

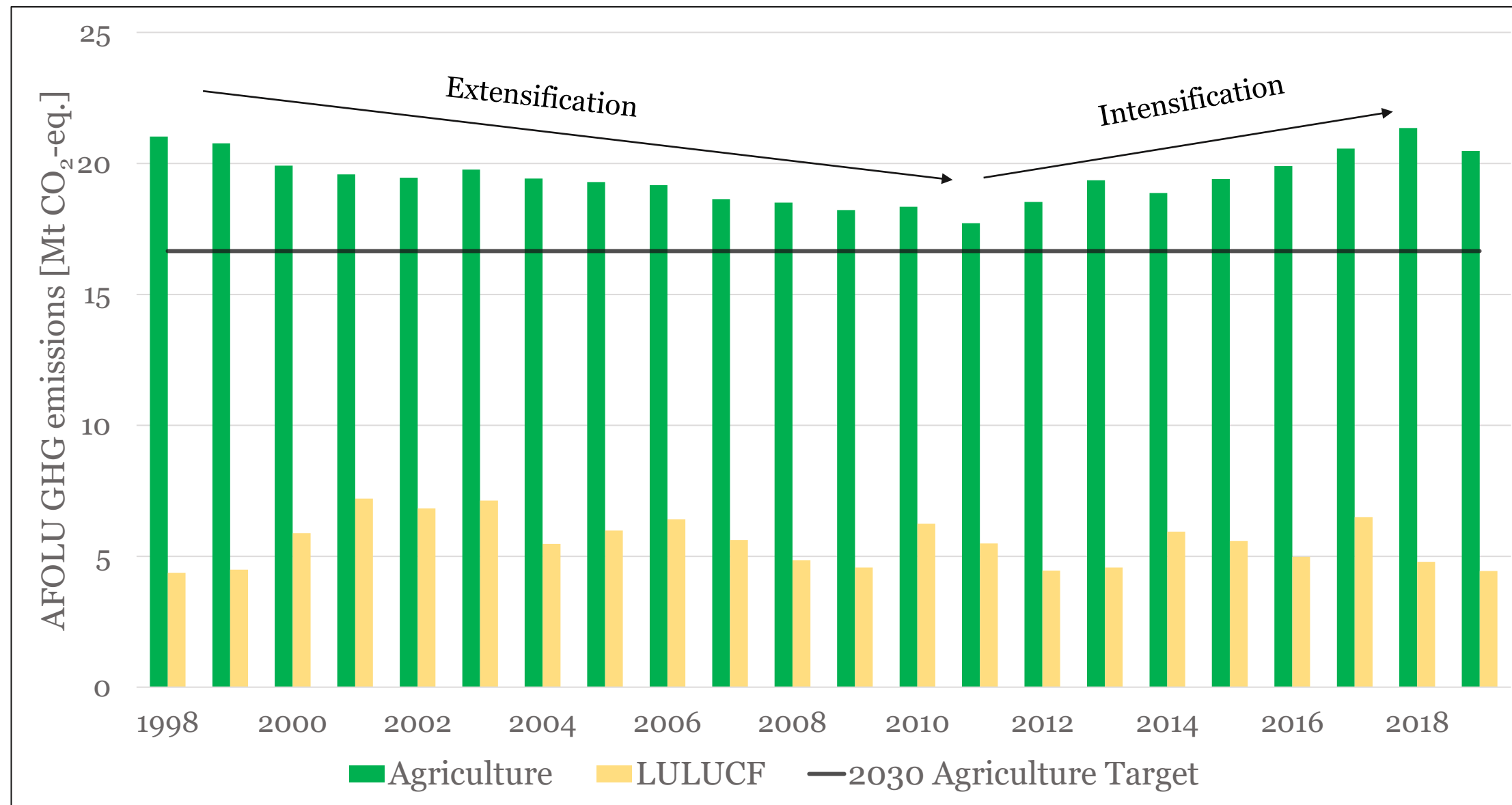
# Climate implications of dairy expansion and beef co-production displacing suckler beef production in Ireland

