Intensification as a way to reduce cattle greenhouse gas emissions : a question of scale

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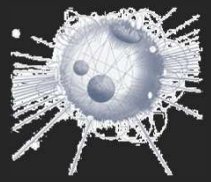
Rationale

Trade-off = meat and milk production & GHG mitigation

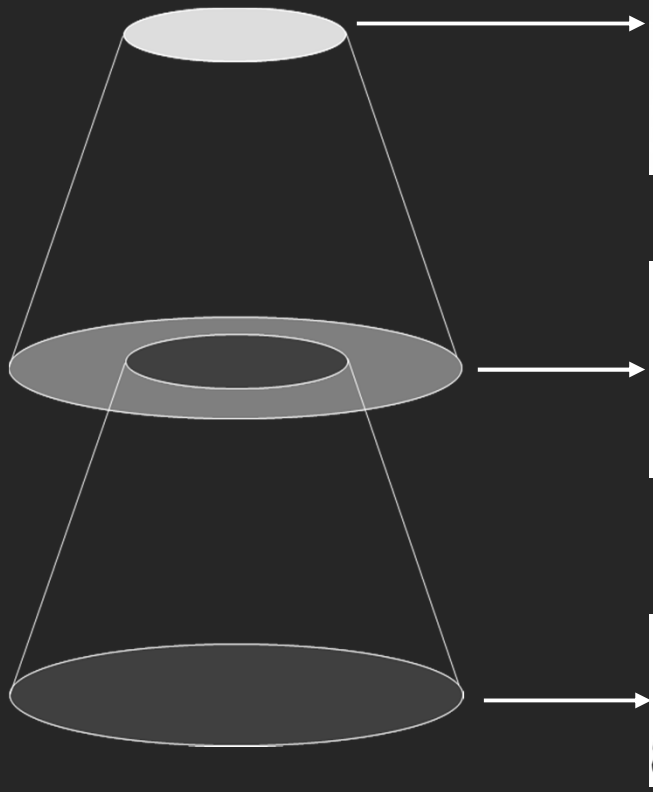
Solution = intensification of animal production

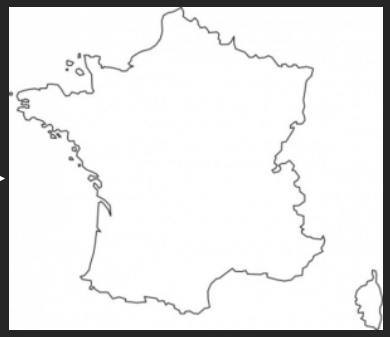


Complexity of LFS = multiple interactions + **hierarchical levels**

Rationale

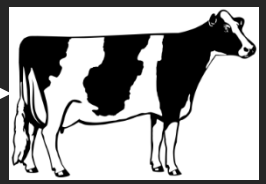
Intensification of animal production: an efficient strategy to mitigate GHG emissions from LFS ?





