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# Evaluation of 16 European beef production systems contribution to food security

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# Beef production, an inefficient food production

Ruminant productions criticised for low conversion efficiency of natural resources into edible food

➤ Yet, they can use resources that cannot be consumed by human

Globally, when considering only feed that is also human edible :

- In average, in the world, 6 kg DM of plant resources needed to produce 1kg of proteins from cattle (Mottet et al. 2017)
- High variability between production systems

What is the contribution of beef production systems to food safety in Europe?

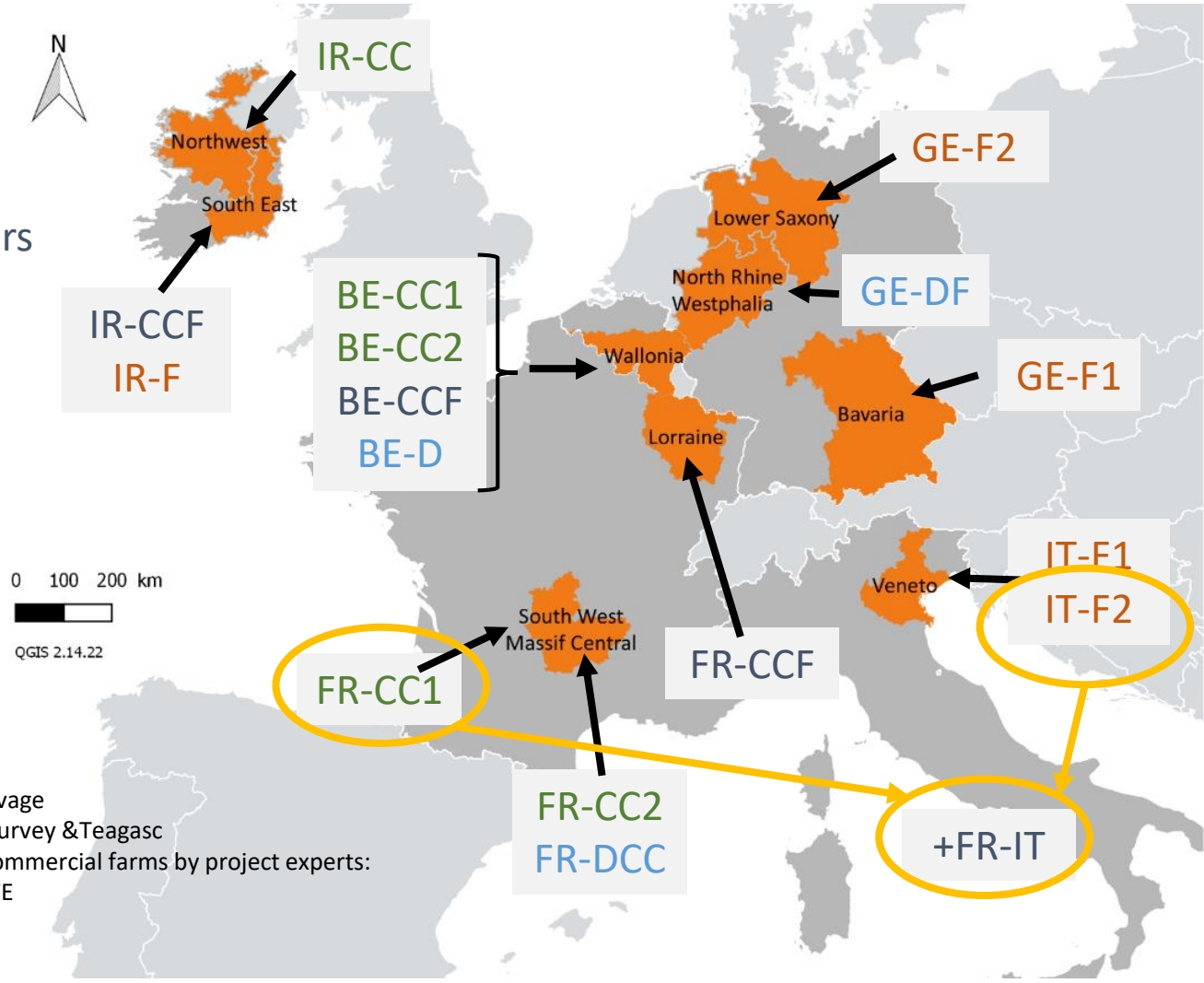
# 16 Beef production systems

Cow-Calf Systems

Fatteners

Cow-Calf + Fatteners

Dairy

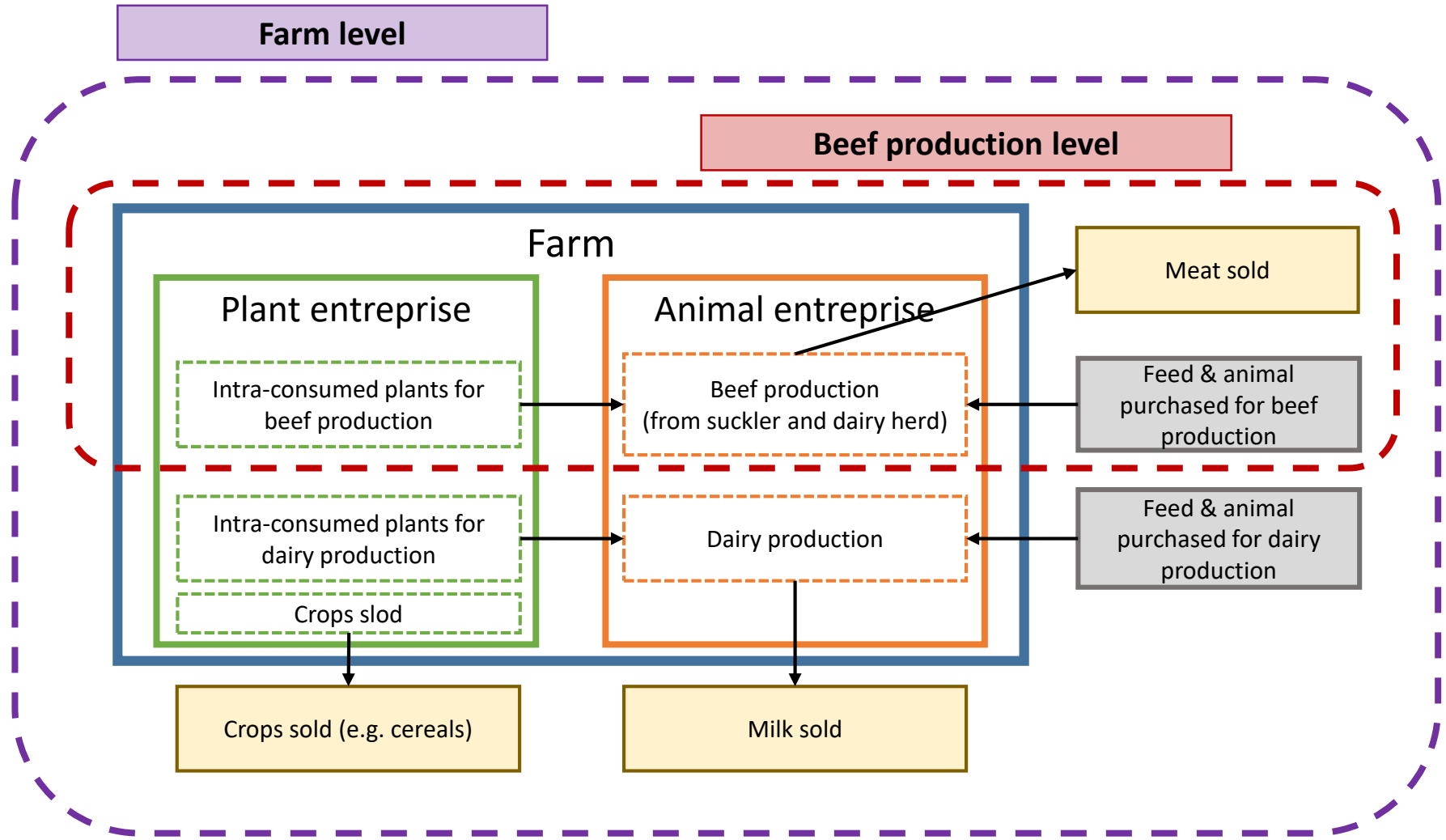


Systems based on:  
 France : Inosys-Réseaux d'Élevage  
 Ireland : Irish National Farm Survey & Teagasc  
 Other countries, selection of commercial farms by project experts:  
 Belgium: CRA-W – Eleveo-AWE  
 Italy: CREA  
 Germany: Uni Bonn

