



# Teagasc National Farm Survey 2022 Sustainability Report

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**Rural Economy and Development Programme**

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# Overview

- Theoretical framework
- Methodology
- Results
- Summary / conclusion



# Sustainability Framework

- Farm level sustainability is intersection of:
  1. Economic
  2. Environmental
  3. Social
  4. Innovation

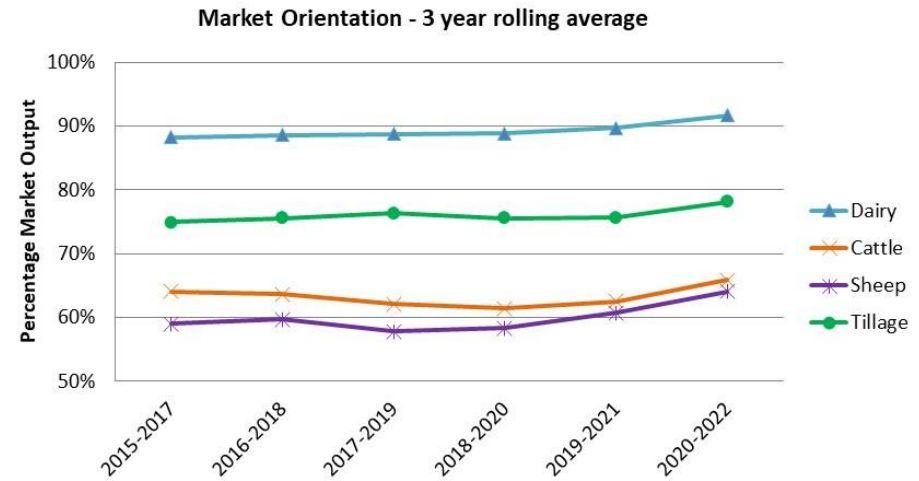
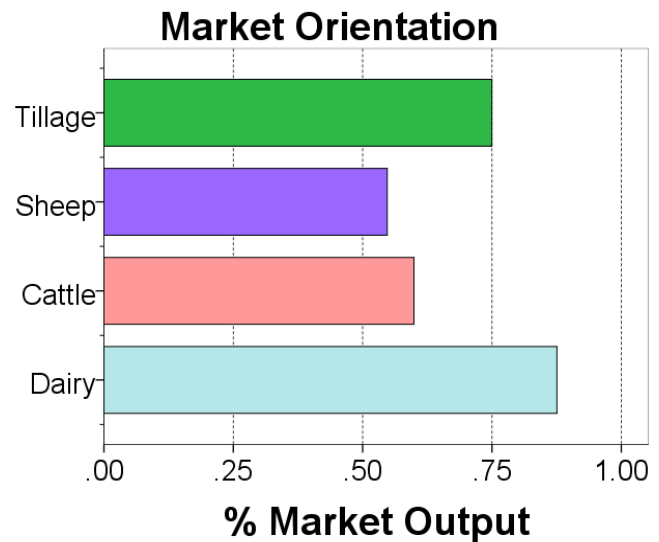
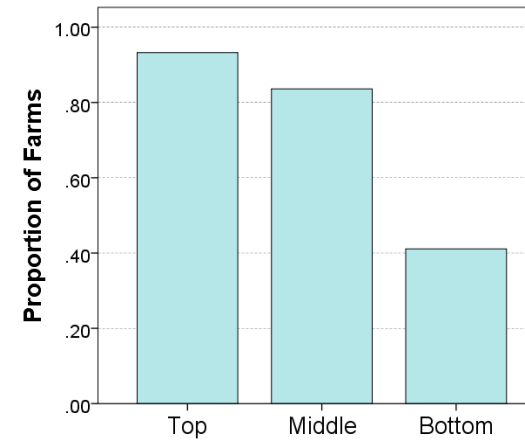
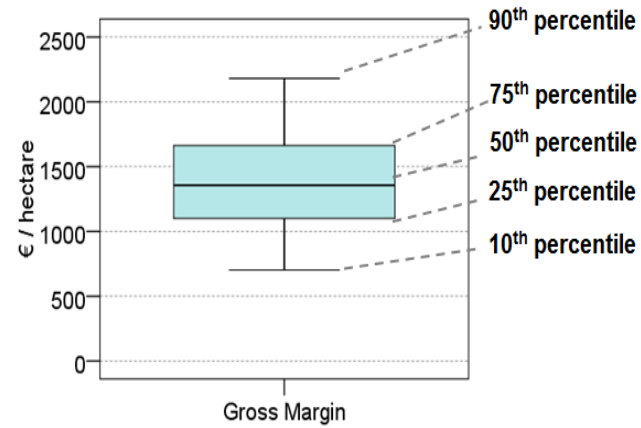


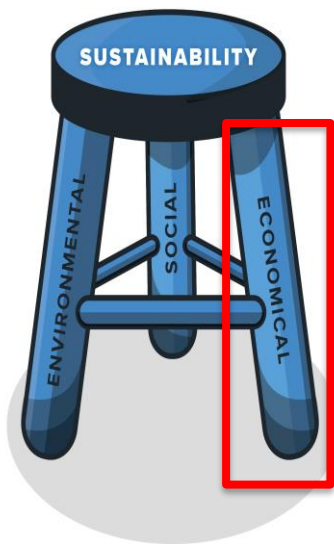
# Profile of Teagasc NFS Sample - 2022

Farm Type	Dairy	Cattle	Sheep	Tillage	All Farms
Sample No.	262	333	106	73	774
Population Represented	15,323	48,227	13,979	6,246	83,776
<u>Average</u>					
Utilisable Agricultural Area (ha <sup>-1</sup> )	64.8	34.8	45.0	63.9	44.6
Grassland Area (ha <sup>-1</sup> )	63.2	34.1	43.8	21.6	40.1
Tillage Area (ha <sup>-1</sup> )	1.6	0.7	1.2	42.3	4.5
Dairy Cow Livestock Units	92.1	0.0	0.0	0.0	16.9
Cattle Livestock Units	41.5	40.9	16.8	26.4	35.8
Sheep Livestock Units	0.7	1.8	33.4	4.7	7.1
Total Livestock Units	134.3	42.7	50.2	32.1	59.8
Farm Stocking Rate (LU ha <sup>-1</sup> )	2.1	1.3	1.3	1.2	1.4



# Presentation of Results - Charts





# Economic Sustainability

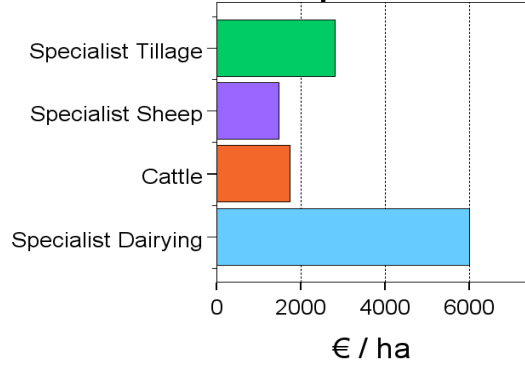


Indicator	Measure	Unit
1. Economic return to land	Gross output per hectare	€ / hectare
2. Profitability of land	Gross margin per hectare	€ / hectare
3. Family Farm Income	Returns to farm family labour, land and capital	€ / hectare
4. Productivity of labour	Family Farm Income per unpaid labour unit	€ / unpaid labour unit
5. Market Orientation	Output derived from market rather than subsidies	%
6. Economic Viability	Economic viability of farm business – Minimum wage for labour & 5% return on non-land based assets	1=viable 0=not viable

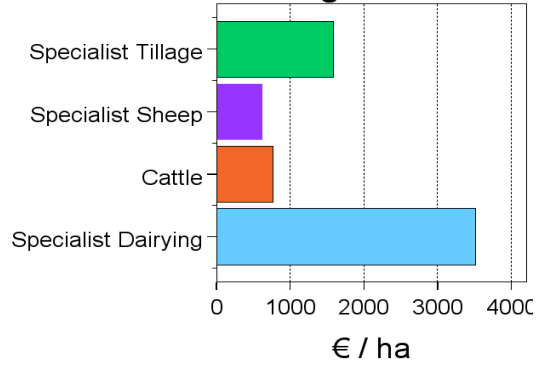
# Economic Sustainability

## 2022 Results

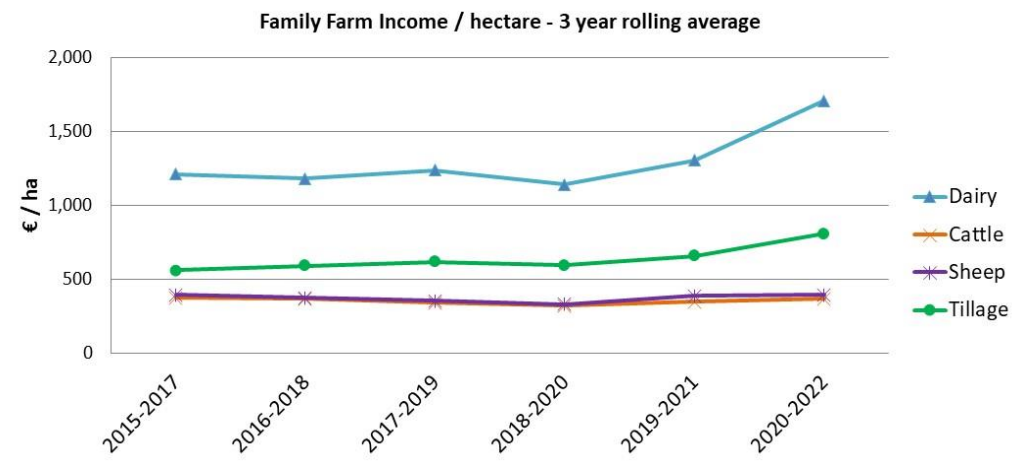
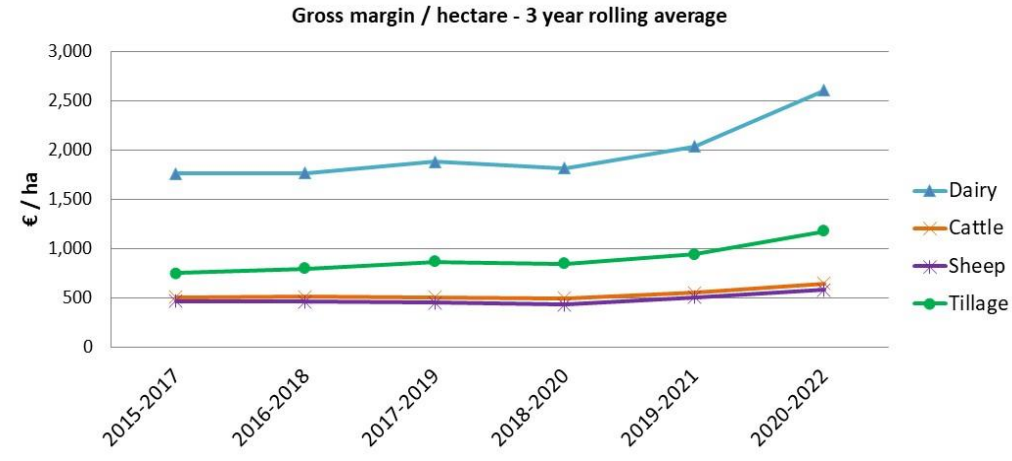
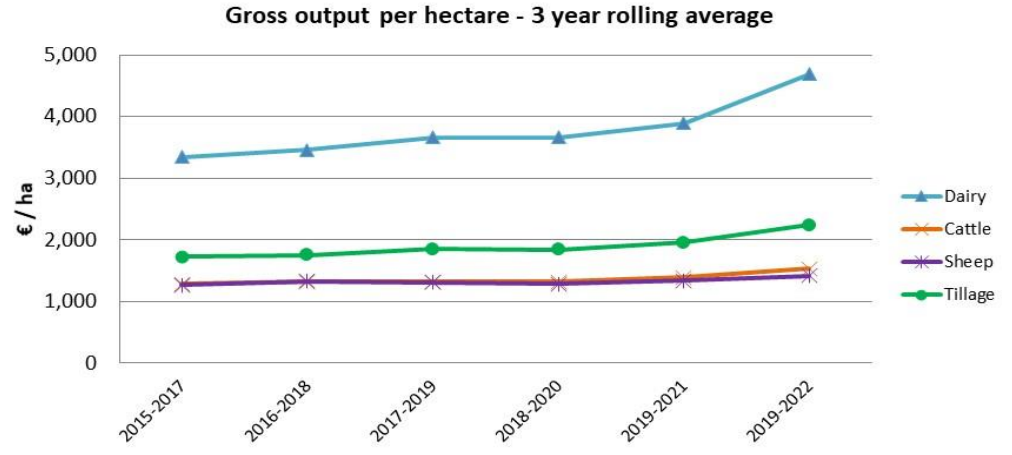
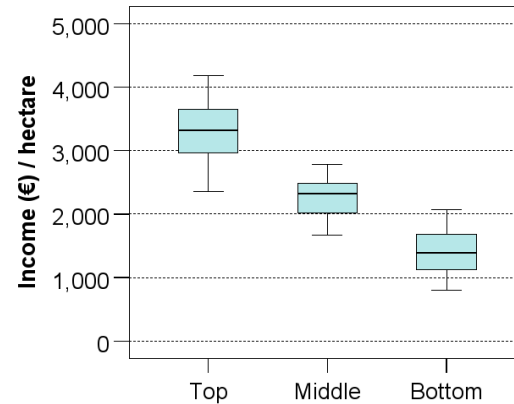
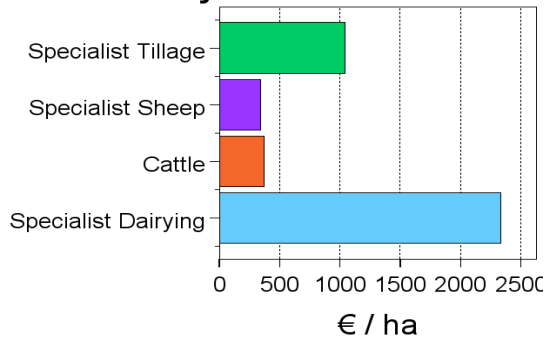
### Gross Output