Milk & meat co-production

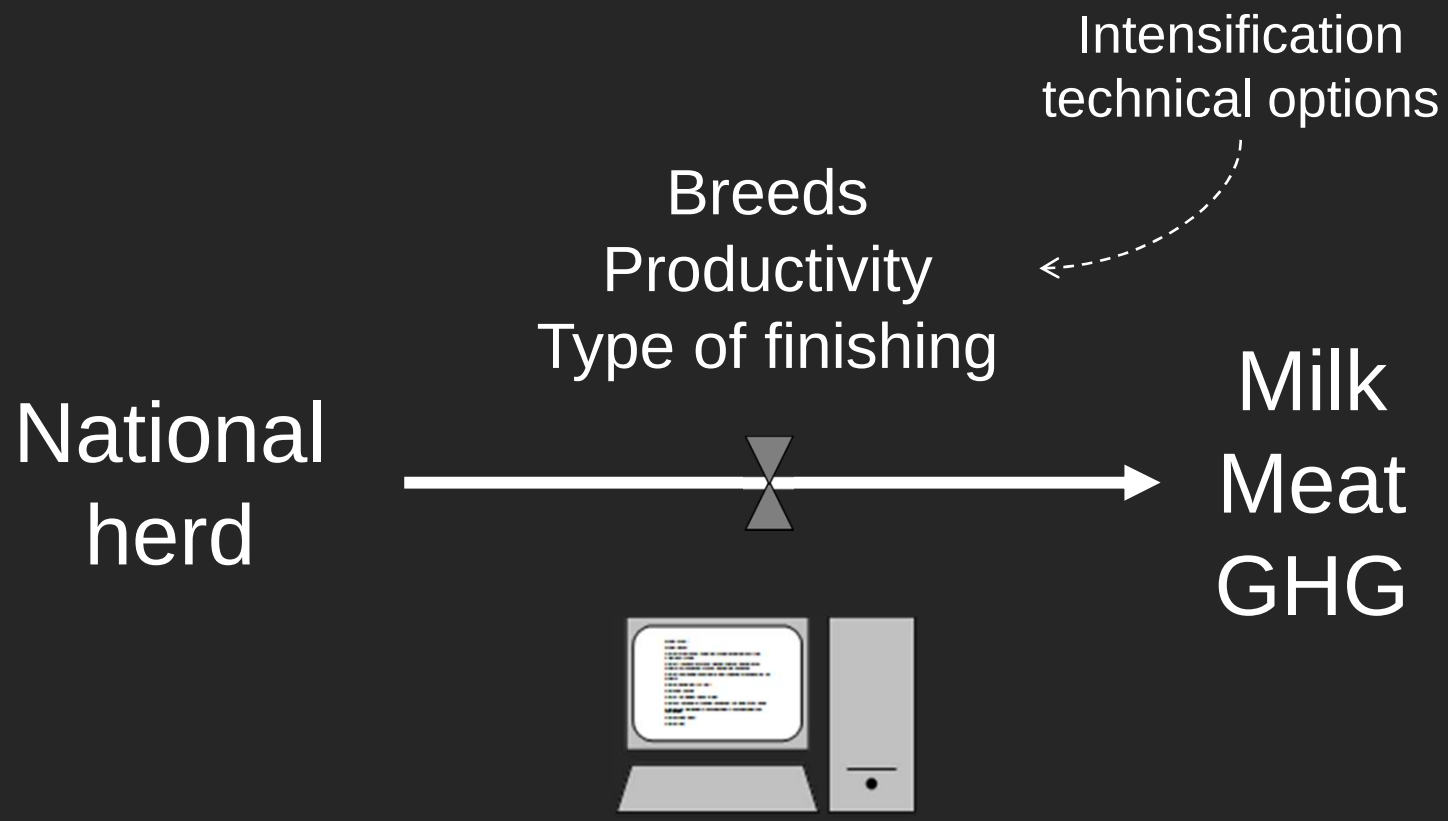
Interactions with farm components



Dilution effect

Objective and method

Evaluate the effects of animal intensification on GHG emissions at the national level



