Environmental impact of diseases in dairy farming

4-7-2019, Pim Mostert

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Background

- BSc Animal Sciences
- MSc Animal Sciences
- PhD ‘The impact of diseases in dairy cows on greenhouse gas emissions and economic performance
- Wageningen Livestock Research ‘Climate change and circularity’

Content

- Why this study
- Methodology
- Results
- Discussion/questions

Introduction

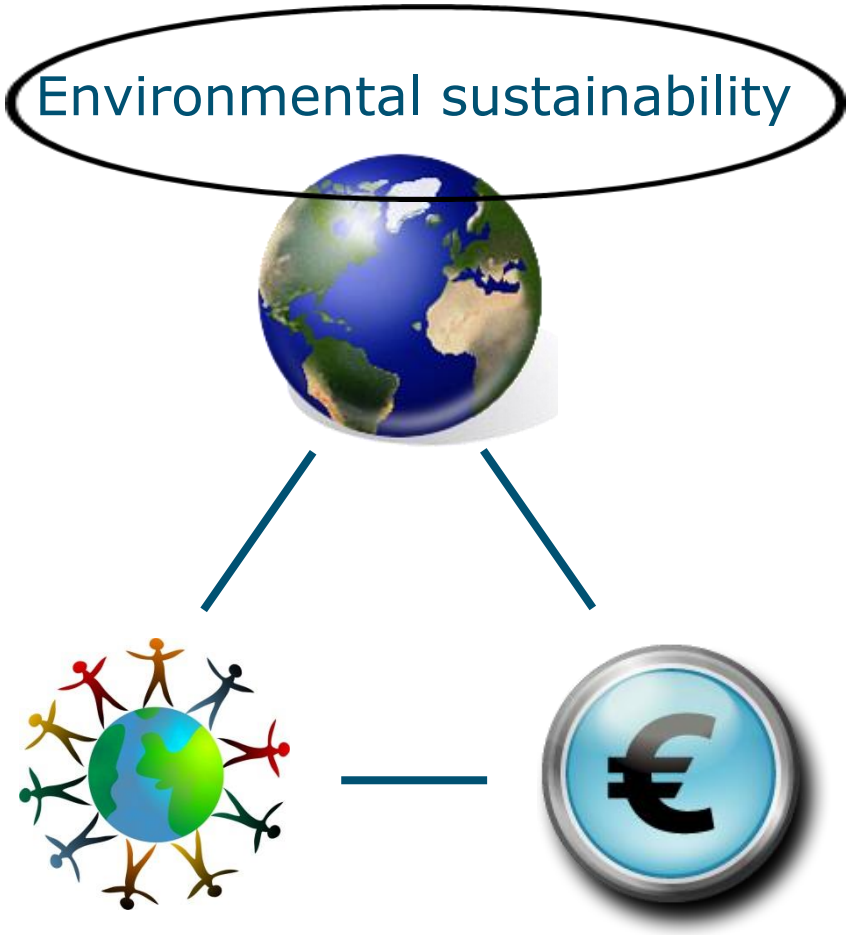
- 14.5% GHG emissions from livestock sector
- Demand for milk production will increase by 58% in 2050
- Diseases impact on milk production, reproduction, and culling
- Inefficient production impact on greenhouse gas (GHG) emissions

Dairy production

Diseases: major cause of inefficiency

Disease	Incidence (%)
Foot lesions	± 30
Clinical mastitis	± 27
Subclinical ketosis	± 25
Metritis	± 10
Displaced abomasum	± 4

Impact diseases on sustainability



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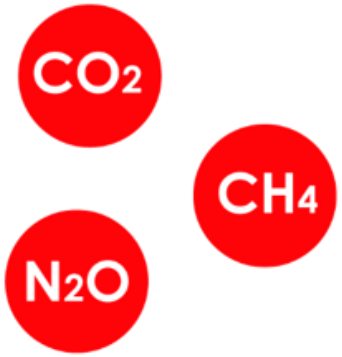
a. Raboisson et al. 2015. b. Cha et al. 2010. c. Mostert et al. 2017. d. McArt et al. 2015