### Gross Margin



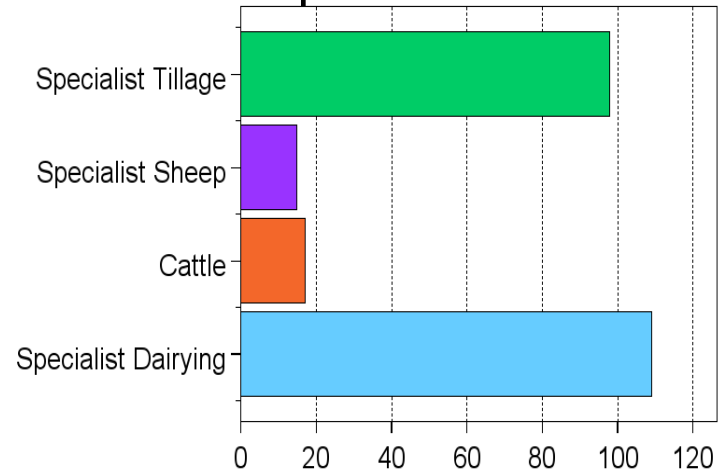
### Family Farm Income



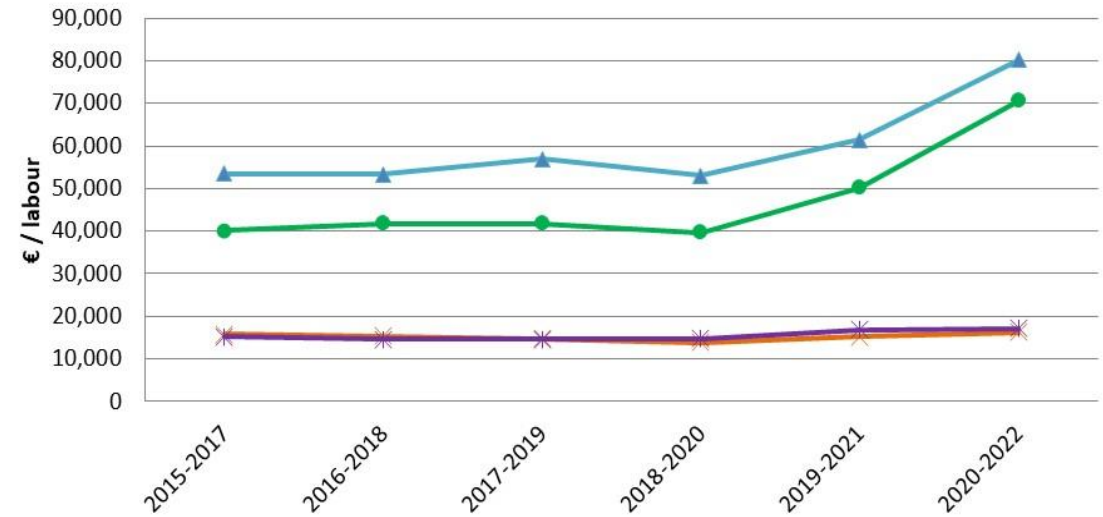
# Economic Sustainability

Indicator	Measure	Unit
Productivity of Labour	Family Farm Income per unpaid labour unit	€ / unpaid labour unit

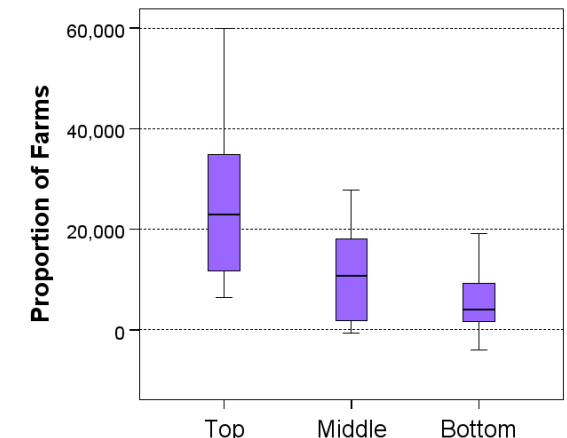
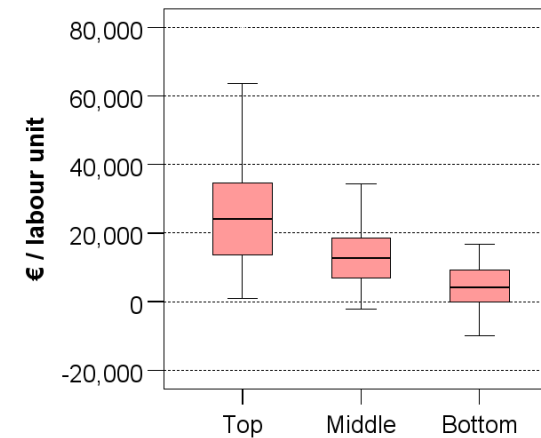
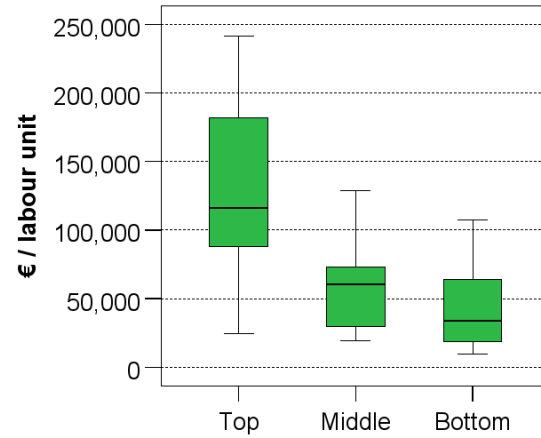
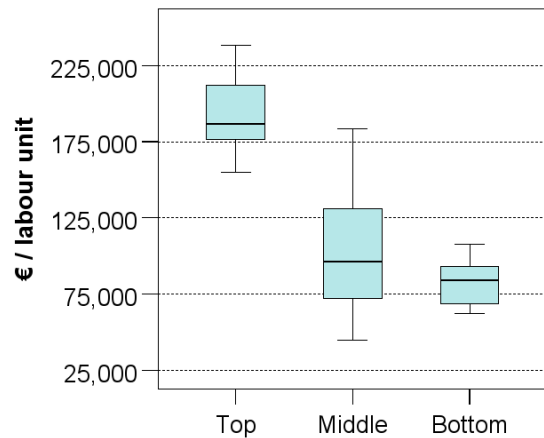
Income per Labour Unit 2022



Productivity of Labour: 3 year rolling average



€'000 / Labour Unit

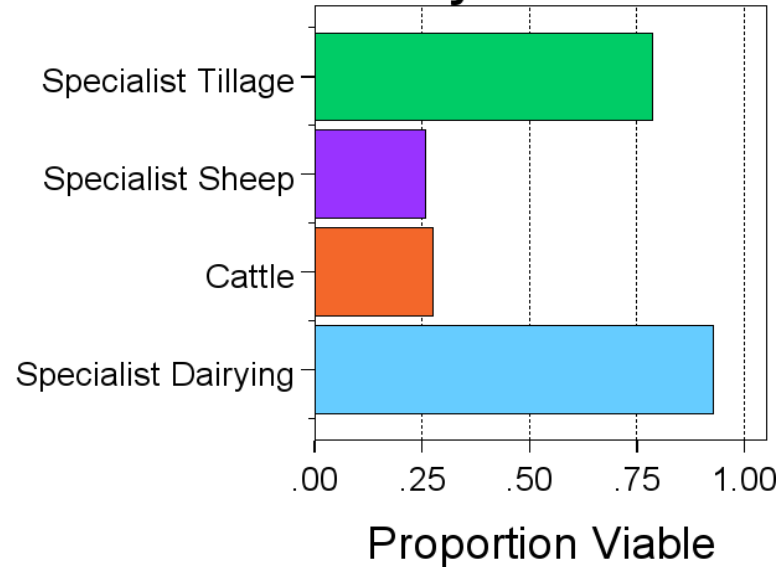




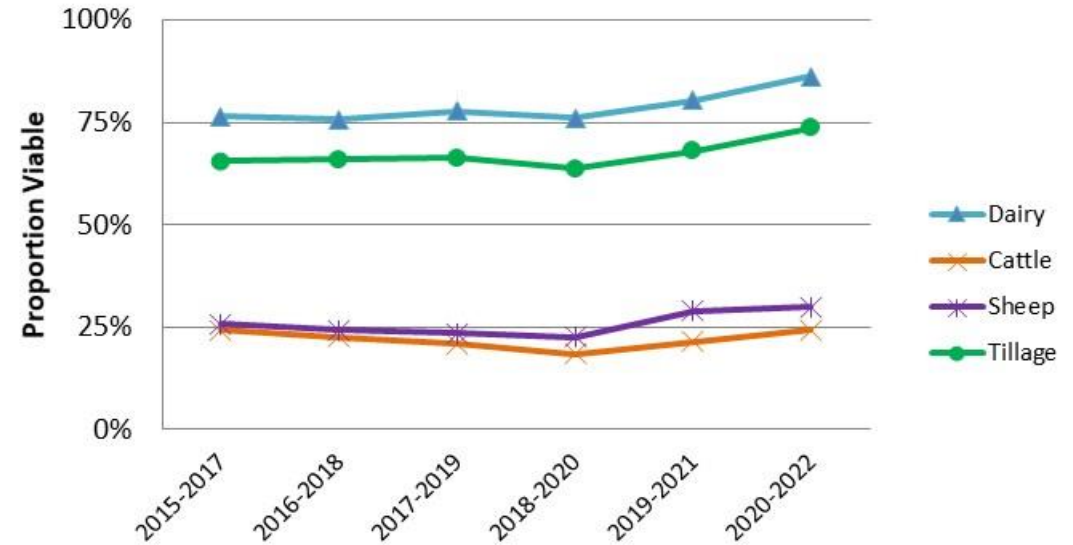
# Economic Sustainability

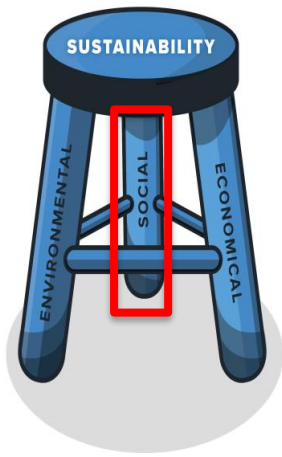
Indicator	Measure	Unit
Economic Viability	Economic viability of farm business – Min wage for unpaid labour & 5% return on non-land based assets	1=viable 0=not viable

**Viability- 2022 Results**



**Economic Viability - 3 year rolling average**





# Social Sustainability



Indicator	Measure	Unit
1. Household vulnerability	Farm business is not viable and no off-farm employment	Binary variable, 1= vulnerable
2. Isolation Risk	Farmer lives alone	Binary variable 1=isolated
3. High Age Profile	Farmer is over 60 years old & no members of household under 45	Binary variable 1=high age
4. Agricultural education	Formal agricultural training received	Binary variable 1= agricultural training received
5. Hours worked on the farm	Work load on farm** (Off-farm work hours not included)	Hours worked on the farm
6. Total hours worked	Work-life balance	Hours worked on and off farm