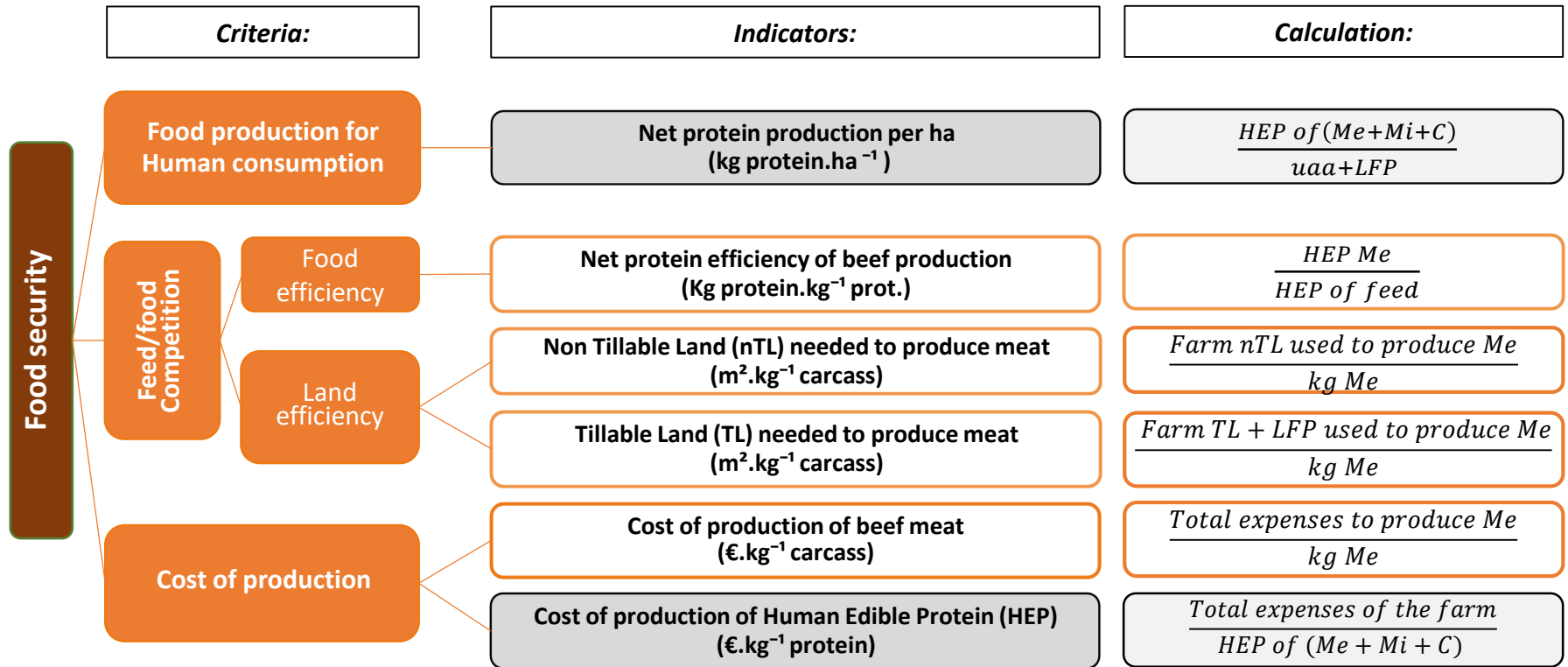
# Various production and feeding systems

- Part of animals finished on farm :
  - From 0 to 83% for Cow-calf systems
  - From 50 to 100% for Fatteners and Cow-calf + fattener systems
- For fatteners, variability in age and weigh of animal purchased
- Use of feed potentially in competition with human food:
  - Cow-calf: 0,2 to 4 kg DM / LU / Day
  - Fattener: 3,3 to 16,5 kg DM / LU / Day
  - Cow-calf + Fattener: 0,8 to 17,6 kg DM / LU / Day

