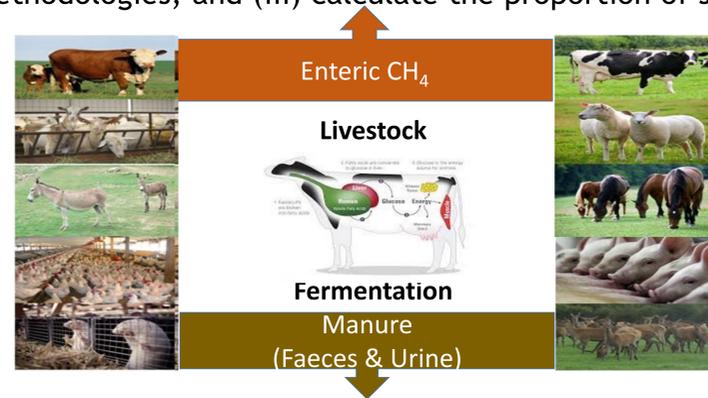
A major proportion of the slurry was applied to grassland (97 vs. 73%; Fig. 3).

The spring and summer (36-42%) were higher than the autumn applications (18-24%).

## Materials & Methods

The recent Census of Agriculture survey data 2010, collected by the Central Statistics Office (CSO), Ireland was used.

Based on the compiled datasheets, several steps (Fig. 1) were taken to (i) generate missing information, (ii) develop methodologies, and (iii) calculate the proportion of slurry and manure production and application across farm categories.



Similar values were found for solid manure application but applied more during autumn.

Farmers mostly used splash plate (90%) and side discharge (60%) methods.

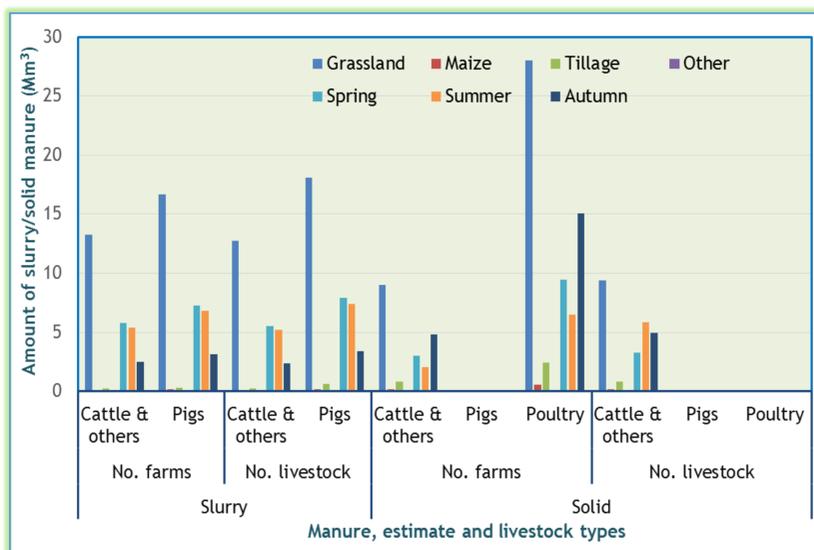


Fig. 3. Amount of slurry and solid manure (poultry 10x) applied to various land uses and seasons

Nationally, the total estimated (no. of places vs. population) amount of slurry from cattle and pigs for 2010 was 30.9 vs. 32.1 Mm<sup>3</sup>.

For solid manure it was 319.8 vs. 320.3 Mm<sup>3</sup> and included other categories (e.g., sheep, poultry, goats and horses).

**Livestock category:** Population - Slurry (S) and Farm Yard Manure (FYM) production (% derived from the Nitrate Directive)

**Housing periods:** Each livestock category (Day-Week-Month)  
**Housing types:** No. of places → No. of livestock under (i) Cubicle (Solid & Slatted), (ii) Loose (Solid & Slatted), (iii) Other indoor, and (iv) Out-wintering pads

**Individual and weighted proportion:** Slurry (S) and FYM

**Manure storage type (cover & uncover):** (i) Slurry /Liquid, (ii) Solid manure/FYM, and (iii) Lagoons.

**Manure production (m<sup>3</sup>):** Livestock category & number;  
**Total Slurry and Solids:** No. livestock\*(proportion S or FYM/100)  
 \*weighted production/wk\*wks housed

**Manure applied across agricultural land uses (LU) and Seasons (m<sup>3</sup>):** Proportion from CSO (No. farms vs. no. livestock, and proportion applied).

**Major land uses (LUs):** Grassland, Maize, Tillage and Others. **Seasons:** Spring, Summer and Autumn

**Total LU/S=** (Total S or FYM produced \* Proportion for corresponding LU/Seasons)/100

Fig. 1. Steps followed to develop methodologies, generate missing data and calculate solid and liquid manure data across livestock and agricultural land uses

## Conclusions

- Significant deficiencies in the available information and the application methods for slurry and solid manure were found.
- There were discrepancies in the number of available places during the housing period (key categories vs. poultry).
- Expert advice and the collection of more activity data are required to make use of the outcome for reporting purposes.