# Social Sustainability

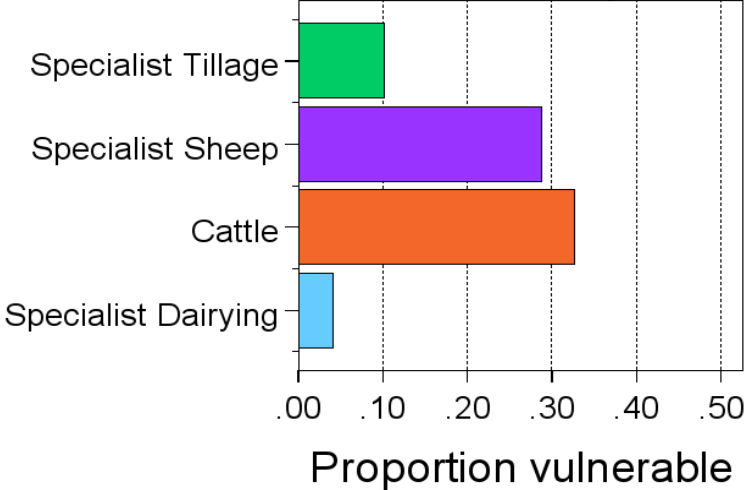
Indicator

Measure

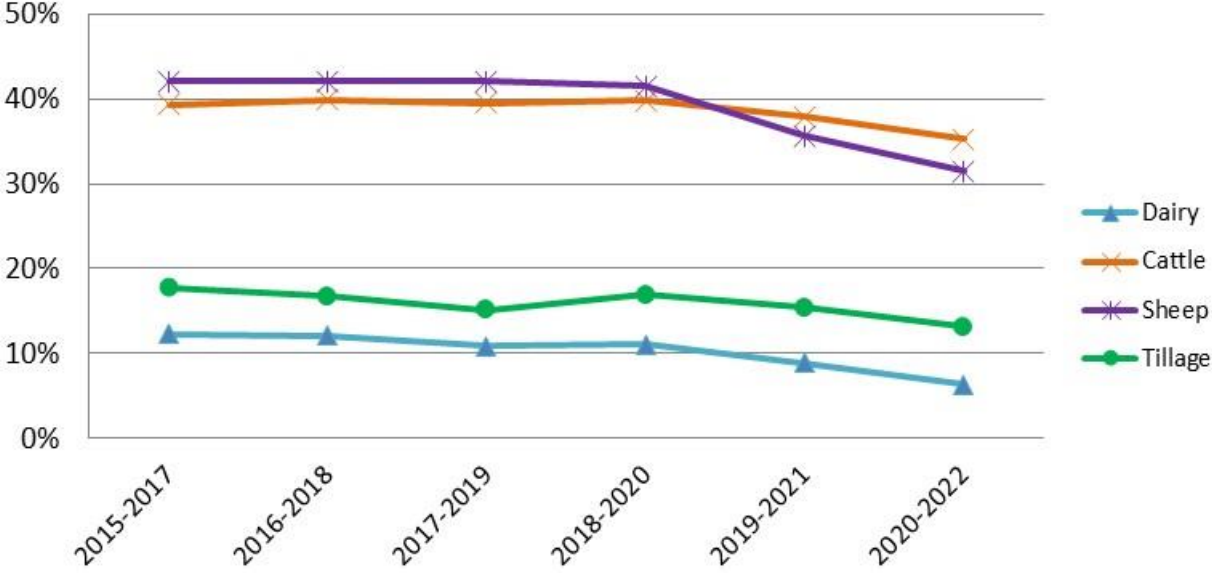
Unit

<b>Household vulnerability</b>	Farm business is not viable & no off-farm employment	Binary variable 1= vulnerable 0=Non vulnerable
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Household Vulnerability 2022

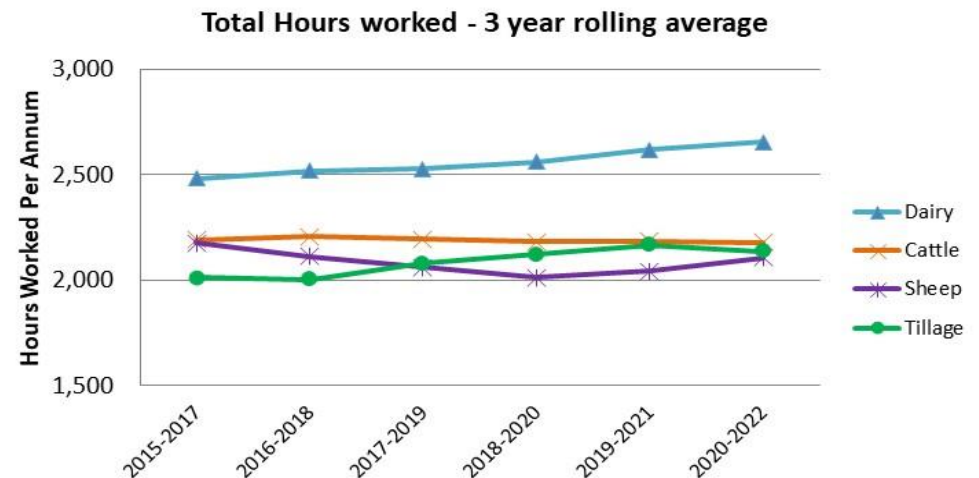
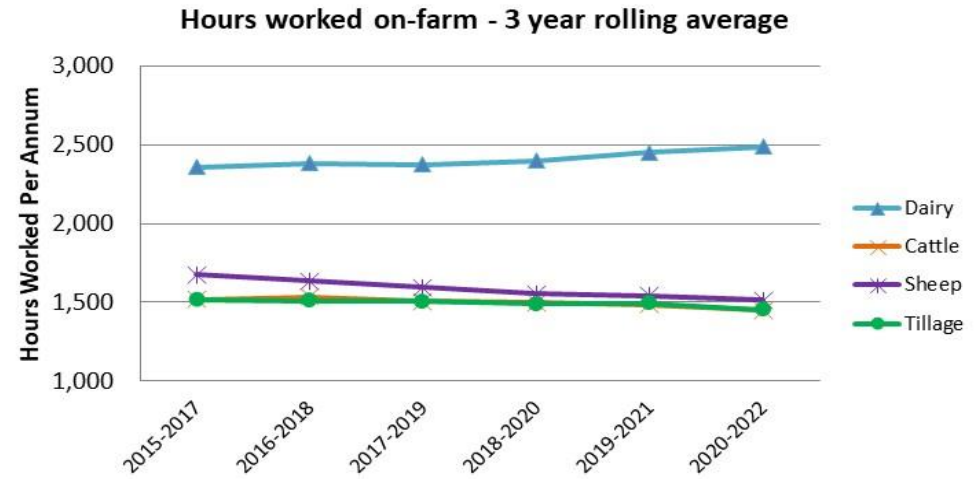
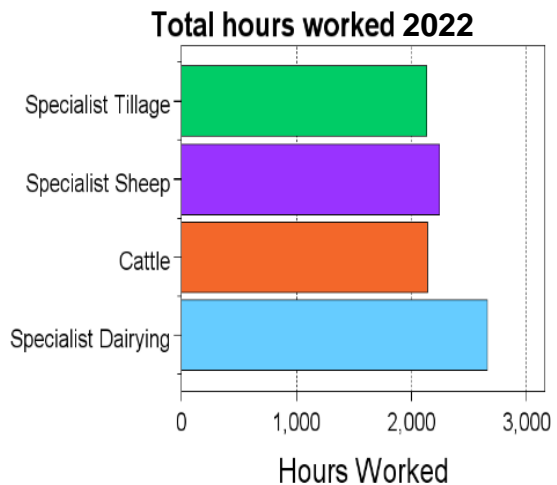


Household Vulnerability - 3 year average



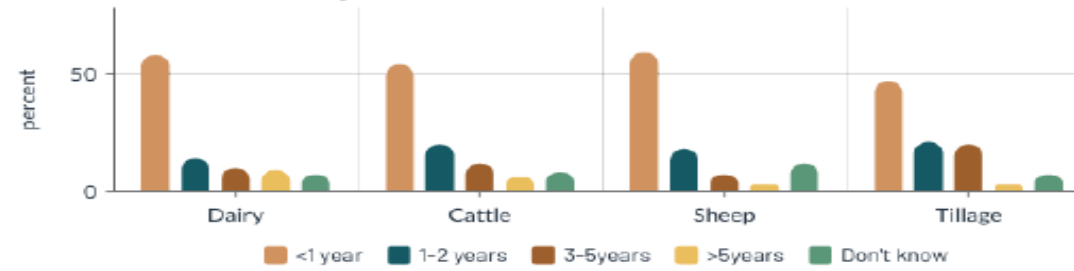
# Social Sustainability

Indicator	Measure	Unit
Hours worked on farm	Work load on farm (Off-farm work hours not included)	Hours worked on the farm
Total hours worked	Total work load (On and off-farm)	Hours worked on and off farm

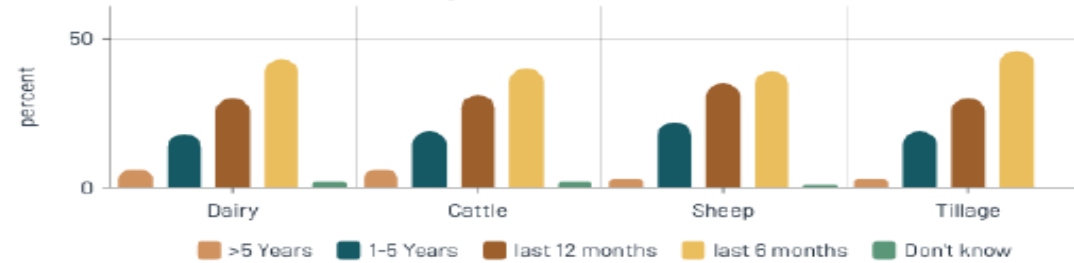


# Social Sustainability Special Focus 2022

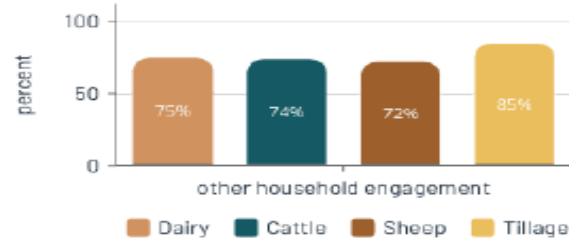
When did you last take a break from the farm?



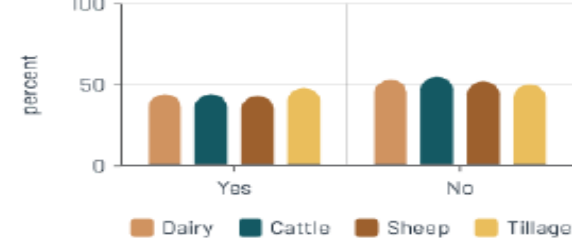
When did you last visit a doctor?



Daily contact with people outside the farm?

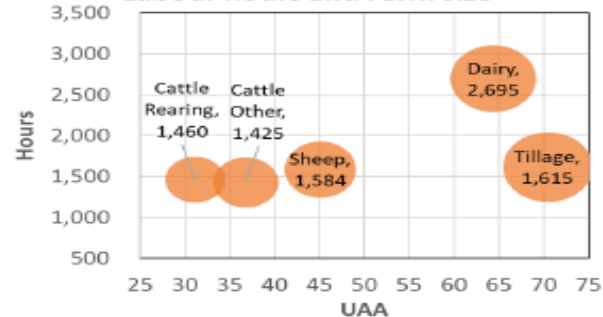


Provide/receive help on farm

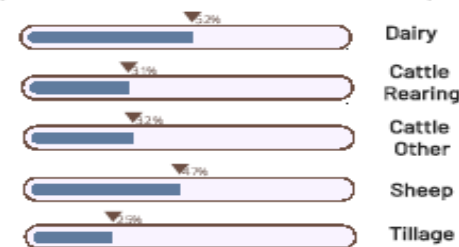


## Farm Labour

Labour hours and Farm size



Proportion of farms with female labour input 2022

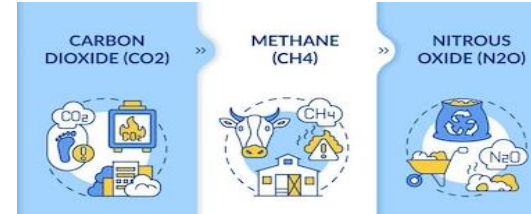


These social sustainability metrics for 2022 are based on data from a special survey of a sample of 611 farms, representing over 85,000 farms nationally.