Aim

Quantify the impact of diseases in dairy cows on greenhouse gas emissions



Methodology

- Simulate diseases and consequences
  - Stochastic, dynamic, simulation model
- Impact on GHG emissions
  - Life Cycle Assessment for Dutch situation
- Developed in R (statistical computing program)

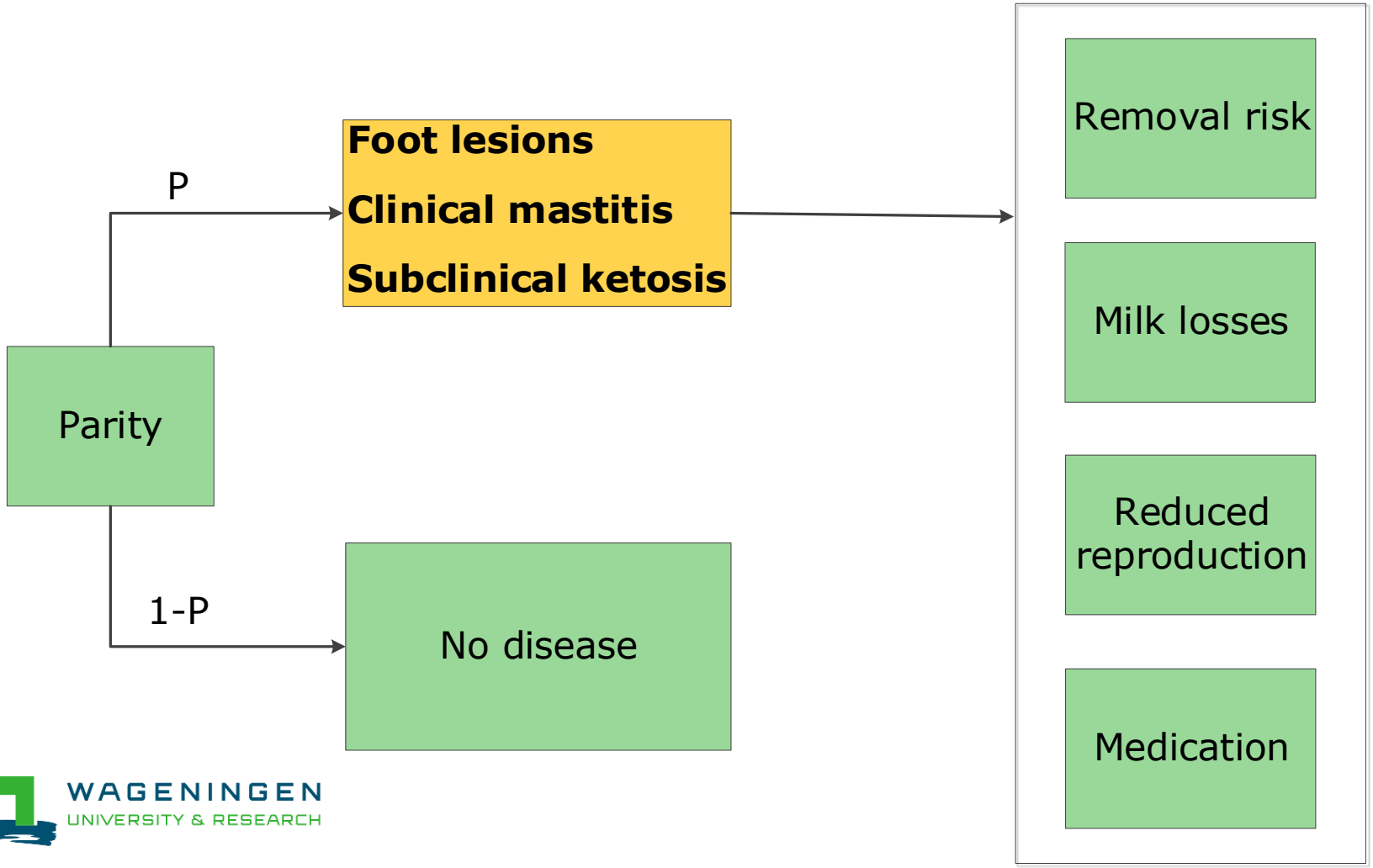
Modelling

- Using simulations is generally cheaper, safer and sometimes more ethical than conducting real-world experiments
- Simulations can often be even more realistic than traditional experiments
- Simulations can often be conducted faster than real time