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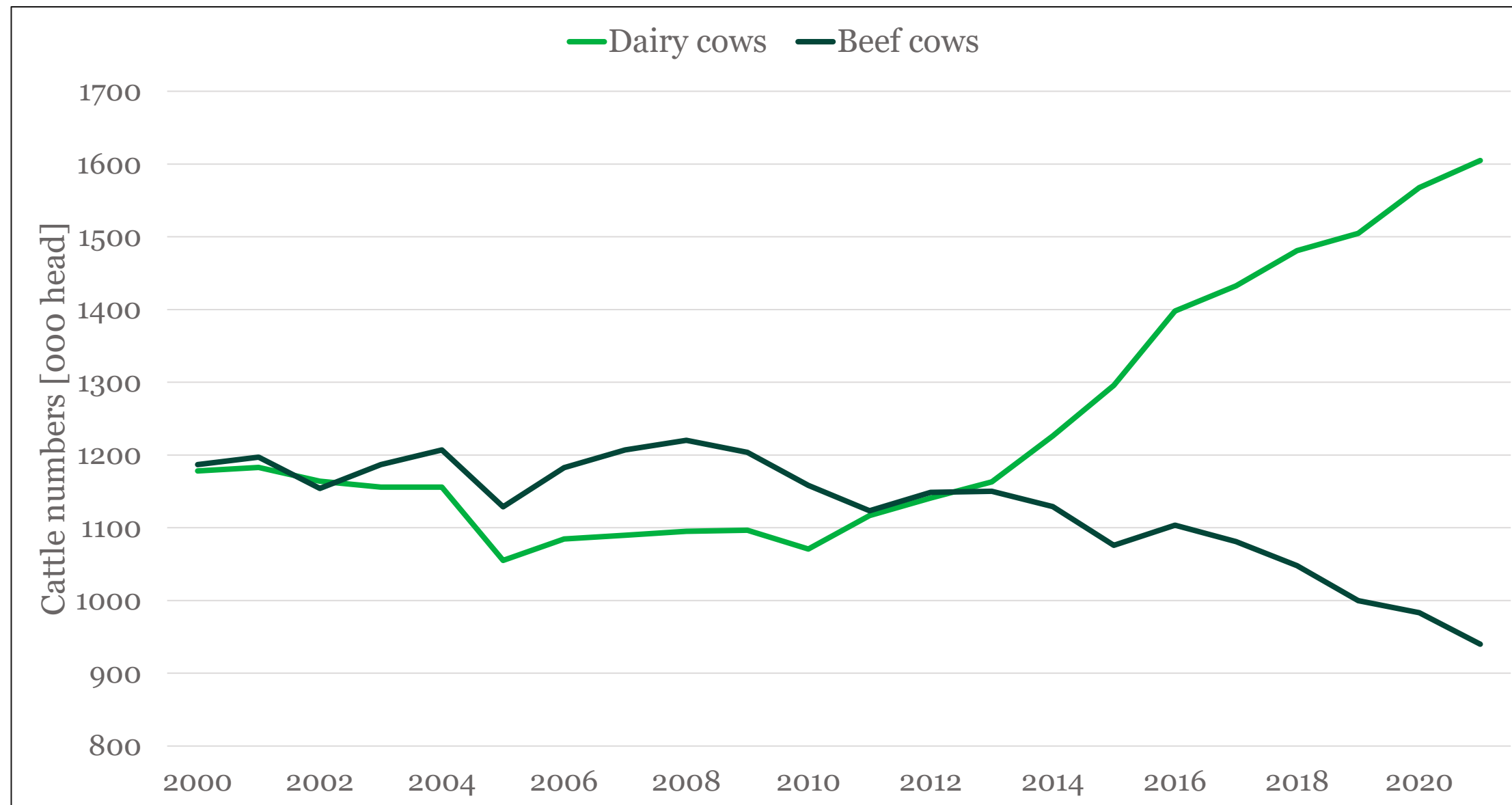
# Ireland's climate challenge