# Environmental Sustainability

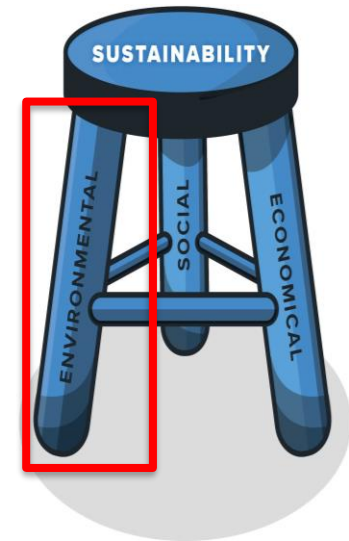
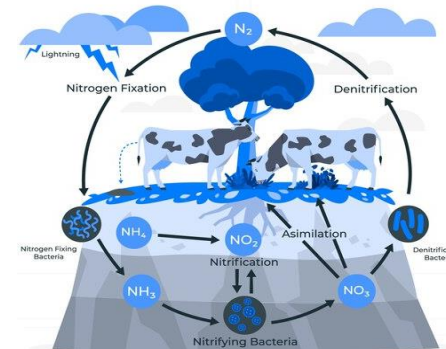
## 1. Gaseous Emissions

- Greenhouse Gases (**Ag. & Energy**)
  - » IPCC national inventories approach – All Farms
  - » Life Cycle Assessment (LCA) - Dairy
- Ammonia
  - » National inventories approach for all farms



## 2. Risk to water quality

- Farm gate input/output approach
- Balance / use efficiency of nitrogen & phosphorus



## 3. Biodiversity Indicator

- More about this later



# Overview of Environmental Indicators

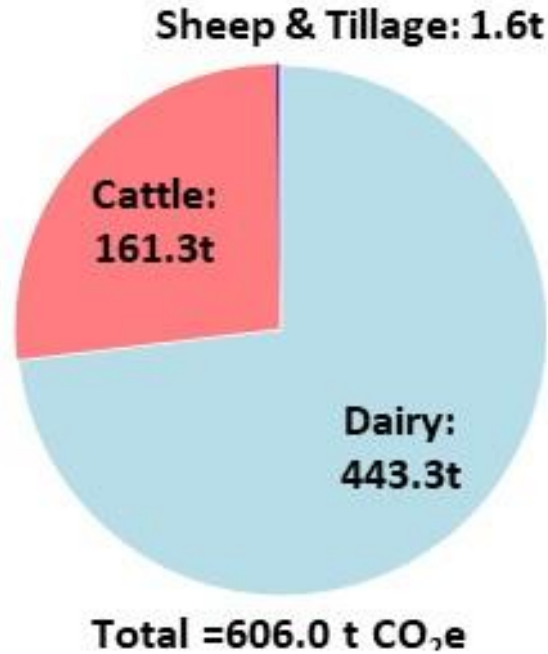
Indicator	Measure	Unit
<b>Ag. GHG emissions per farm</b>	Absolute GHG emissions per farm	Tonnes CO <sub>2</sub> equivalent / farm
<b>Ag. GHG emissions per hectare</b>	Absolute Ag. GHG emissions per hectare	Tonnes CO <sub>2</sub> equivalent / hectare
<b>Ag. GHG emissions per kg / € of output</b>	GHG emissions efficiency	kg CO <sub>2</sub> equivalent / kg output AND kg CO <sub>2</sub> e / € output
<b>Energy GHG emissions per farm</b>	Farm GHG energy use efficiency	kg CO <sub>2</sub> equivalent / kg output
<b>Energy GHG emissions per hectare</b>	Absolute Energy emissions per hectare	Tonnes CO <sub>2</sub> equivalent / hectare
<b>Energy emissions per kg / € of output</b>	Energy GHG emissions efficiency	kg CO <sub>2</sub> equivalent / kg output AND kg CO <sub>2</sub> e / € output
<b>NH<sub>3</sub> emissions per farm</b>	Absolute NH <sub>3</sub> emissions per farm	Tonnes NH <sub>3</sub> equivalent / farm
<b>NH<sub>3</sub> emissions per hectare</b>	Absolute NH <sub>3</sub> emissions per hectare	Tonnes NH <sub>3</sub> equivalent / hectare
<b>NH<sub>3</sub> emissions per kg / € of output</b>	NH <sub>3</sub> emissions efficiency	kg NH <sub>3</sub> equivalent / kg output AND kg NH <sub>3</sub> / € output
<b>N balance</b>	N transfer risk	kg N surplus / ha <sup>-1</sup>
<b>N use efficiency</b>	N retention efficiency	% N outputs / N inputs
<b>P balance</b>	P transfer risk	kg P surplus / ha <sup>-1</sup>
<b>P use efficiency</b>	P retention efficiency	% P outputs / P inputs

# Environmental Sustainability – GHG Emissions

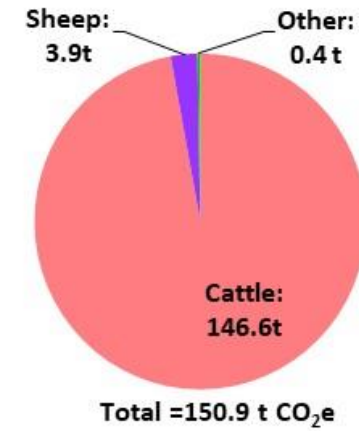
Ag GHG emissions	Measure	Unit
per farm	Absolute Ag. GHG emissions (IPCC methodology)	Tonnes CO <sub>2</sub> equivalent
per hectare	Ag. GHG emissions per hectare farmed (IPCC methodology)	kg CO <sub>2</sub> equivalent
per kg of output	Ag. GHG emissions efficiency (IPCC methodology)	kg CO <sub>2</sub> equivalent
per € output	Ag. GHG emissions efficiency (IPCC methodology)	kg CO <sub>2</sub> equivalent



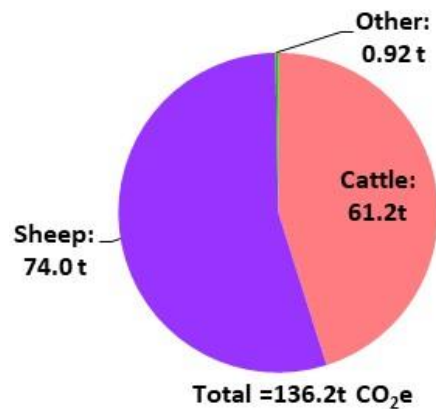
## Dairy Farm Ag. GHG Emissions 2022



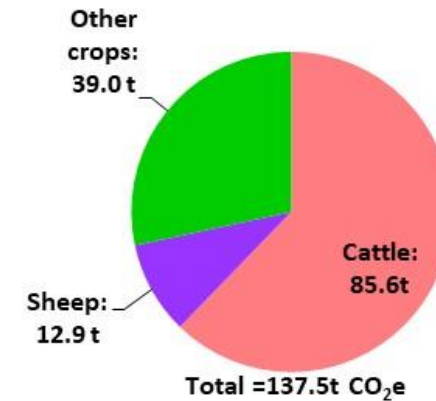
## Cattle Farm Ag. GHG Emissions 2021



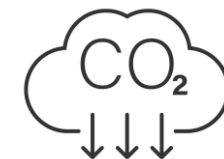
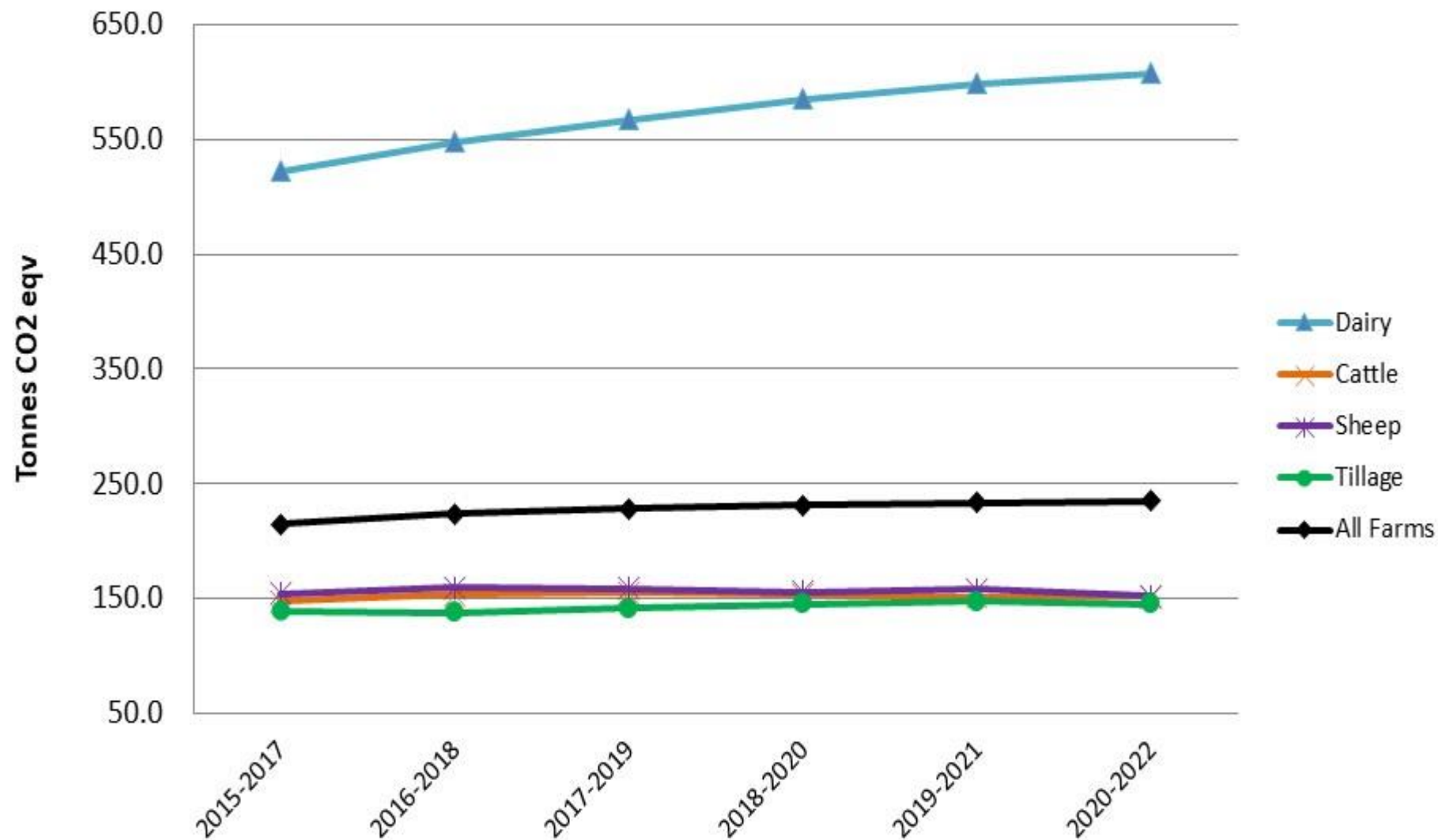
## Sheep Farm GHG Emissions 2022