# Food security can be studied at various levels



# Indicators used for food security analysis



**Farm Gate**

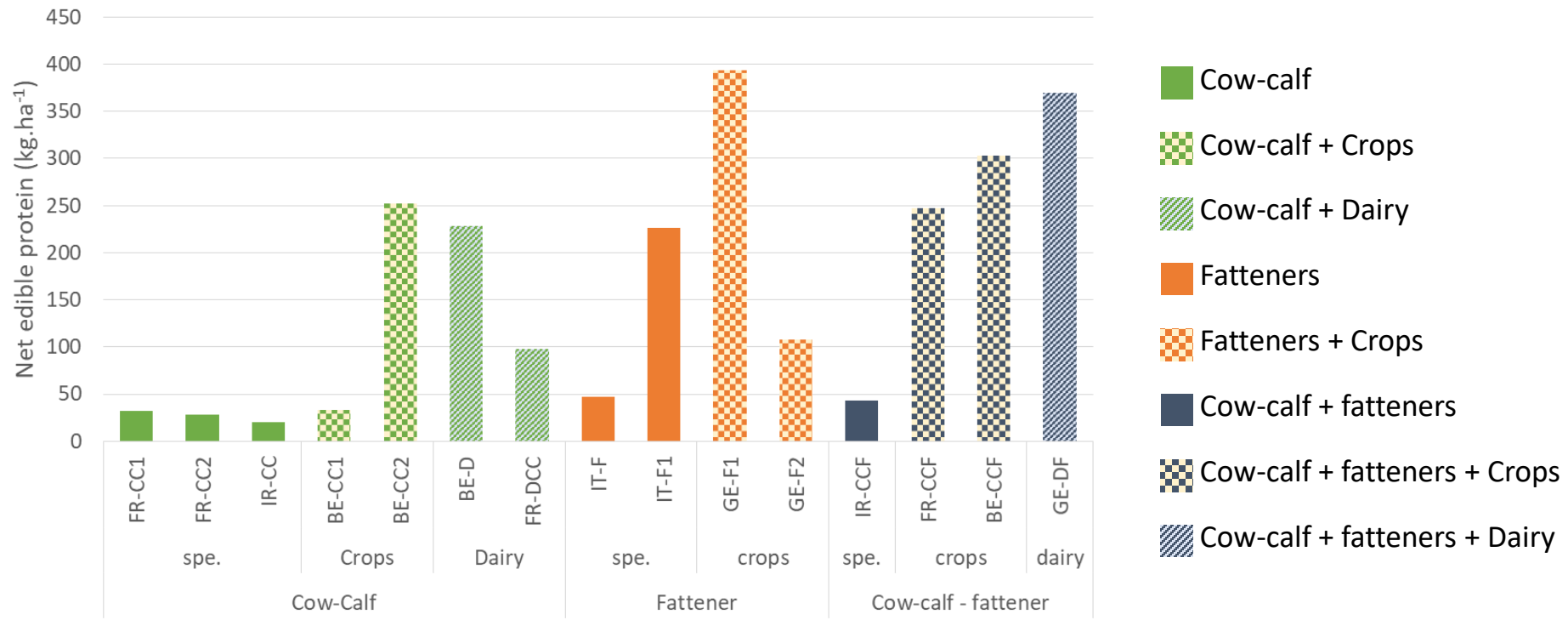
- HEP Human Edible Protein - Sources : Laisse et al 2018 ; INRA 2018
- UAA: area of the holding;

**Beef production**

- TL, nTL, LFP: resp. Tillable Land, non-Tillable Land and Land equivalent for the purchased feed - Sources : Ecoalim (Wilfart et al 2016) et Agribalise (Colomb et al 2015)
- Me, Mi, C: resp. Meat, Milk and Crops sold