Outline

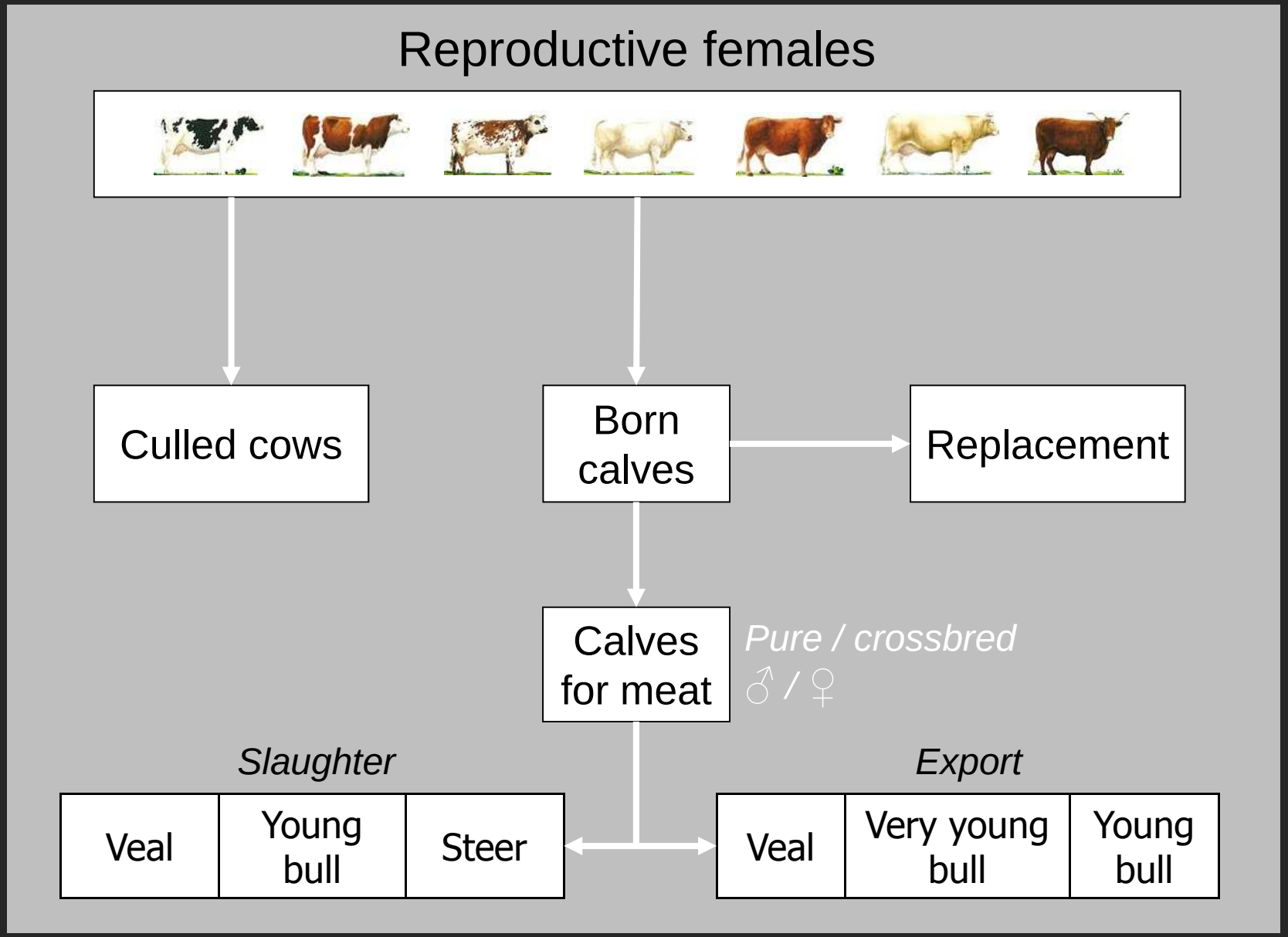
1. The model

- Description
- Calibration
- Simulation

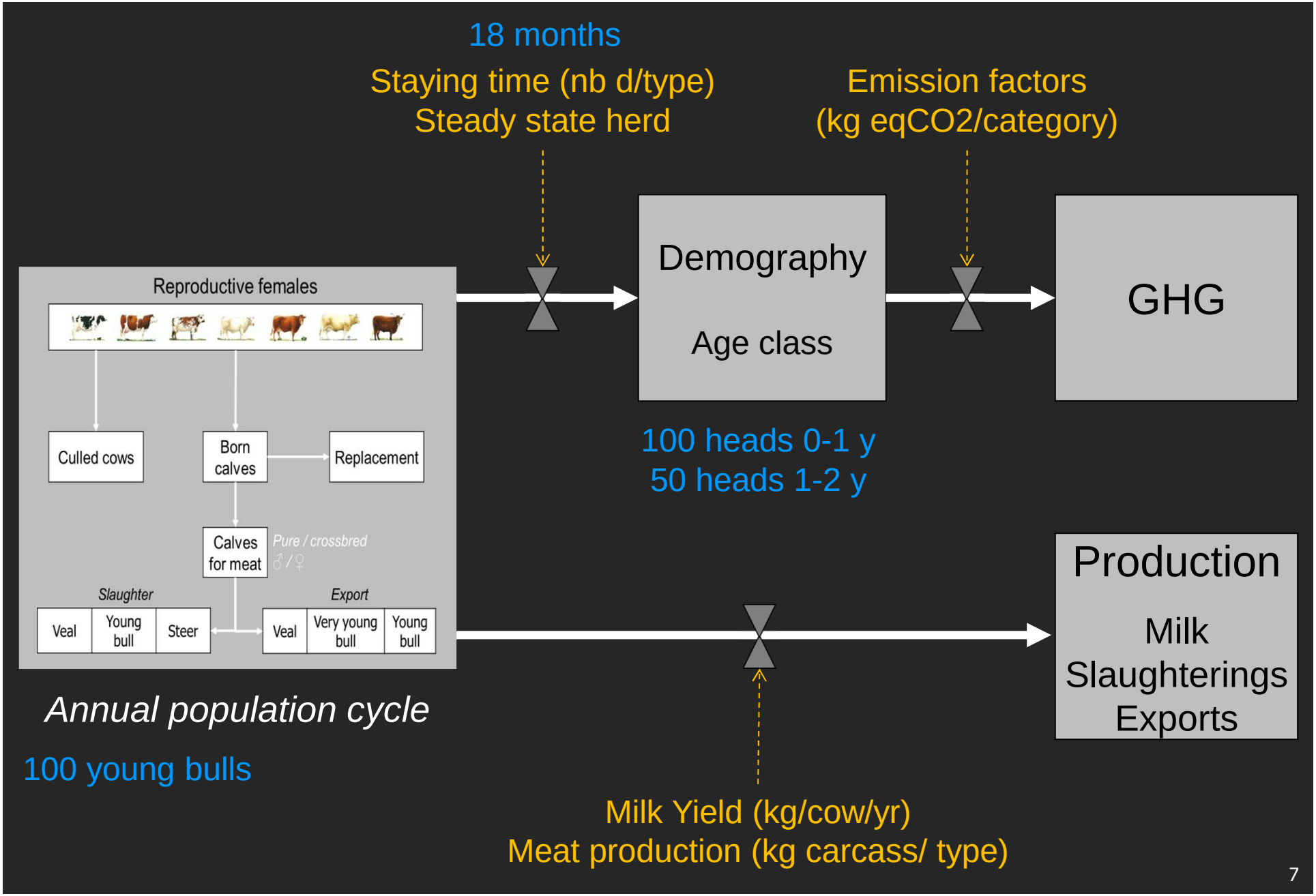
2. The results

- Dairy intensification
- Dual purpose breed
- Beef intensification

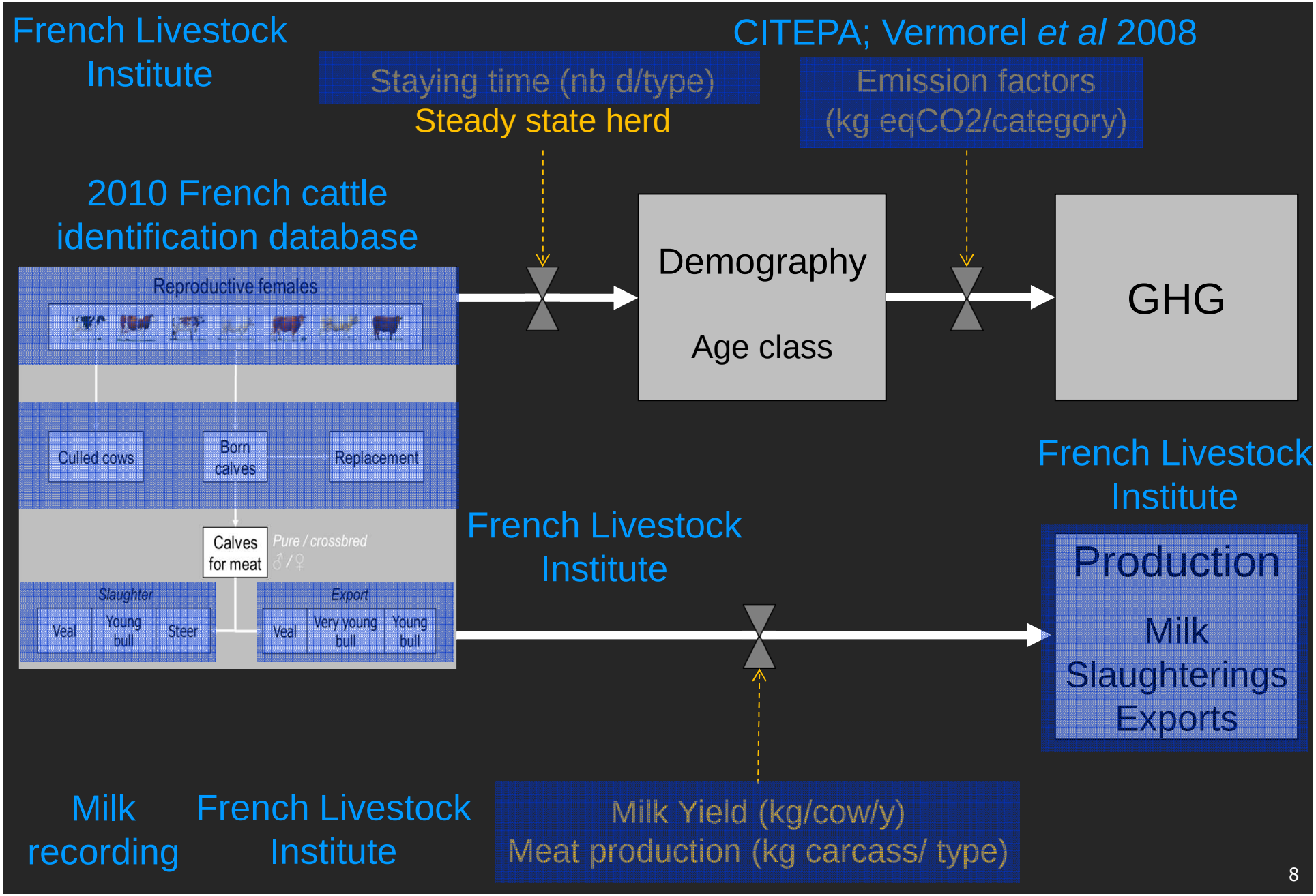
Model description: the herd production cycle