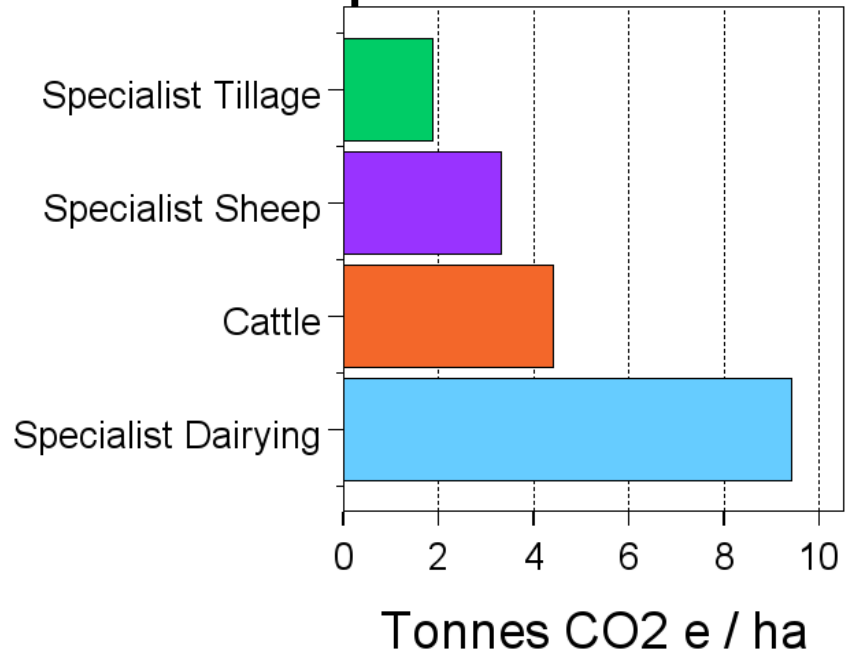
## Tillage Farm Ag. GHG Emissions 2022



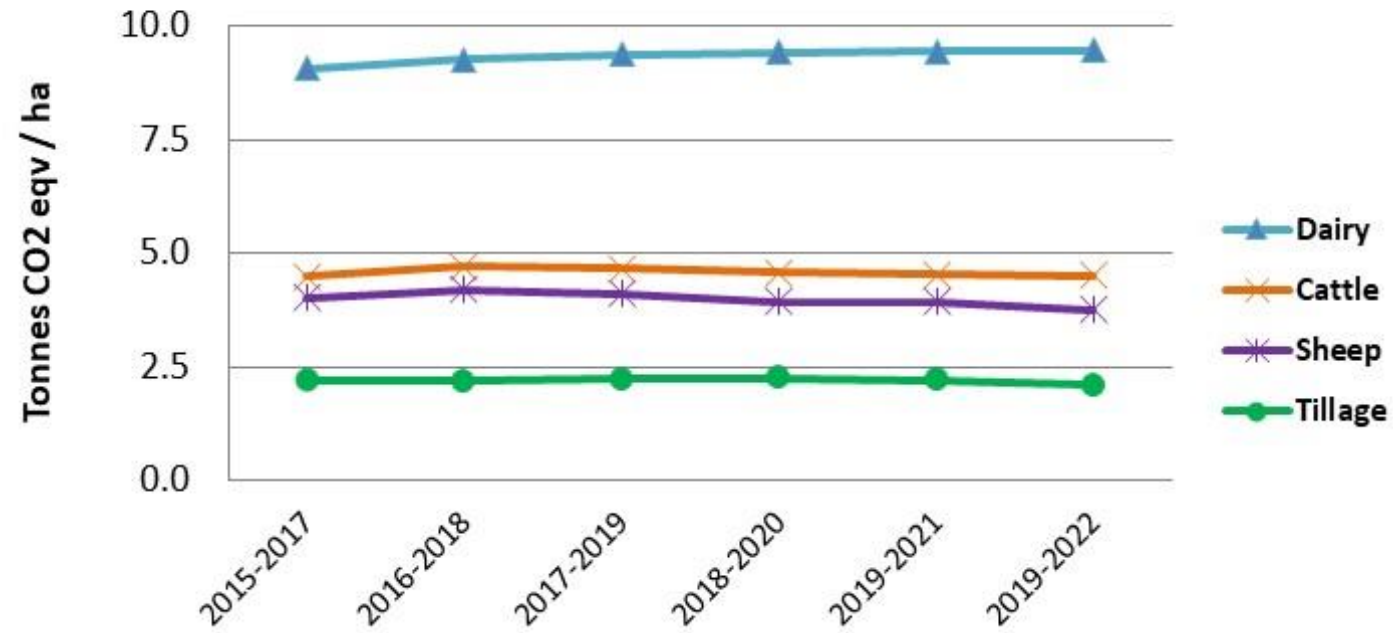
## Ag. based Co2eq per Farm - 3 year rolling average



## GHG per Hectare 2022



## Ag. based Co2eq ha - 3 year rolling average

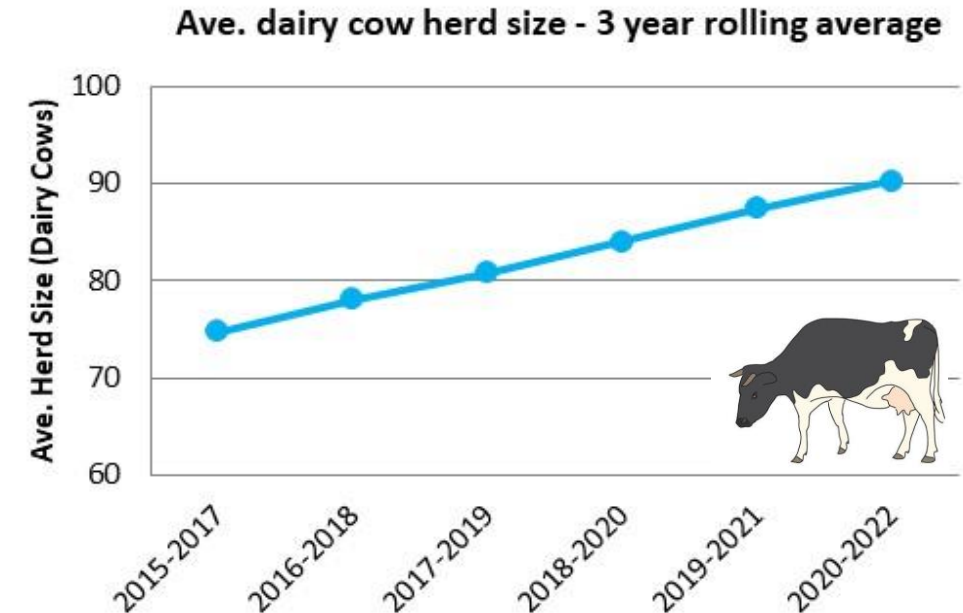
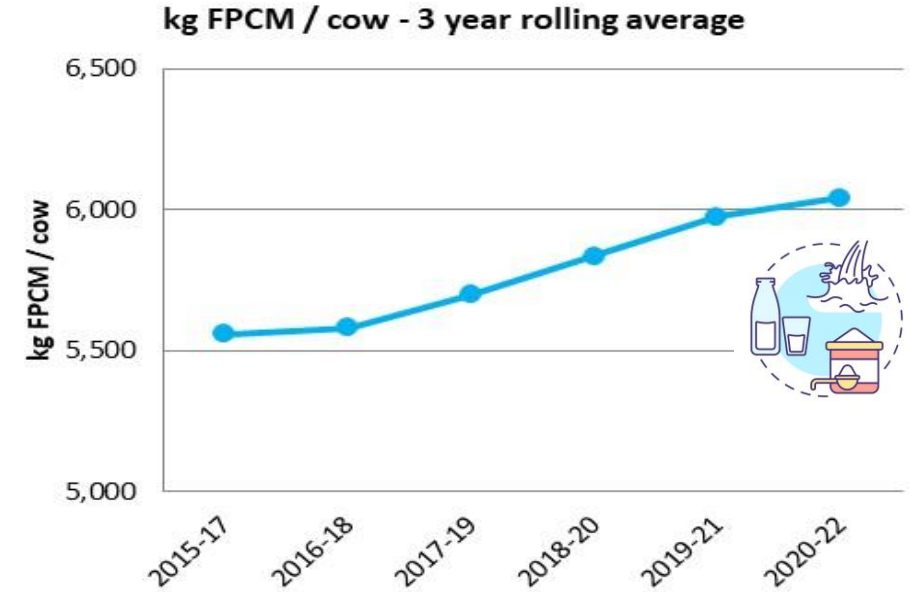
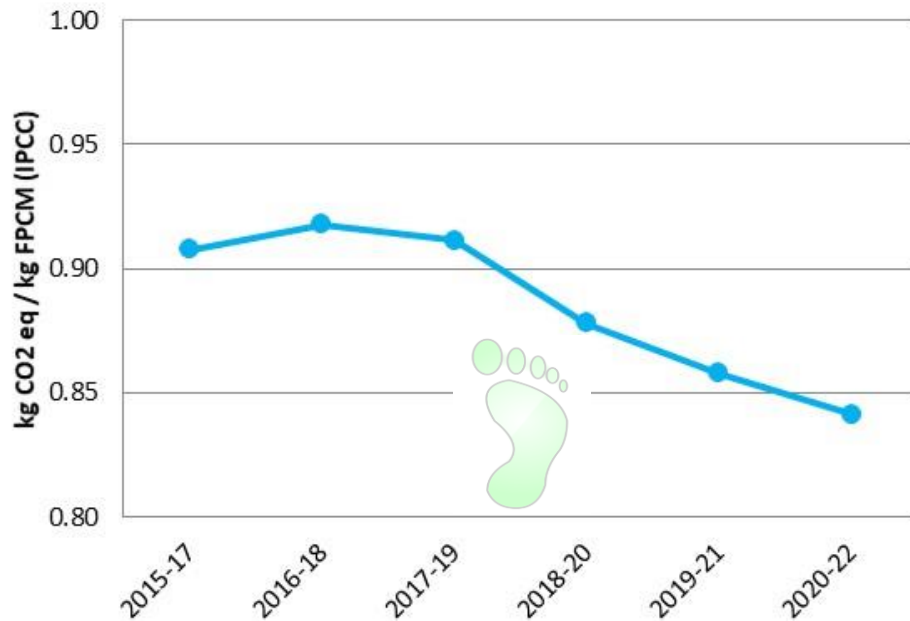


# Dairy based Ag. GHG emissions - Components

Dairy absolute GHG emissions equation = 3 Components

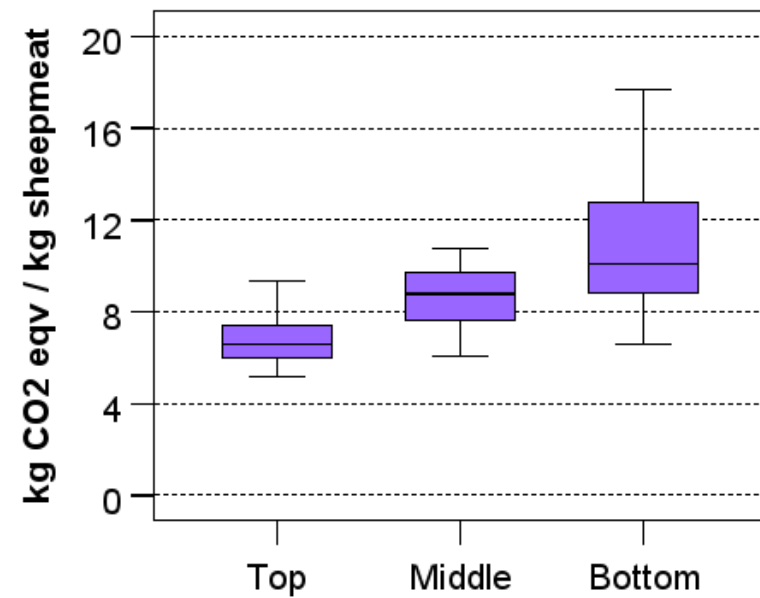
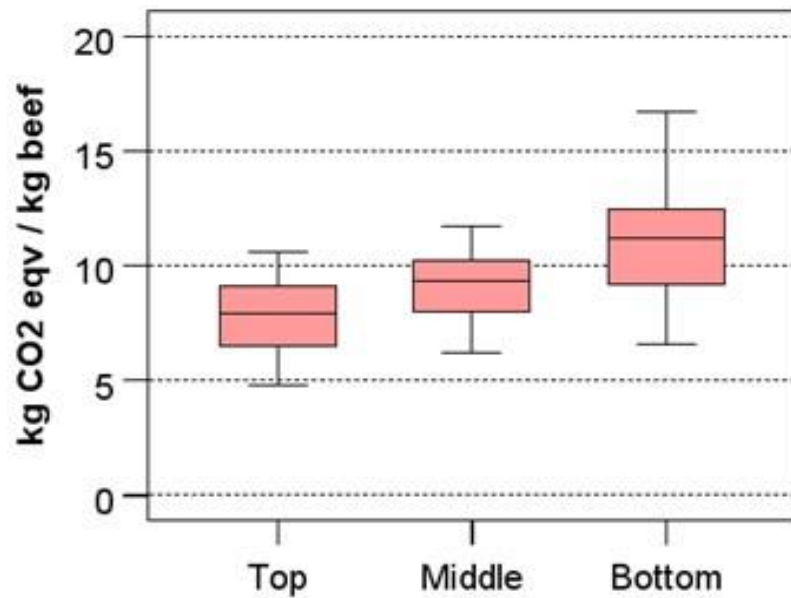
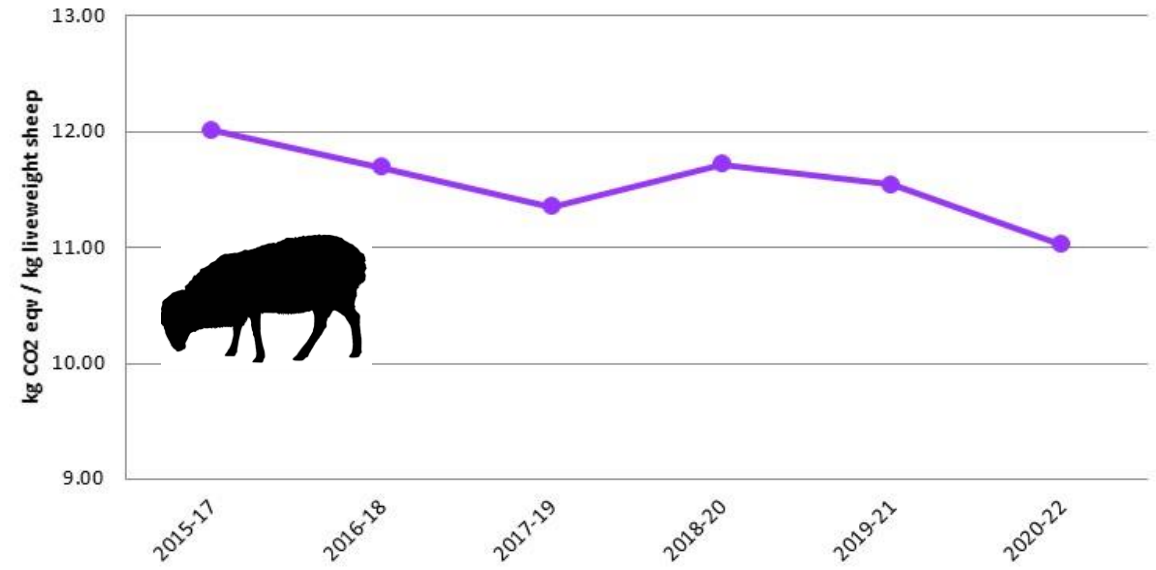
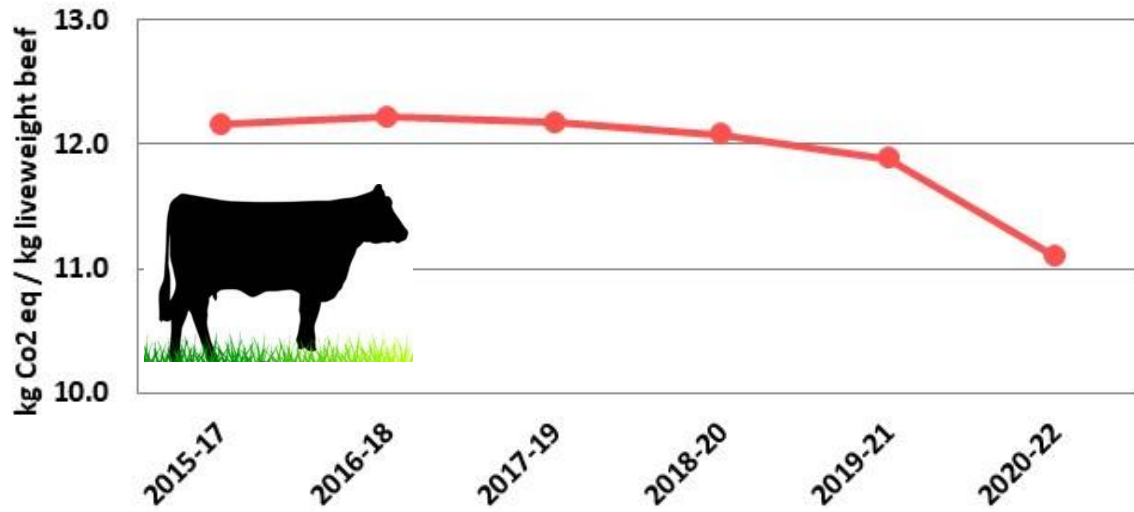
- (1) kg of milk produced per cow \*
- (2) CO<sub>2</sub>e per kg of milk \*
- (3) No. of cows (Herd size)