# Net edible protein production per ha at farm scale

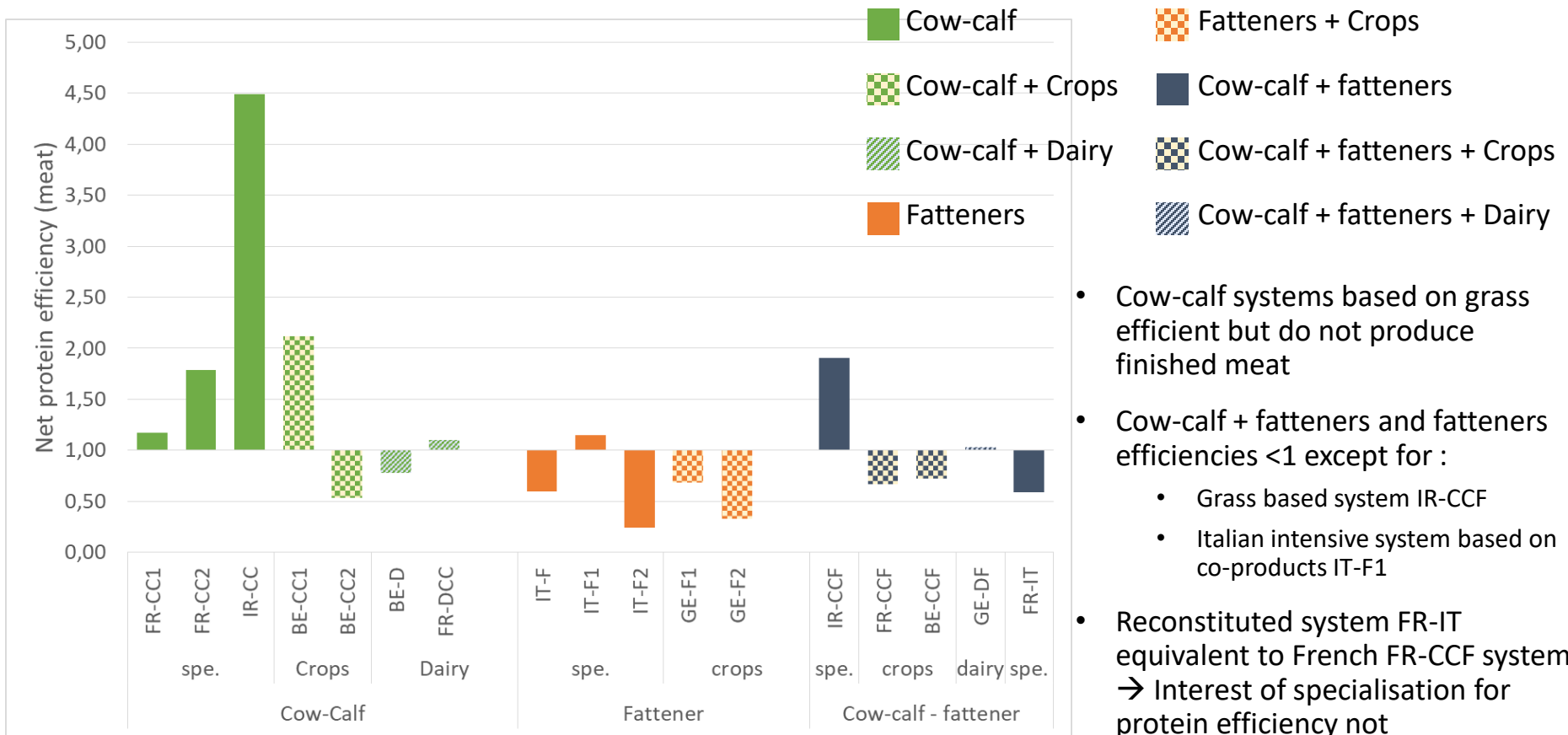


Diversified systems (cash crops or milk production) produce more protein per hectare because of the higher yield per hectare of these productions.

Extensive grass based cow-calf systems produce less protein per hectare.

