MONASH INDUSTRY TEAM INITIATIVE (MITI)
Applying Innovative Technologies to Improve Manure Management on Dairy Farms

Amanda Lum (PhD. Eng), Yu Ting Tan (B.Chem. Eng.),
Romeel Ranjit (M. Mech. Eng.), Kunal Sharma (M.Data Science)

PROJECT SCOPE:

In Australia, as dairy production intensifies from grazed to housed systems, manure management had become more challenging for farmers due to increases in manure production.

The dairy industry has supported farmers with programs to improve manure management. However, farmers are reluctant to change current management practices as they view manure as a waste and usually do not value manure nutrients. Technologies that allow farmers to rapidly estimate manure volume and nutrients will result in improved manure management.

PROJECT OBJECTIVE:

To list and recommend new technologies to rapidly estimate manure volume and nutrient contents

Bulk Density (kg/m³) → Volume (m³) → Nutrient Content (N,P,K) → Dry matter → Nutrient mass → Land Application
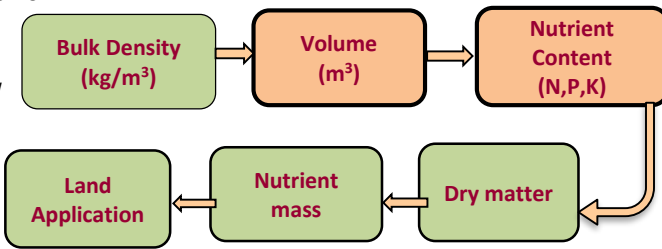
LEARNING OUTCOMES:

- Insight into dairy Industry
- Manure management problems faced by farmers
- Australian working culture
- Research and problem solving skills
- Listed and also tested different manure nutrient and volume **technologies**


RECOMMENDATIONS:

- Nutrient estimation – further testing of the devices is required using a much larger sample size which includes a larger group of manure types from farms with different feed systems and over all seasons.
    - The Soil Test Kit does not work for manure.
- Volume estimation - Stockpile Reports Lite App that we tested looked very promising.
    - The other technologies present in the market are likely to be able to estimate stockpile volume, but will be more expensive
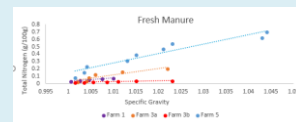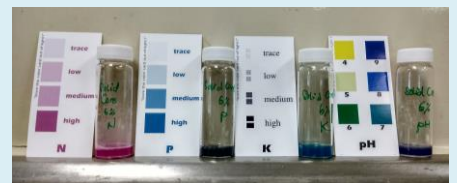

PROJECT OUTCOMES:

1. Technologies to estimate manure stockpile volume
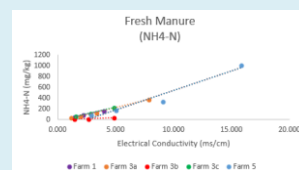
- Photogrammetry
- LiDAR
- Laser Scanning
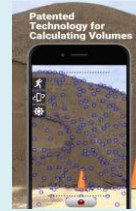
2. Technologies to estimate manure nutrients

- Soil Test kit
- Hydrometer
- Electrical Conductivity
- Agros Nova
- Quantofix Meter
- Infrared Spectroscopy

Graph of Hydrometer experiment - TN vs Specific gravity

Graph of Electrical Conductivity experiment - Ammonium vs EC