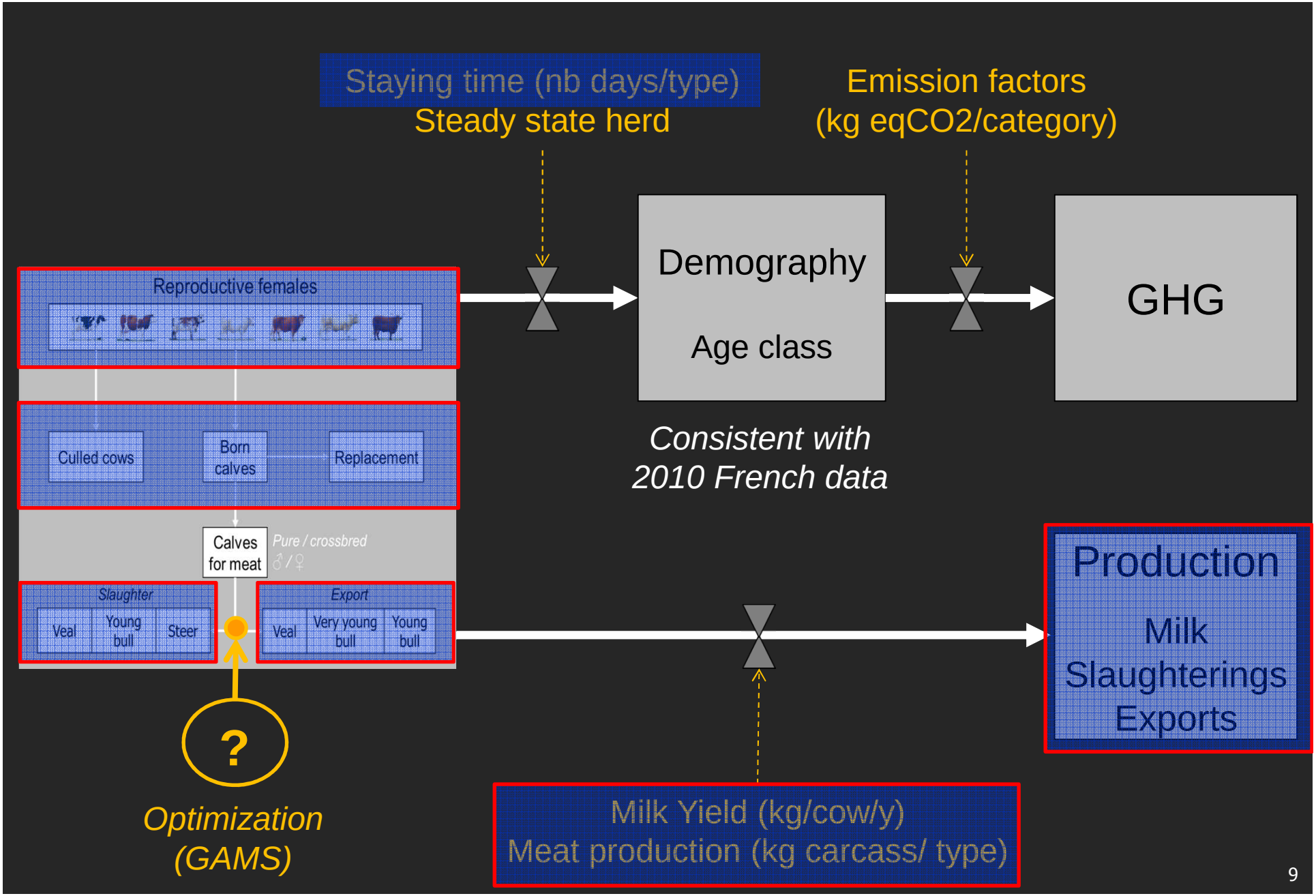
Model description: production, demography & GHG