Data source: eurostat (2022)

- Emissions driven by total cattle numbers, these have grown from 6.6m in 2011 to 7.3m in 2020
- Development driven by extensification (CAP) and intensification post EU milk quotas
- 25% emission reduction target requires emissions lower than they were at bottom in 2011

# A trend fuelled by milk



Data source: eurostat (2022)

- 60% rise in milk production between 2010 and 2020
- Dairy sector benefitted from a combination of policies and market forces
- Very profitable due to low concentrate costs in pasture-based production systems



# More dairy cows and lower emissions?

- A shift towards more dairy cows → more dairy calves
- Dairy-beef cross-breeds combine milk production with relatively fast weight gain
- “Dual purpose” dairy cows lower overall (milk + beef) carbon footprint

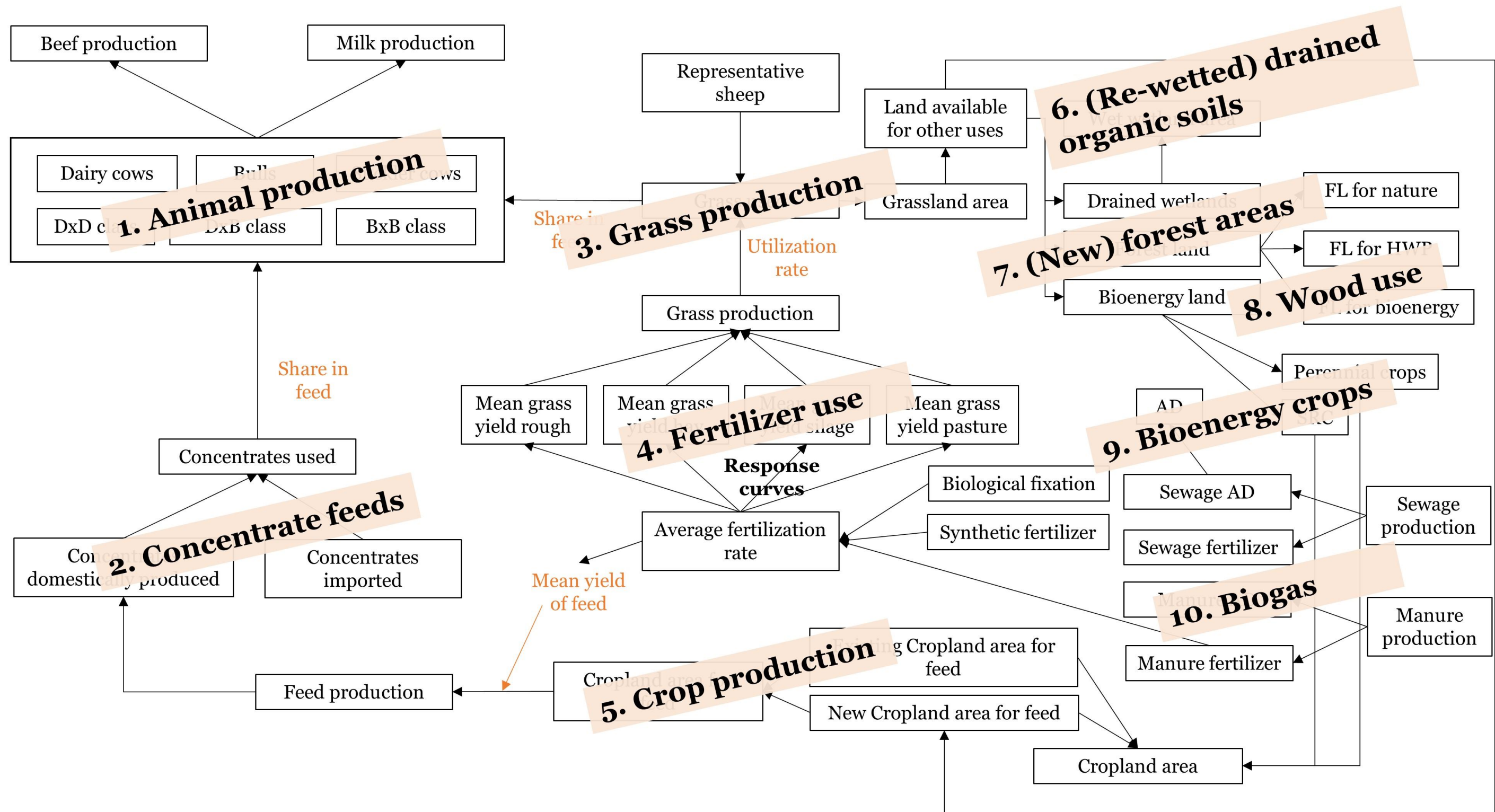
How does dairy specialisation impact GHG emissions and land sparing opportunities?