\*Kg of Fat & Protein Corrected Milk (FPCM) milk = Standardized to 4% fat and 3.3% protein.

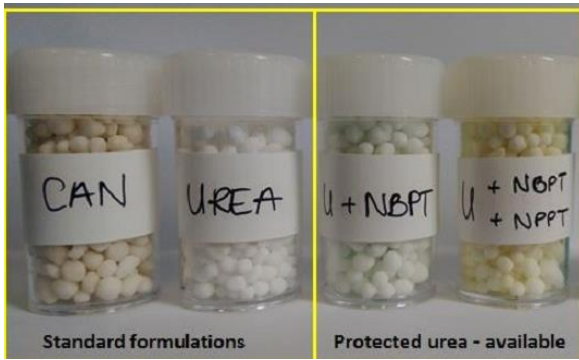


# Ag. Emissions intensity – Cattle & Sheep

kg Co2 Eq / kg liveweight beef - 3 year rolling average (IPCC)

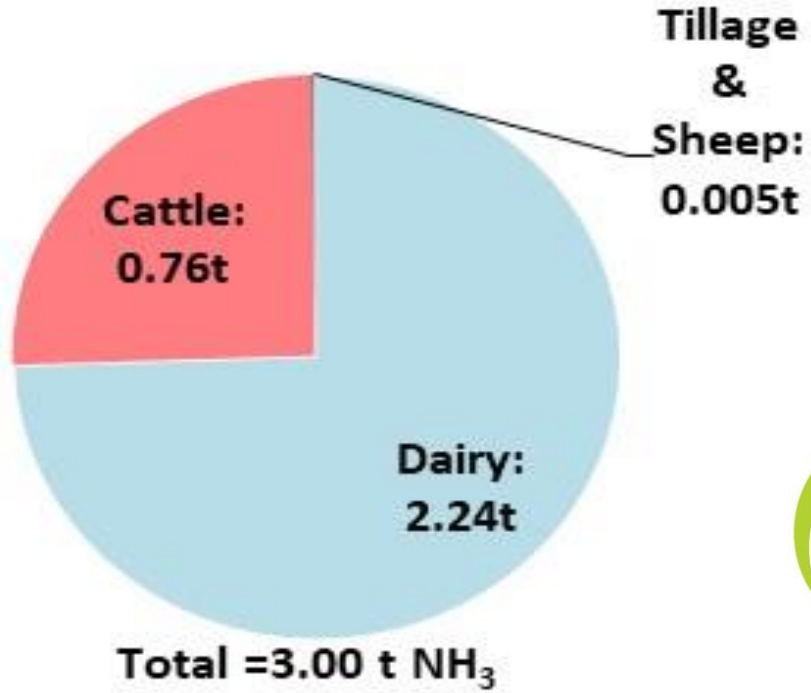


# Ammonia Emissions

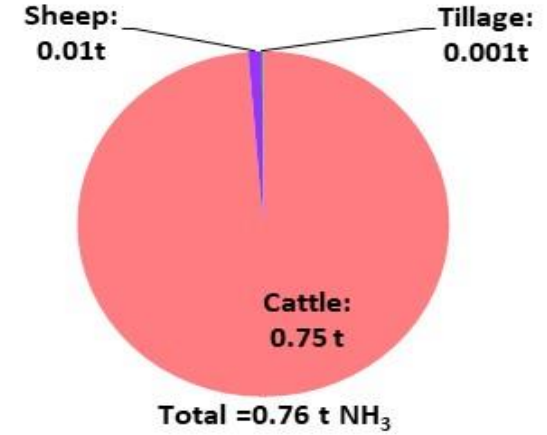


Ammonia emissions Indicators	Measure	Unit
per farm	NH <sub>3</sub> emissions	Tonnes NH <sub>3</sub> equivalent
per hectare	NH <sub>3</sub> emissions per hectare farmed	kg NH <sub>3</sub> equivalent
per kg of output	NH <sub>3</sub> emissions efficiency on a kg of product basis	kg NH <sub>3</sub>
per € of output	NH <sub>3</sub> emissions efficiency on a Euro of output generated basis	kg NH <sub>3</sub>

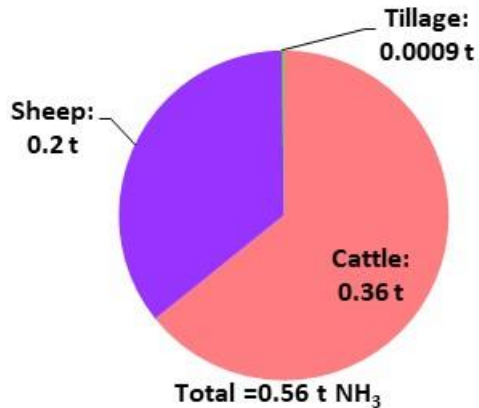
## Dairy Farm NH<sub>3</sub> Emissions 2022



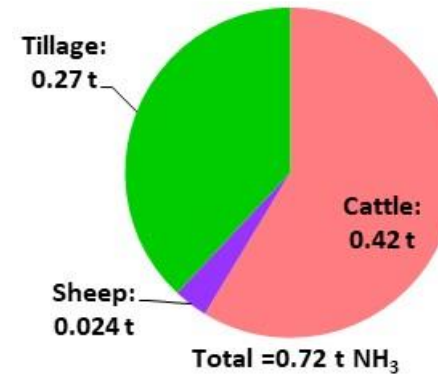
## Cattle Farm NH<sub>3</sub> Emissions 2022



## Sheep Farm NH<sub>3</sub> Emissions 2022

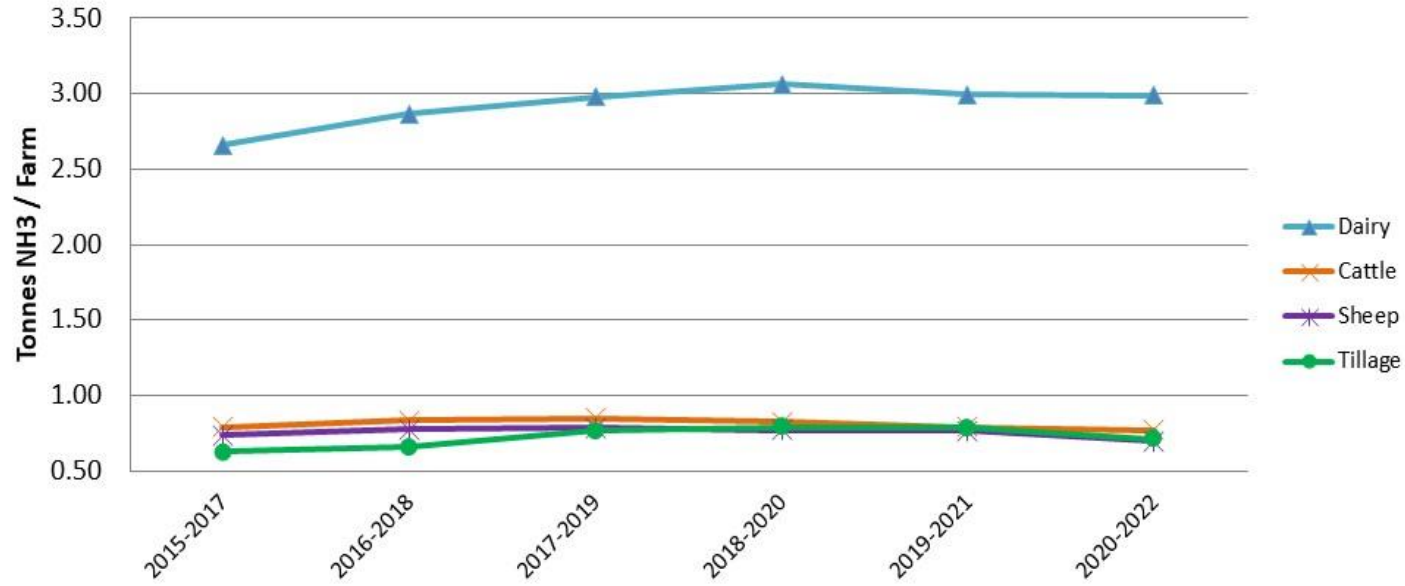


## Tillage Farm NH<sub>3</sub> Emissions 2022

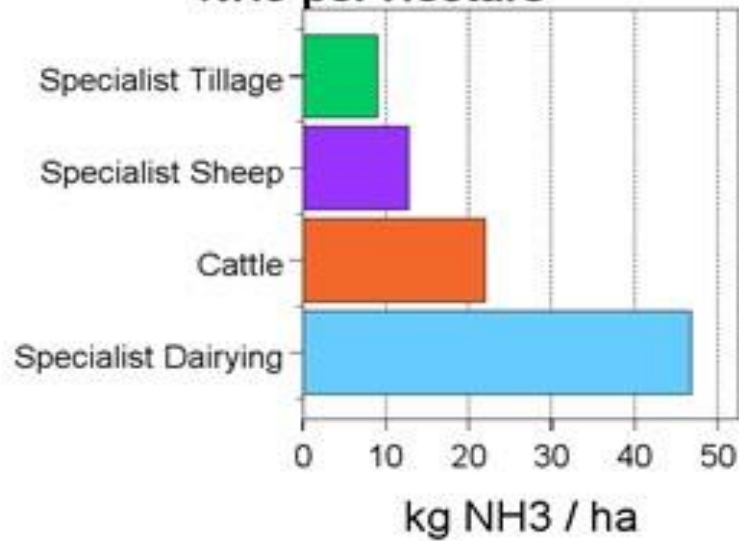


# Trends in Farm and per hectare NH<sub>3</sub> emissions

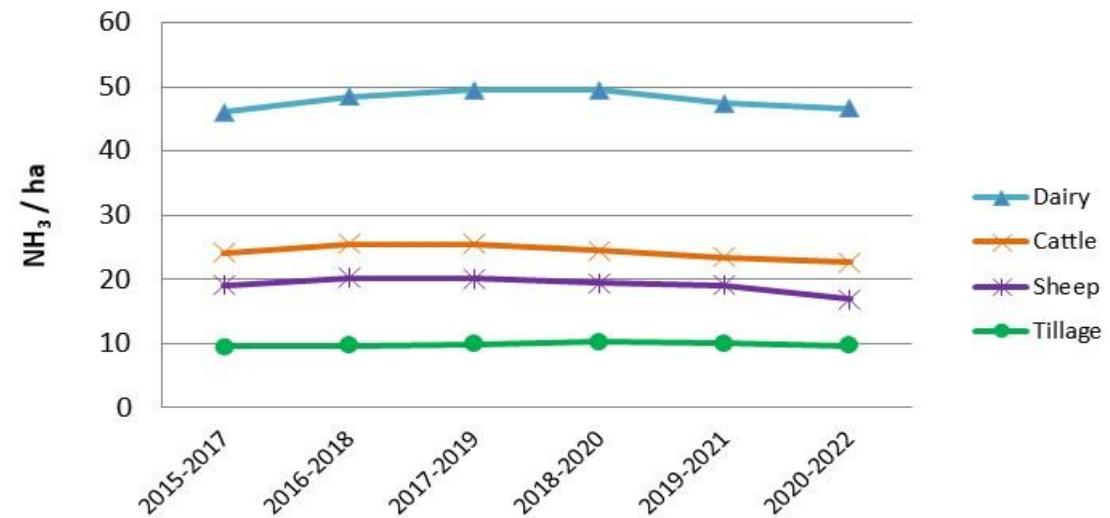
Total NH<sub>3</sub> Tonnes by Farm - Rolling 3 year average