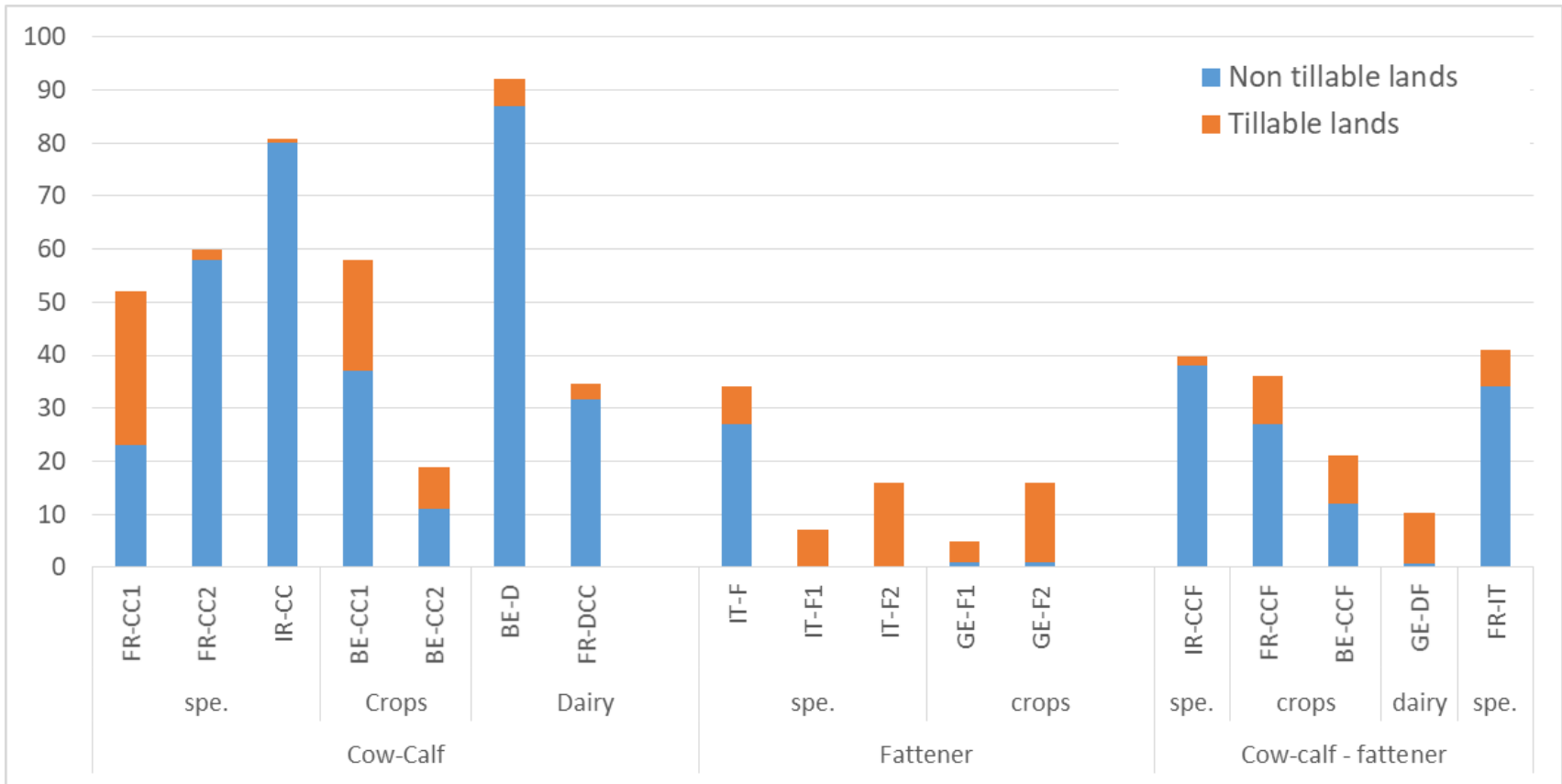


# Net protein efficiency at beef production level



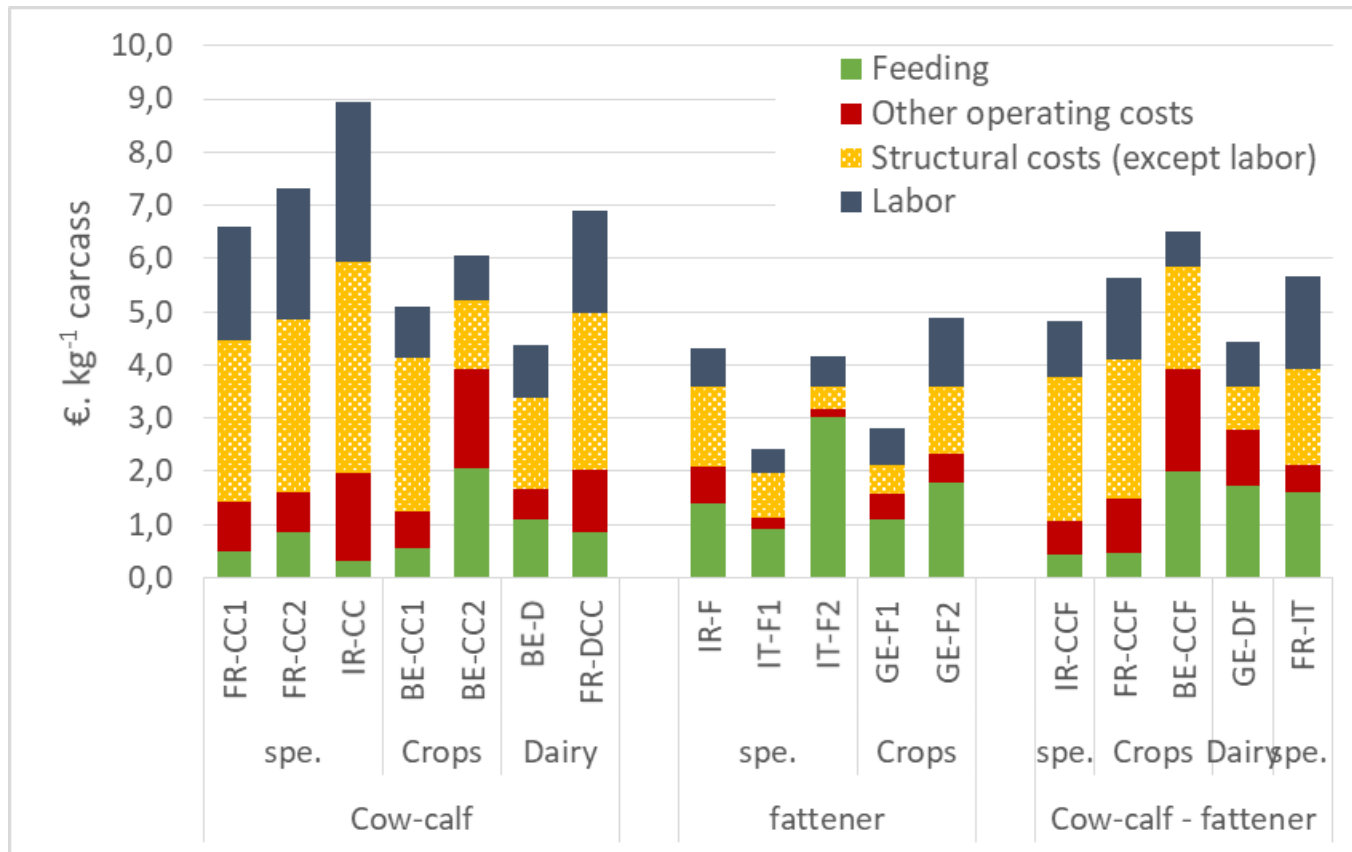
- Cow-calf systems based on grass efficient but do not produce finished meat
- Cow-calf + fatteners and fatteners efficiencies <1 except for :
  - Grass based system IR-CCF
  - Italian intensive system based on co-products IT-F1
- Reconstituted system FR-IT equivalent to French FR-CCF system → Interest of specialisation for protein efficiency not demonstrated

# Land use for beef production



On average, 78% of land used by cow-calf systems are non-tillable land vs. 93% of tillable lands for fatteners

# Cost of production of beef meat



- Impact of farm size on production costs (fixed costs and labor)
- Overall production cost is lower for Fatteners due to higher productivity per LU

# Conclusion

- Harmonized description and evaluation of a variability of systems at European level
  - But data collected from a sample of systems
- Cow-calf phase :
  - Net protein efficiency  $>1$  and low use of arable land
  - Low protein productivity per hectare and high cost per Kg. carcass eq.
- Fattening phase :
  - Lower production costs
  - Protein efficiency  $<1$ , except for fattening with grass and/or co-products.
- Variable results and the compromises to be found over the whole production cycle
- Need for further research on the impact of improvements on food security criteria on other dimensions of the sustainability

# Thanks for your attention



**ERA-NET SUSAN**

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Avec le soutien de la