Emission mitigation and offsetting require land!

- Afforestation
- Wetland restoration
- Green energy production

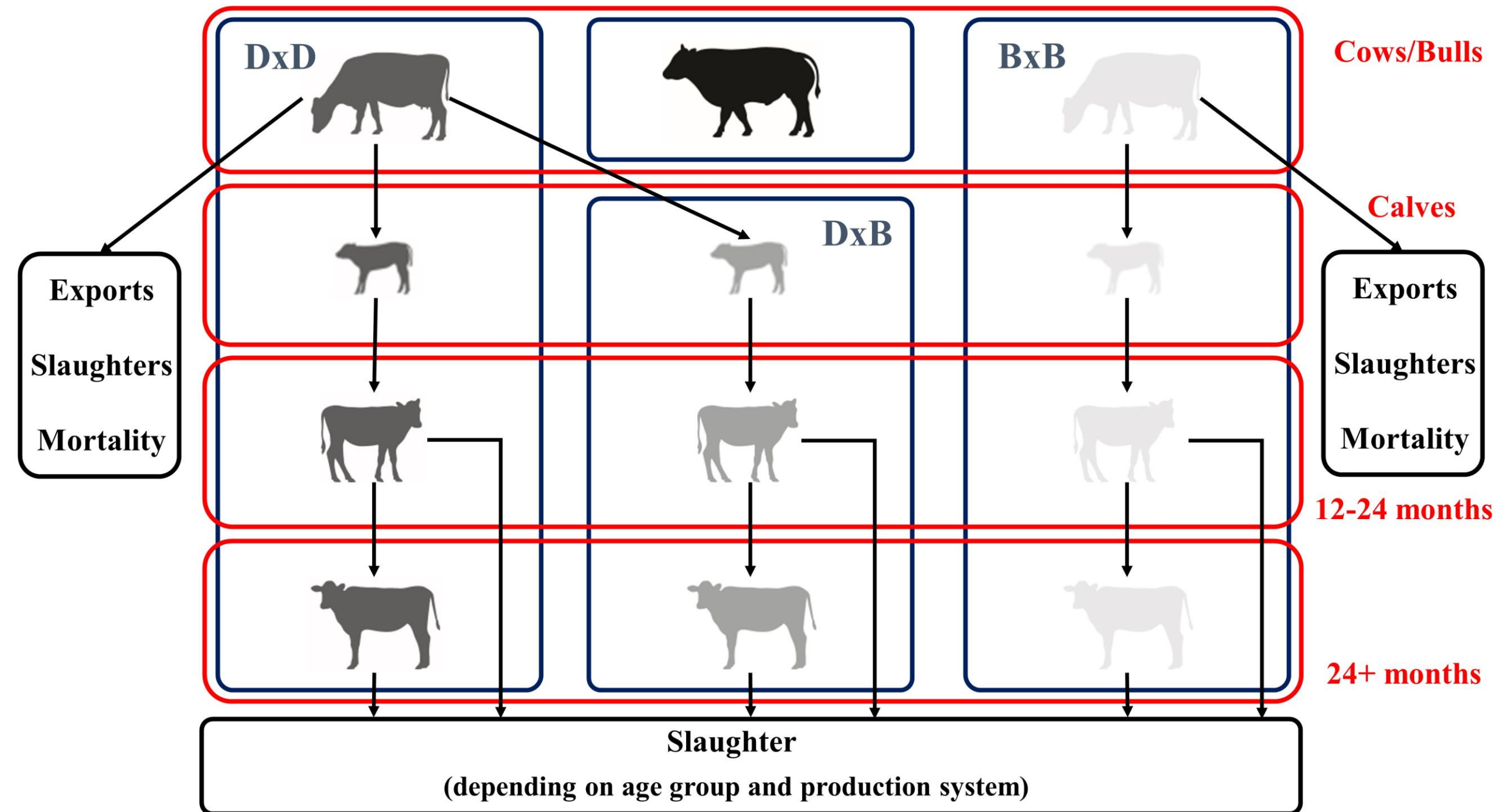


# The GOBLIN model



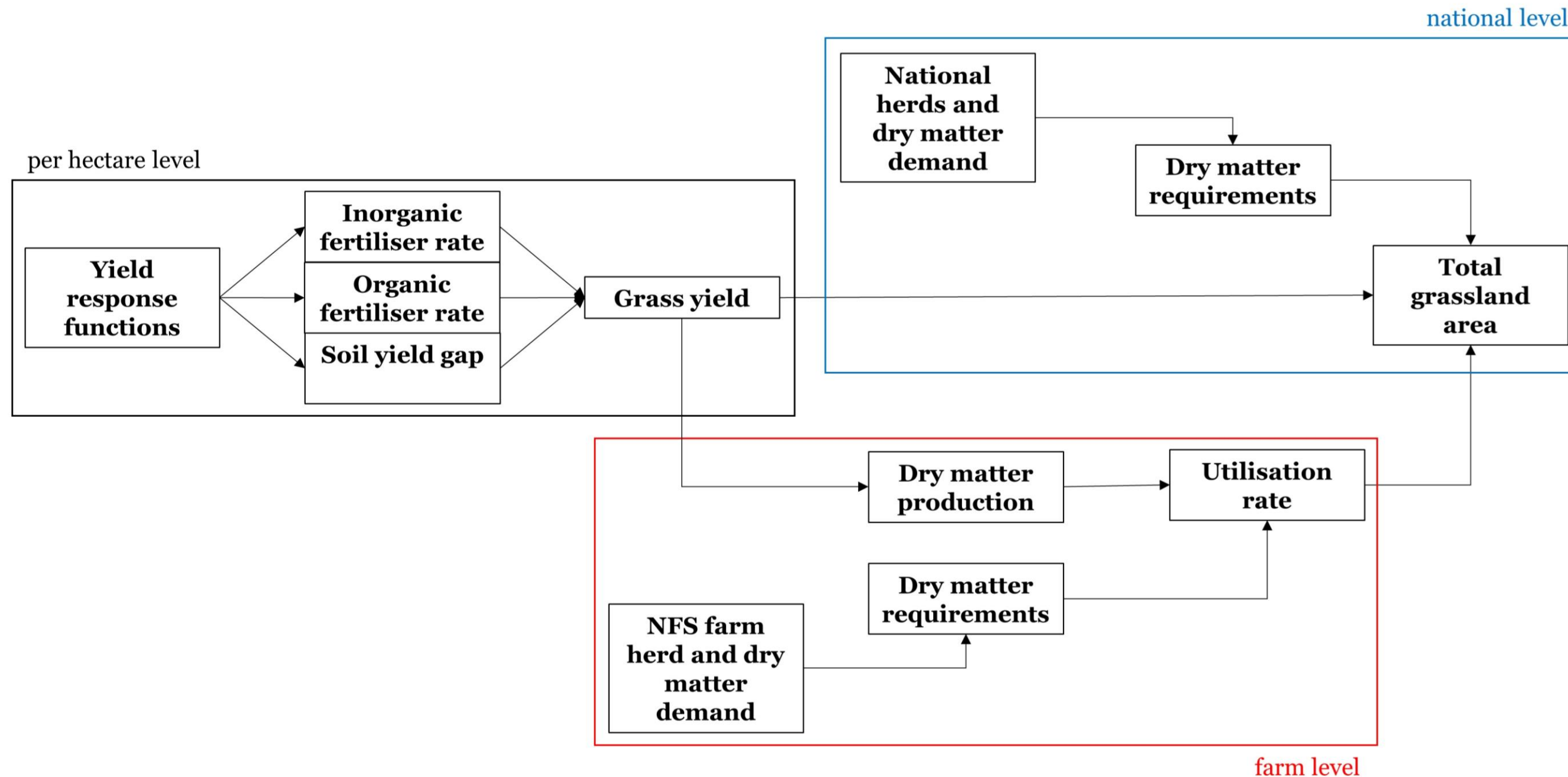


# GOBLIN - cattle cohort structure



- Cohort development using real export and slaughter data
- Cohort-specific LWGs based on average slaughter age and beef production guidelines

# GOBLIN - grassland module







$$Total\ grassland\ area = \frac{Dry\ matter\ requirement}{Grass\ yield * Utilisation\ rate}$$

# Scenarios

Scenario	Description	Dairy cows	Suckler cows	Daily milk	Cohort system	LWG system	DxD_m export rate
Units				L/day			
Dairy specialisation scenarios							
1	2020 Baseline	1,555,000	915,000	14.95	CC3	LWG3	30%
2	Strong dairy increase	2,000,000	470,000	14.95	CC3	LWG3	30%