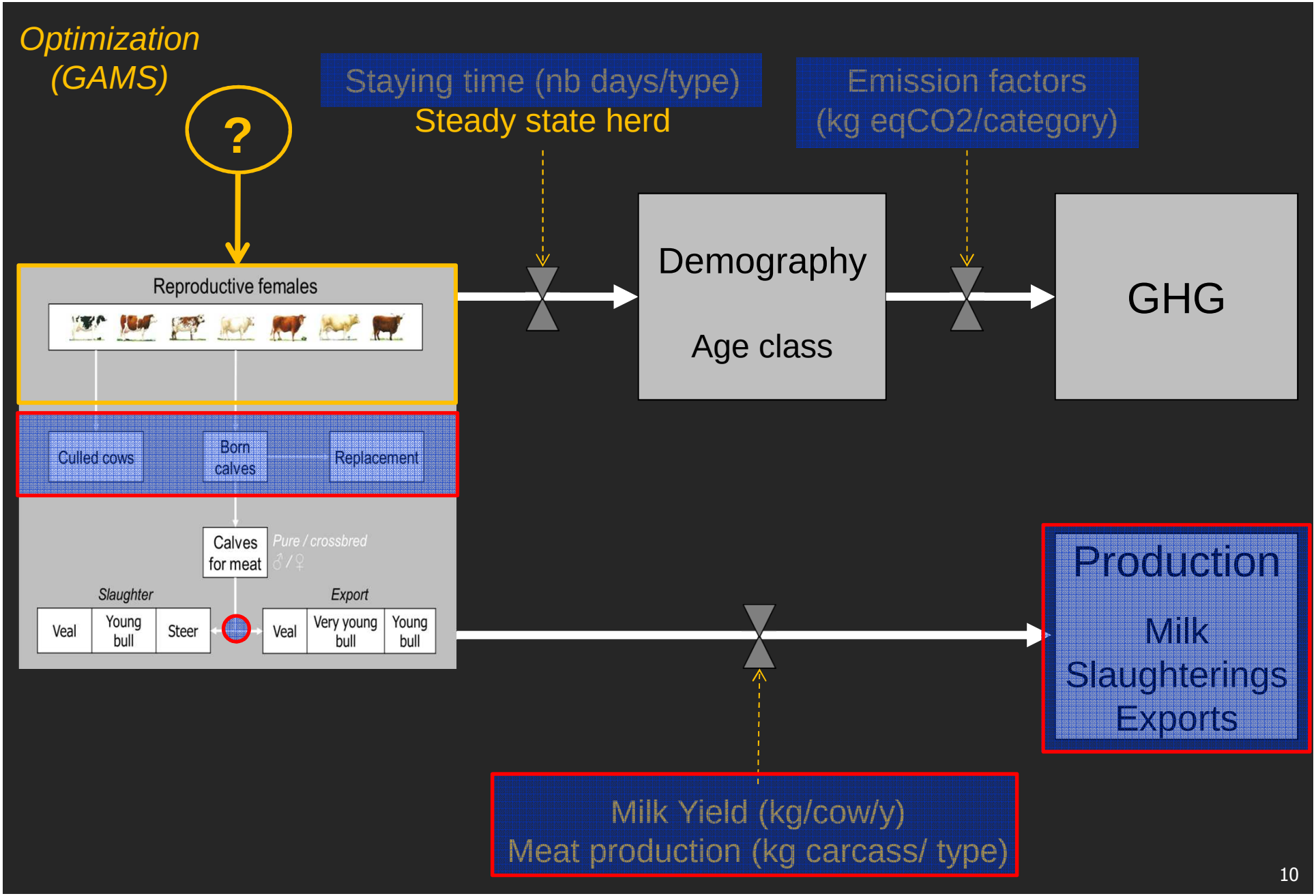
Calibration: input parameters



Calibration: which calves repartition matrix ?



Simulations: which cattle population satisfies constraints?



Simulations: 6 scenarios for 3 strategies of intensification

1. Dairy herd intensification

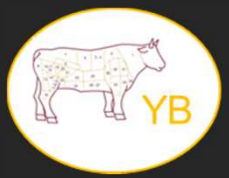
PH productivity 7500 kg/cow/yr → 11500 kg/cow/y + ↓ numerical productivity