NH<sub>3</sub> per Hectare



kg NH<sub>3</sub> / hectare - 3 year rolling average

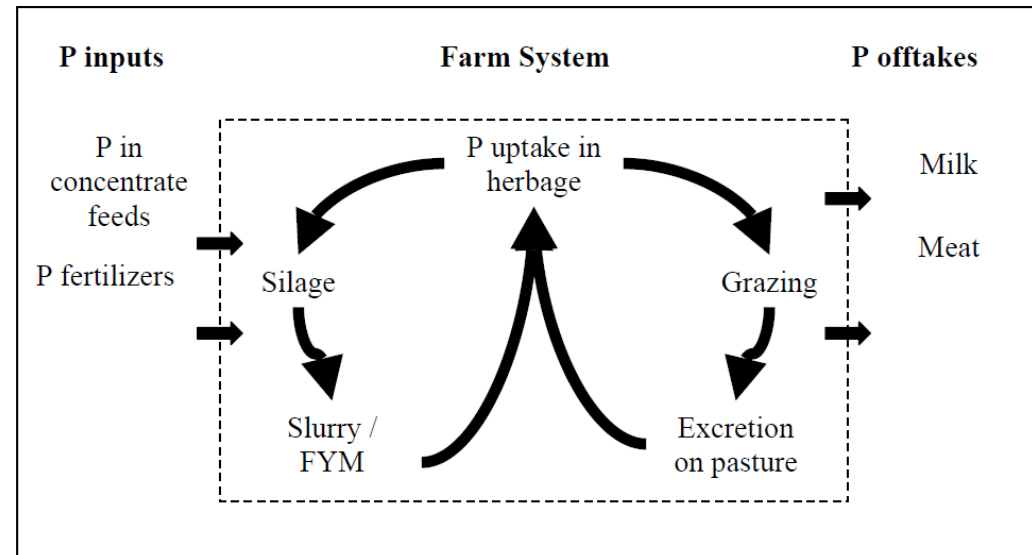
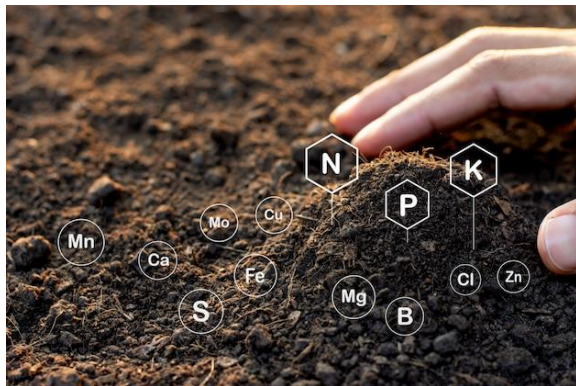




# Environmental Sustainability – Risk to Water Quality

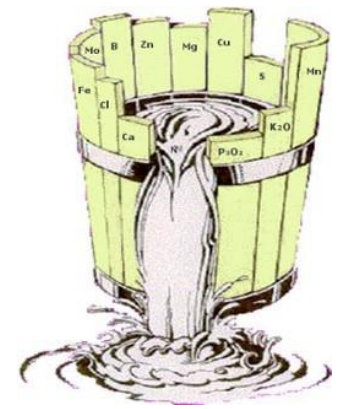


Indicator	Measure	Unit
Nitrogen (N) balance	N loss risk (Farm gate level)	kg N surplus/hectare
Phosphorus (P) balance	P loss risk (Farm gate level)	kg P surplus/hectare
Nitrogen (N) use efficiency	N application efficiency	% N outputs / N inputs
Phosphorus (P) use efficiency	P application efficiency	% P outputs / P inputs

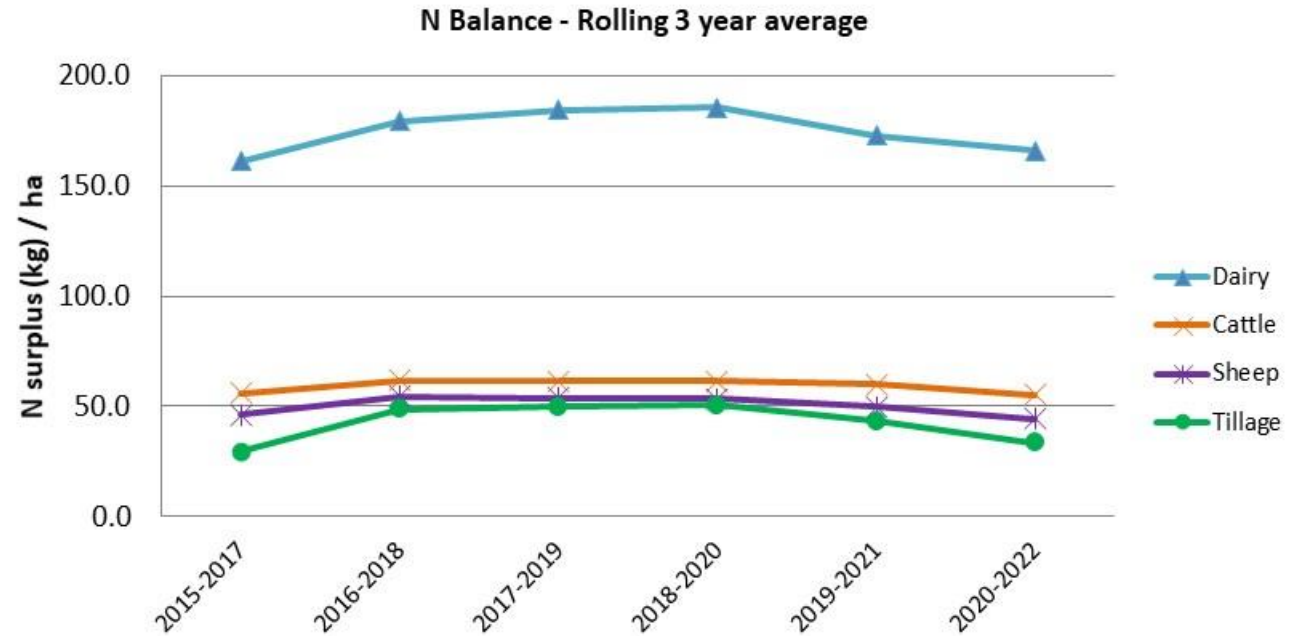
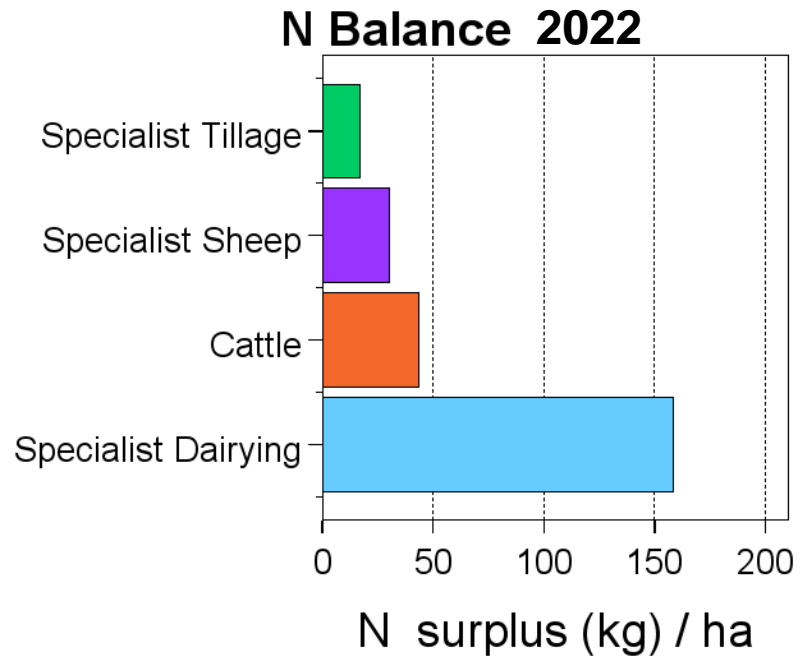


Source: Lalor and Coulter 2009

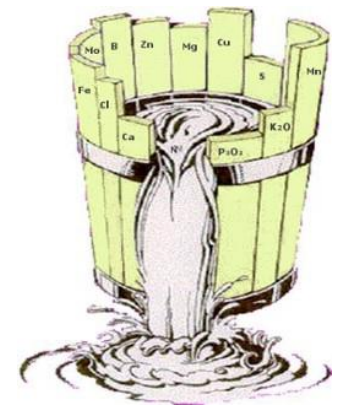
# Nitrogen Balance



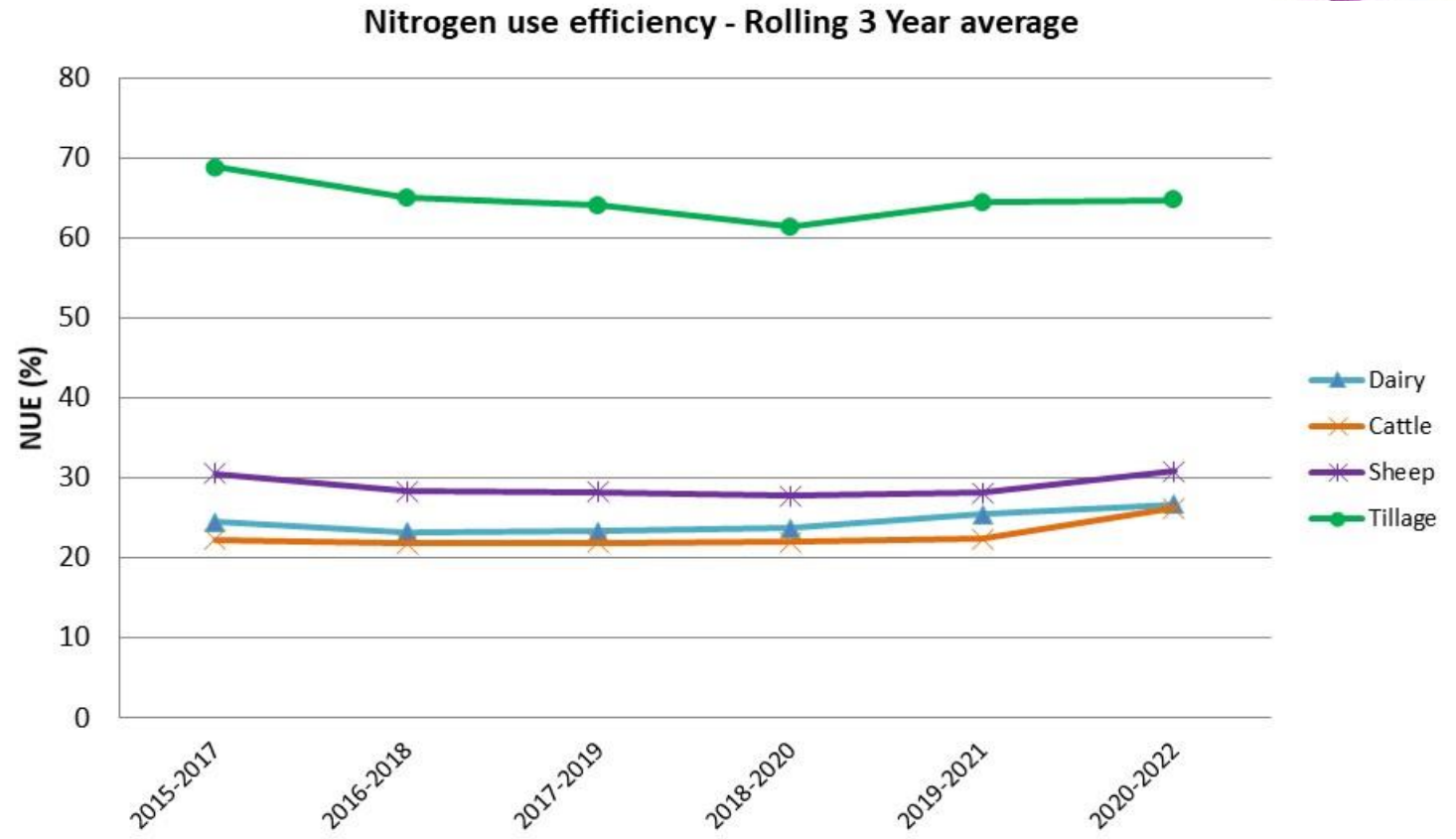
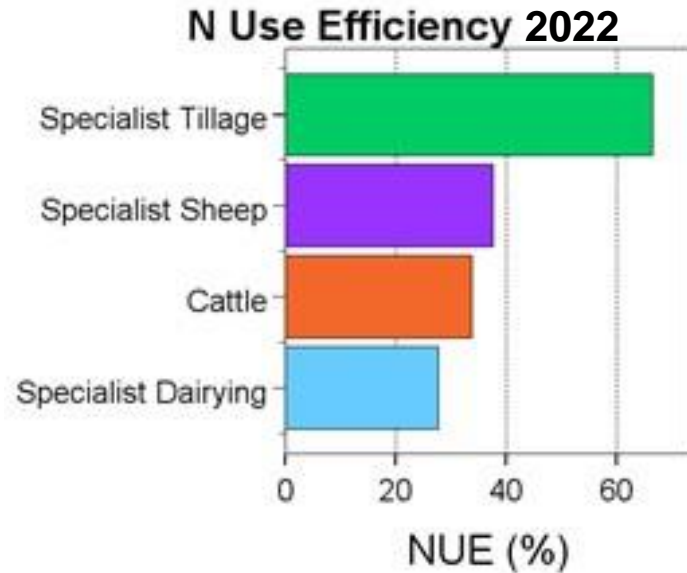
- N inputs – N outputs (farm-gate level), per hectare basis