3	Full dairy maximisation	2,250,000	0	14.95	CC3	LWG3	30%



# Preliminary results

Scenario	Description	Total milk output	Total beef output	GHG emissions	Methane emissions	Grassland area	Spared land
Units		billion L	kt	Mt CO <sub>2</sub> -eq.	Mt CH <sub>4</sub>	million ha	kha
Dairy specialisation scenarios							
1	2020 Baseline	8.43	669.17	26.52	0.54	4.24	-
2	Strong dairy increase	10.84	634.06	26.69	0.54	4.17	68.77
3	Full dairy maximisation	12.20 	543.81 	25.11 	0.50	3.78	458.47 

# Combining scenarios

Scenario	Description	Total milk output	Total beef output	GHG emissions	Methane emissions	Grassland area	Spared land
Units		billion L	kt	Mt CO <sub>2</sub> -eq.	Mt CH <sub>4</sub>	million ha	kha
<b>Dairy specialisation scenarios</b>							
<b>1</b>	2020 Baseline	8.43	669.17	26.52	0.54	4.24	-
<b>Combined scenario</b>							
<b>8</b>	Combined scenario	12.20	521.40	24.45	0.48	3.60	636.95
		+45%	-22%	-8%	-11%	-15%	

## Scenario 8:

- full dairy maximisation (2,250,000 dairy cows with no suckler cows)
- three month slaughter age reduction
- 100% DxD\_m export
- birth rates of 75% DxD\_f and 75% DxB\_m

# Conclusions

- Dairy specialisation provides economic benefits and lowers CF of milk, less beef is produced which could lead to a larger milk + beef CF
  - Future research will indicate if that is the case for Ireland
- Slaughter age reduction lowers GHG emissions and grassland requirements
- Export reductions of male dairy calves increase GHG emissions and beef output, export maximisation the other way around
- Sexed semen scenario slightly increases beef output while other factors remain constant



# Acknowledgements

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