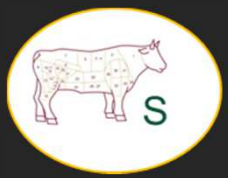
2. Use of dual purpose breed

68 % PH
20 % M
12 % N
→ 100 % N + No calves finished as veals

3. Beef herd intensification

< 40% y. bulls
< 5% steers
→ 75 % y. bulls or 70 % steers



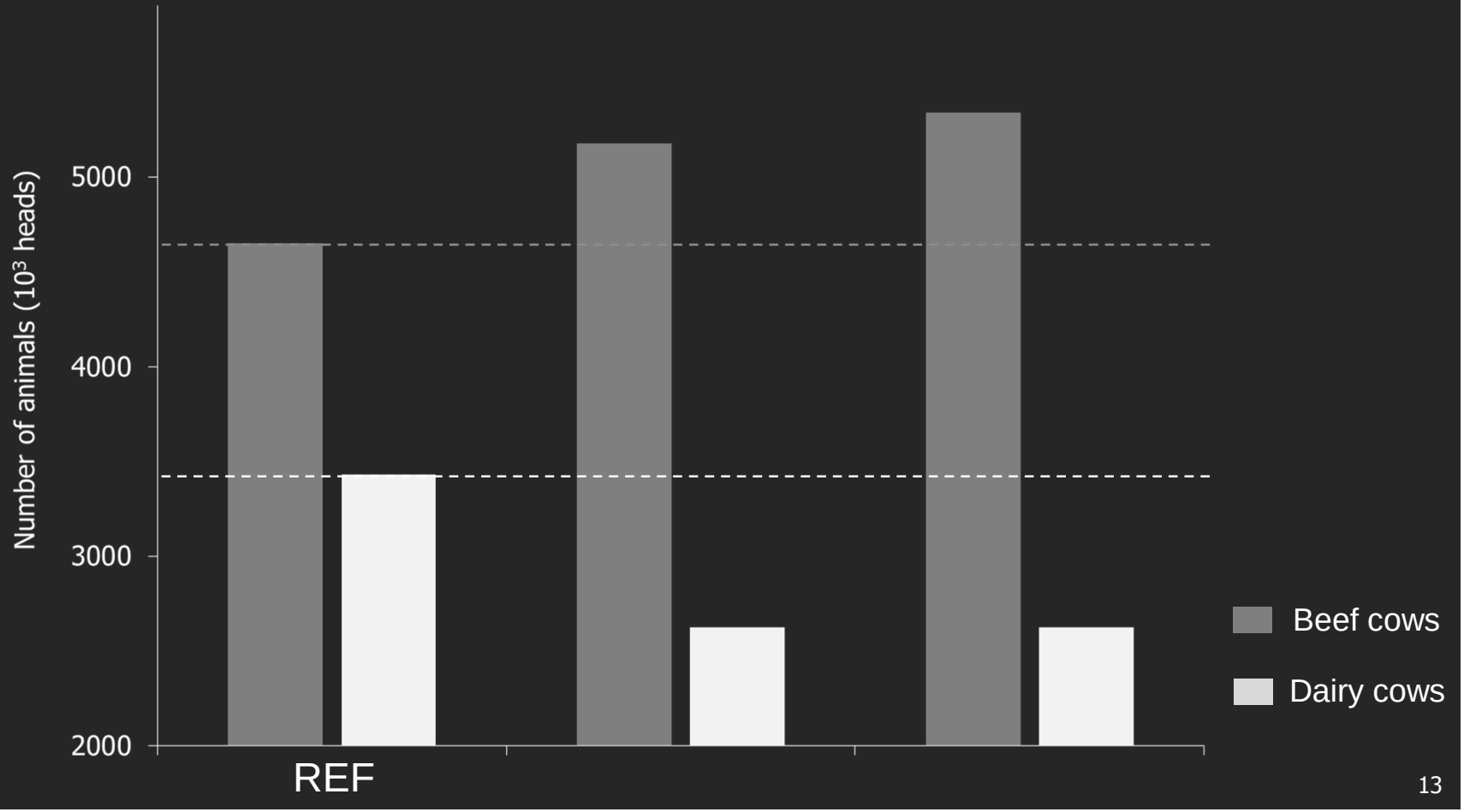


Results

- REF: reference scenario based on French situation in 2010
- For all scenarios
  - Optimal solution = a cattle population satisfying simulation constraints
  - Production constraints = milk (23.8 M T) + meat (1810000 Tec)

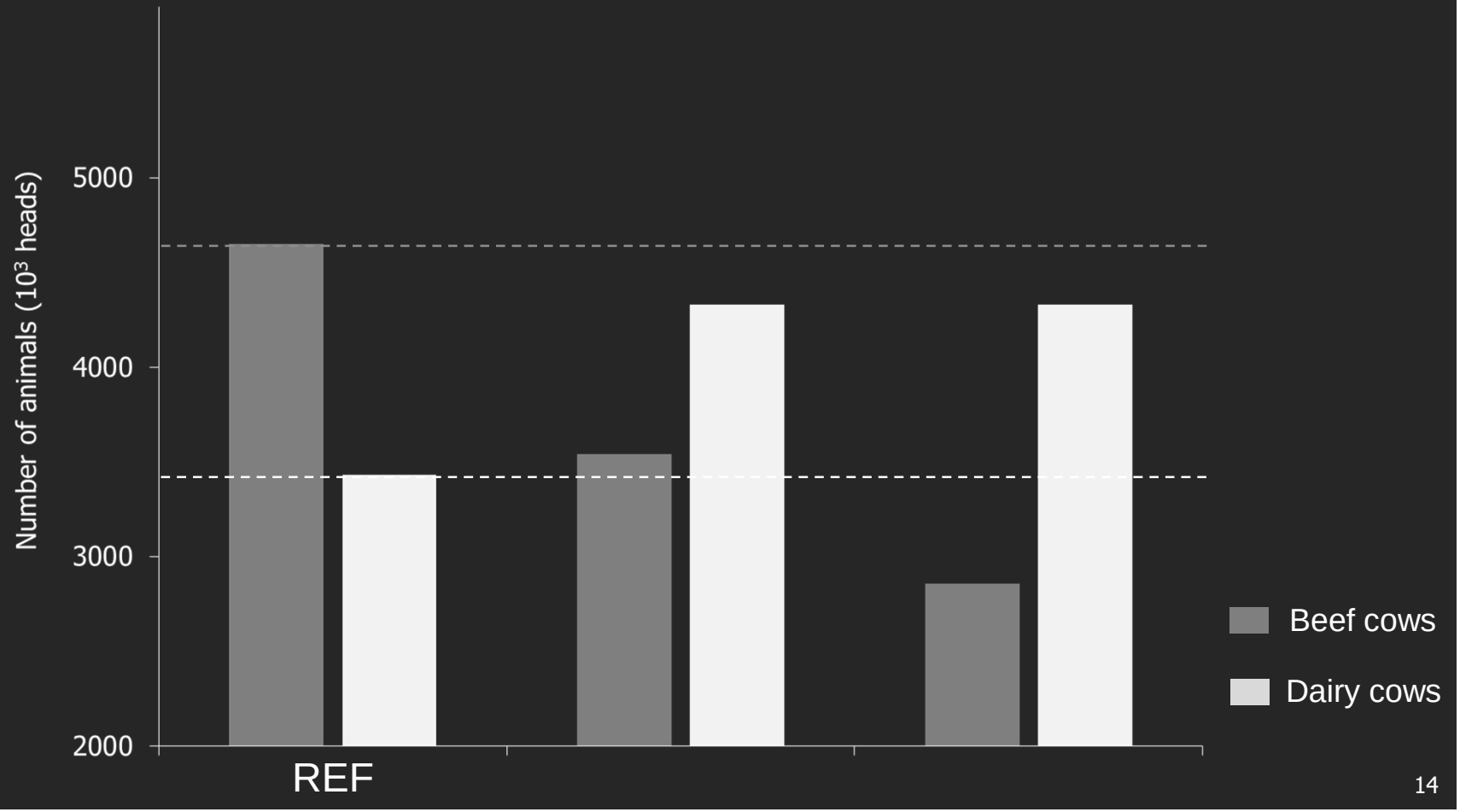
Cattle population : dairy herd intensification