# Nitrogen use efficiency

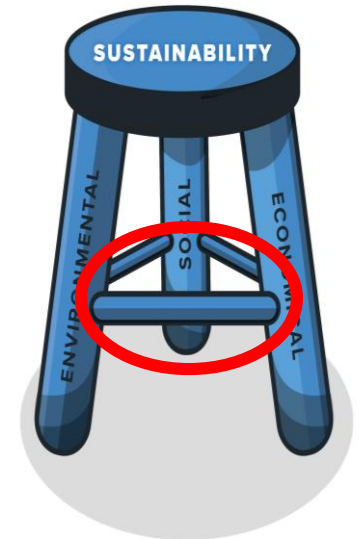
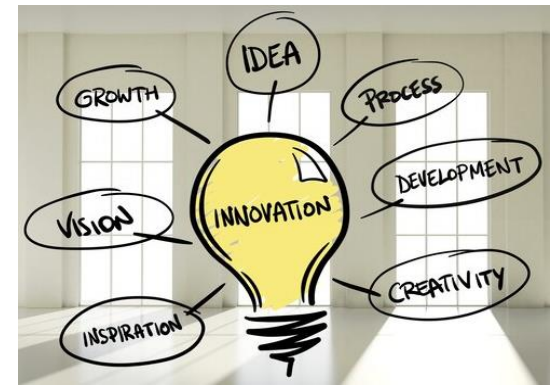
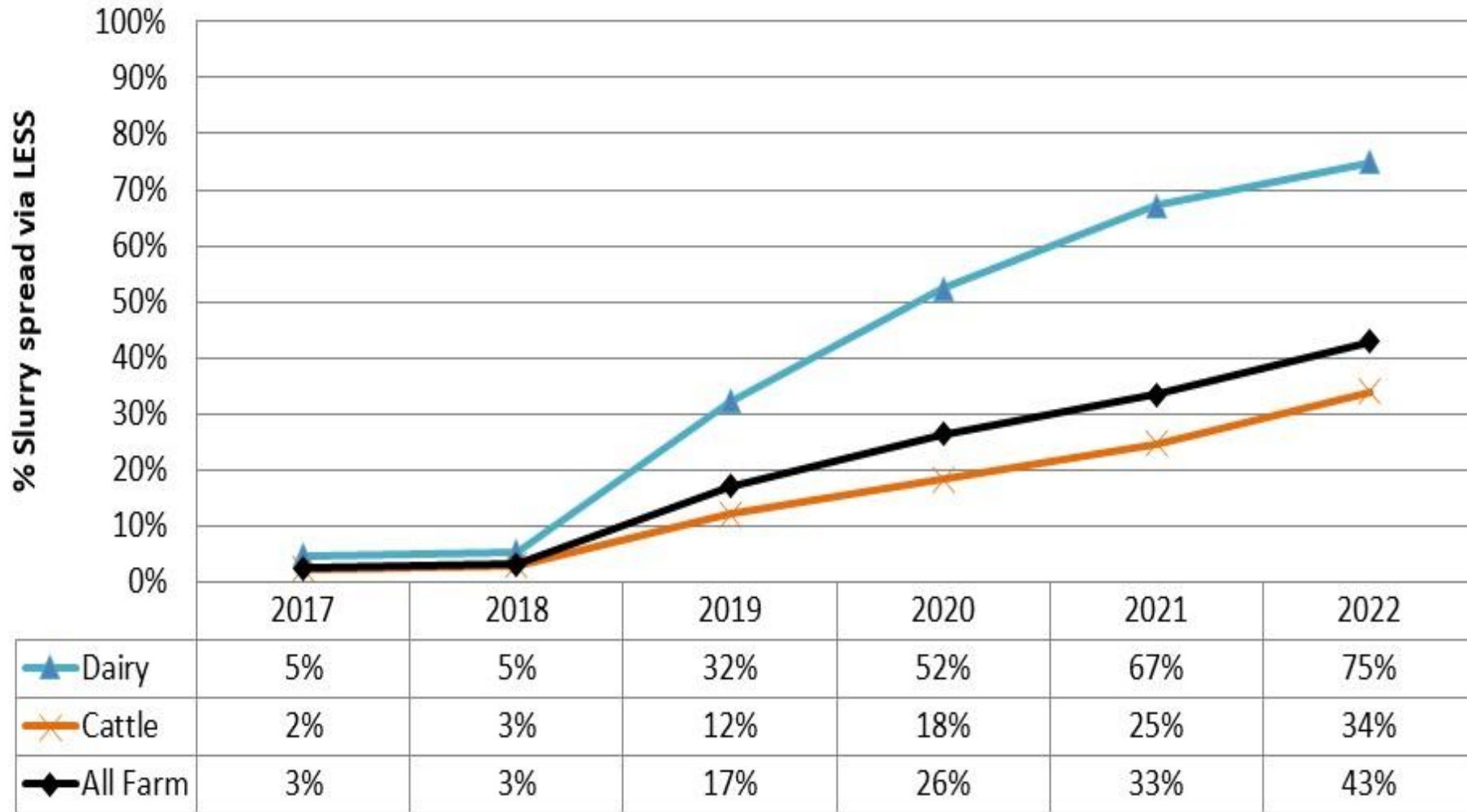


- Retention of N in farm system in % terms (output/input)



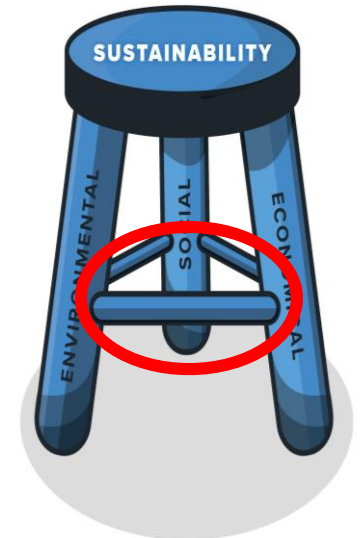
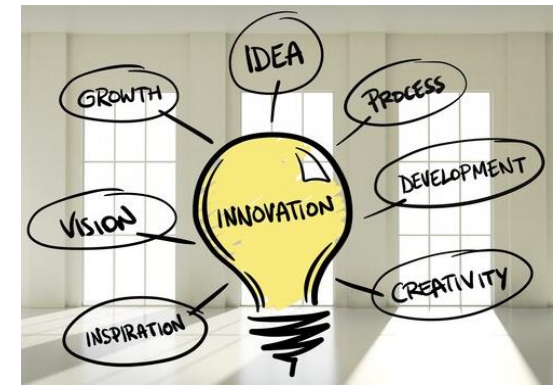
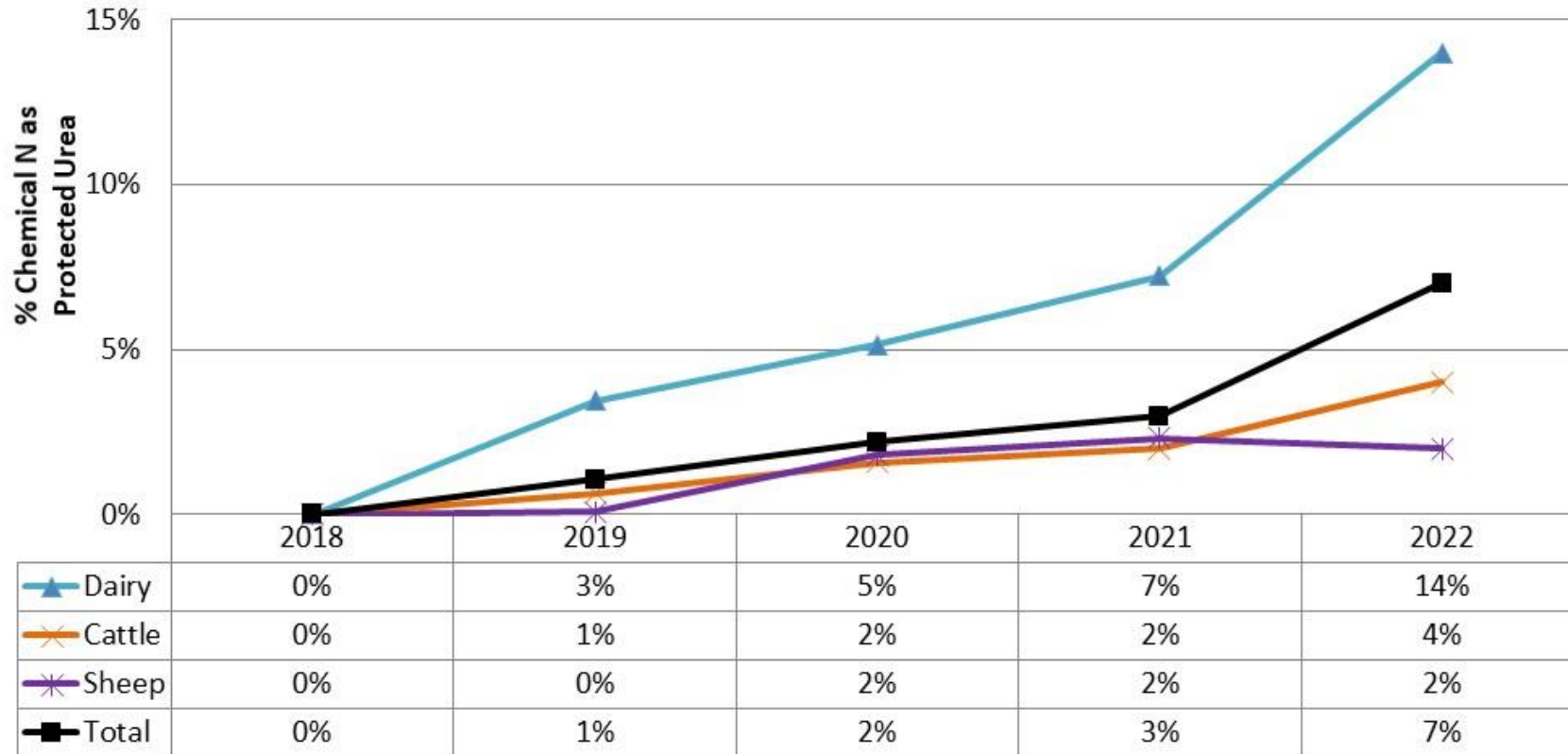
# Innovation - LESS

% Slurry applied via LESS – Farm Average



# Innovation – Protected Urea

% Chemical N applied as Protected Urea – Farm Average



# Summary / Conclusion



## ■ Economic & Social Metrics:

- Dairy performs strongest on a **farm** and **per hectare** basis
- **Tillage** systems **comparable** on **social** and some **economic** indicators
  - » Income per unpaid family labour unit
- **Drystock** systems still the most **challenged**

## ■ Absolute GHG Emissions in 2022:

- Decline in GHG emissions in 2022 (back to around 2020 levels) - Due to reduced chemical N use
- Other farm systems also showed reduced per farm & per hectare GHG emissions

## ■ Absolute NH<sub>3</sub> Emissions in 2022:

- Dairy showed increase vs 2021 (straight urea use), but below long term trend
- Other systems showed a decline on a per farm and per hectare basis (compared to preceding years)

## ■ Emissions intensity of production:

- GHG / NH<sub>3</sub> per kg product (milk & meat) is generally improving

## ■ Innovation Metrics:

- Use of **low emissions slurry spreading continues to increase**
- **Protected Urea** use remains low but is increasing slowly

# Thank You

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<https://www.teagasc.ie/rural-economy/rural-economy/national-farm-survey/sustainability-reports/>