Total population variation -2.1 % -0.9 %



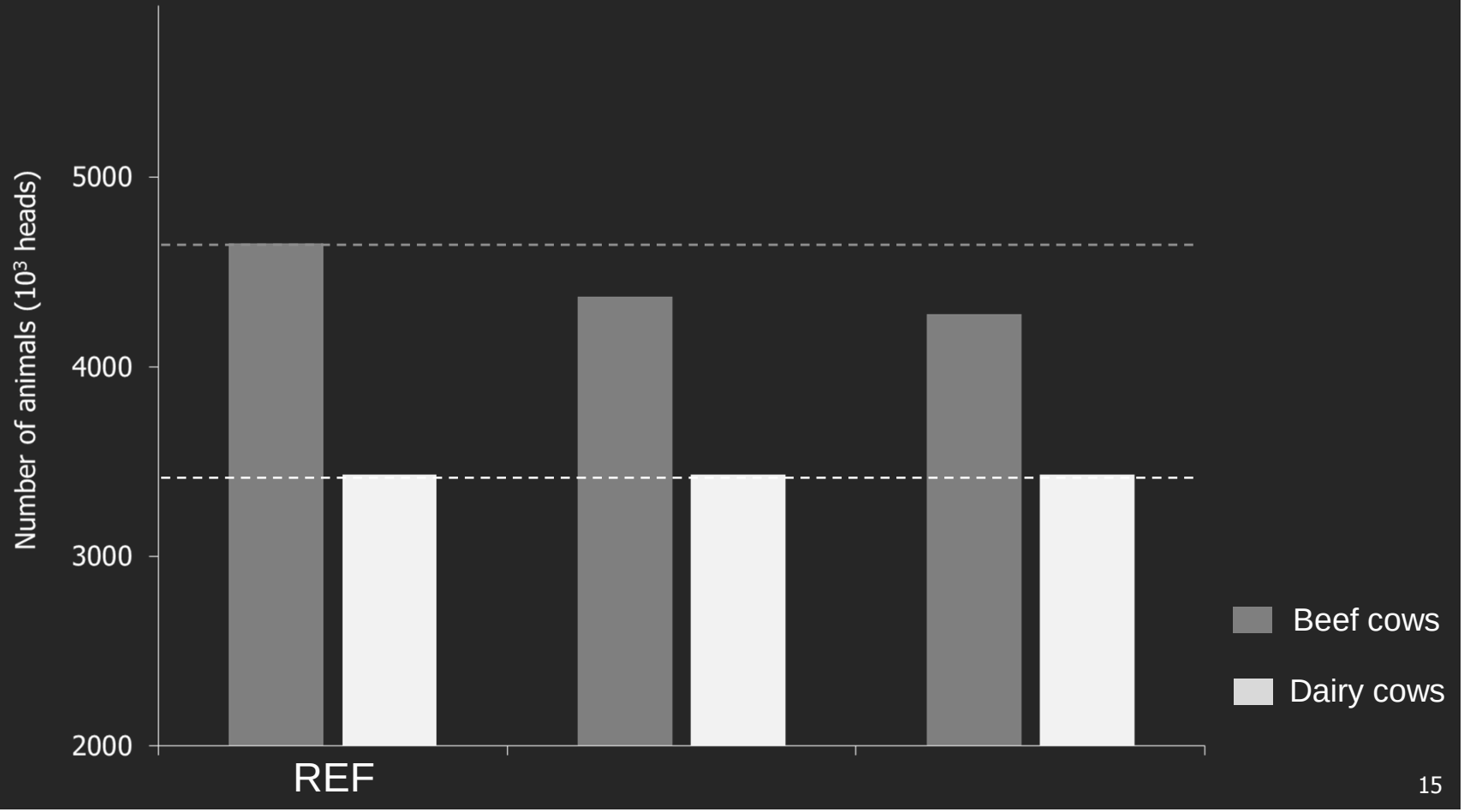
Cattle population : use of dual-purpose breed

Total population variation	1.2 %	-4.0 %



Cattle population : beef herd intensification

Total population variation	-5.5 %	0.9 %



GHG emissions: variation / reference scenario

Dairy intensification

- 2.0 %

- 0.6 %

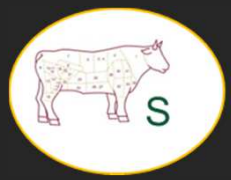
Dual purpose breed

+ 1.0 %

- 4.0%

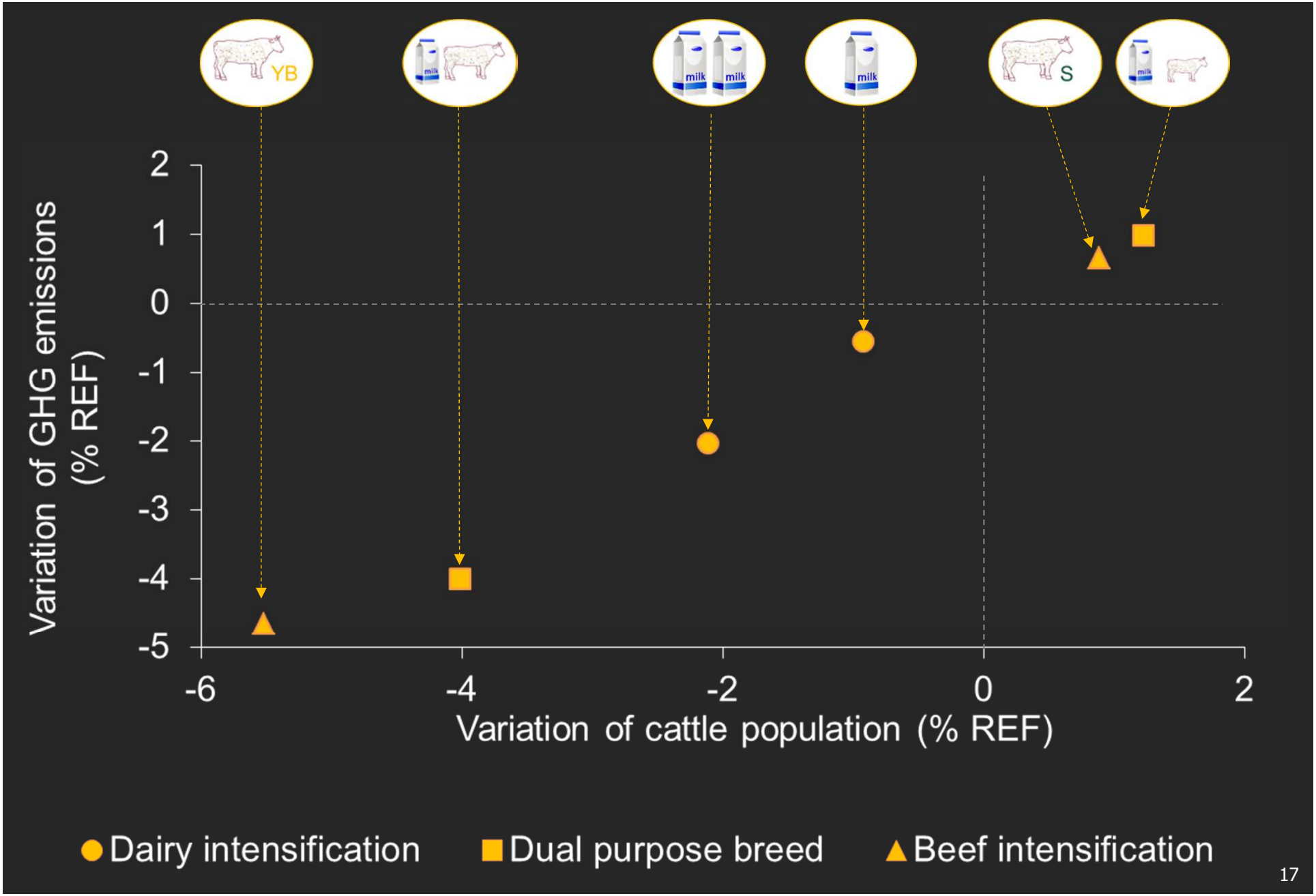
Beef intensification

- 4.7 %



+ 0.6 %

GHG emissions: relation with cattle population



Conclusion: insights from the national scale

Dairy intensification

Low effect on GHG → beef compensation

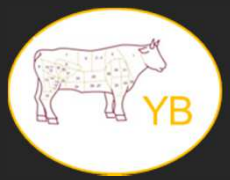
Need to consider link between milk and meat production

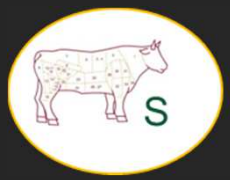
Dual purpose breed

Effect on GHG = f (type of finishing)

Finishing types can be an option to mitigate GHG

Beef intensification





Balance between finishing length and carcass weight

Conclusion: what's next ?

Dairy intensification

Low effect on GHG → beef compensation

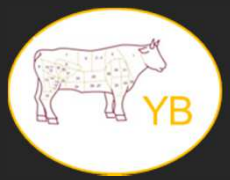
Impact of the national context → ratio meat/milk

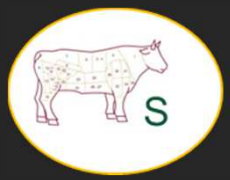
Dual purpose breed

Effect on GHG = *f* (type of finishing)

Including diet / finishing type → indirect GHG - territory

Beef intensification





Balance between finishing length and carcass weight

Take home message

Vertical complexity of LFS → scale change is important to evaluate environmental impacts

Desaggregative approach → conserving relevant system properties and declining options at lower levels

Local constraints when downscaling

Thanks for your attention

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