NSF, 2006

Methods: simulating diseases

Dynamic, stochastic, simulation model (R)



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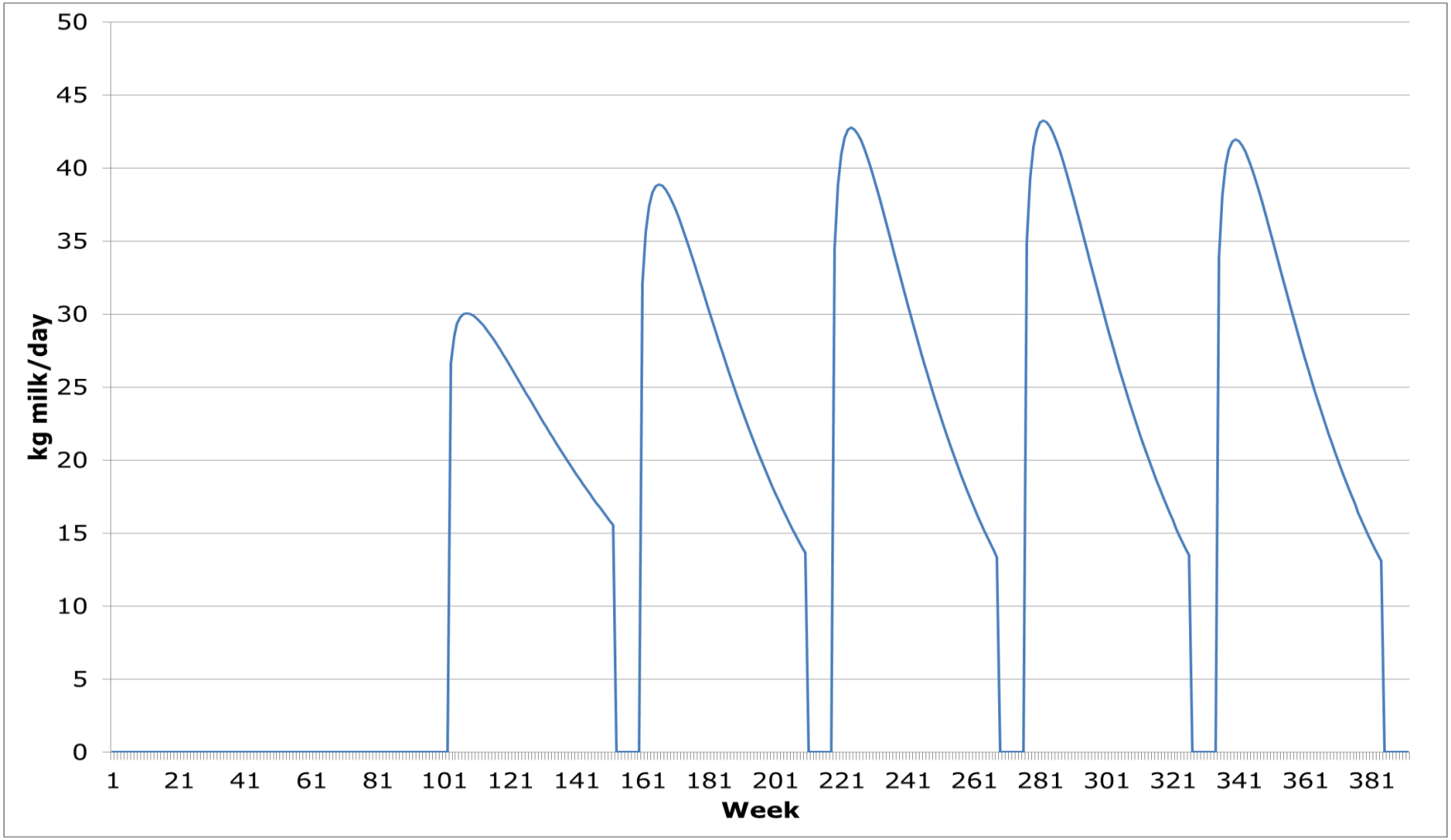
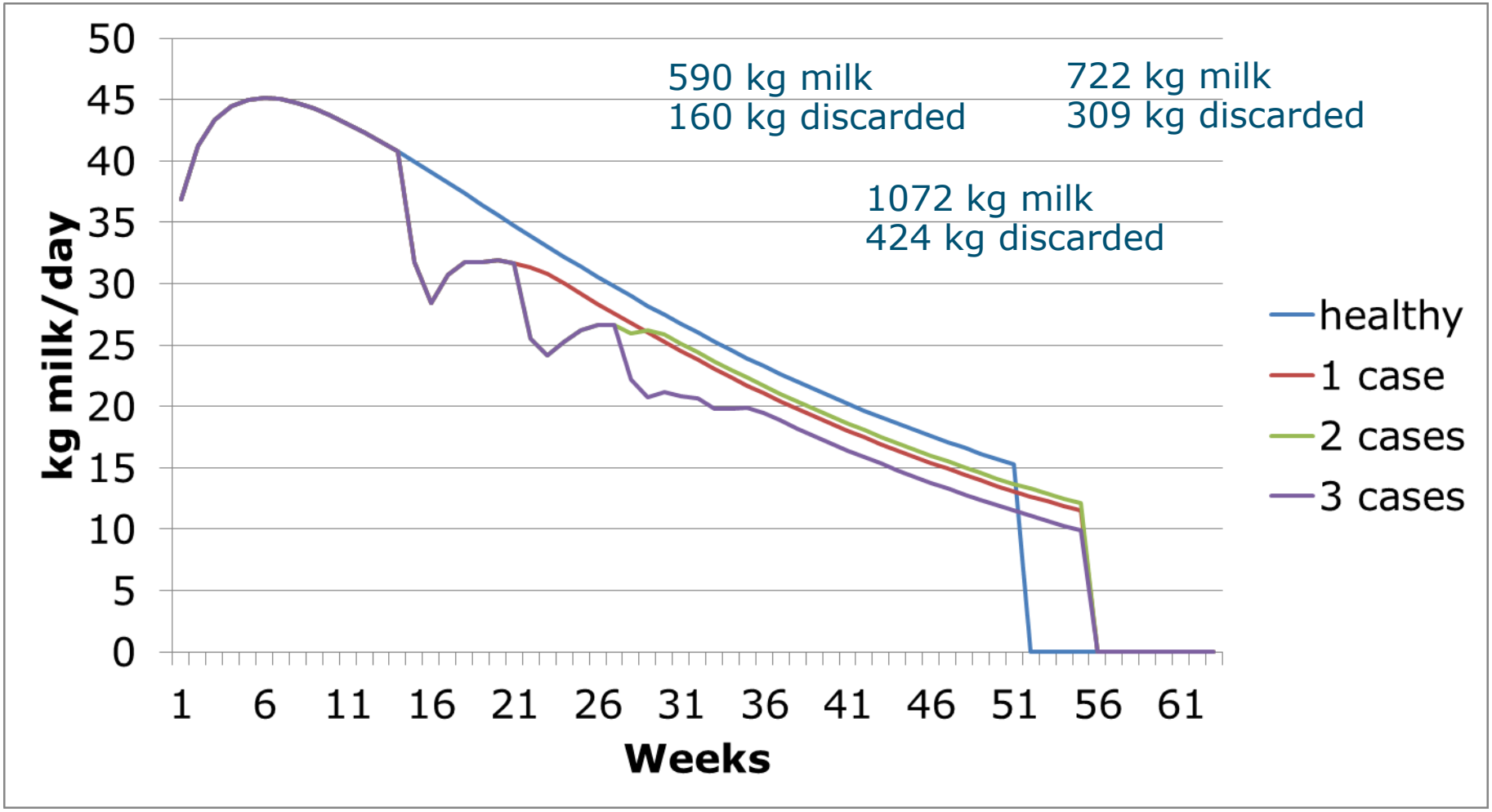
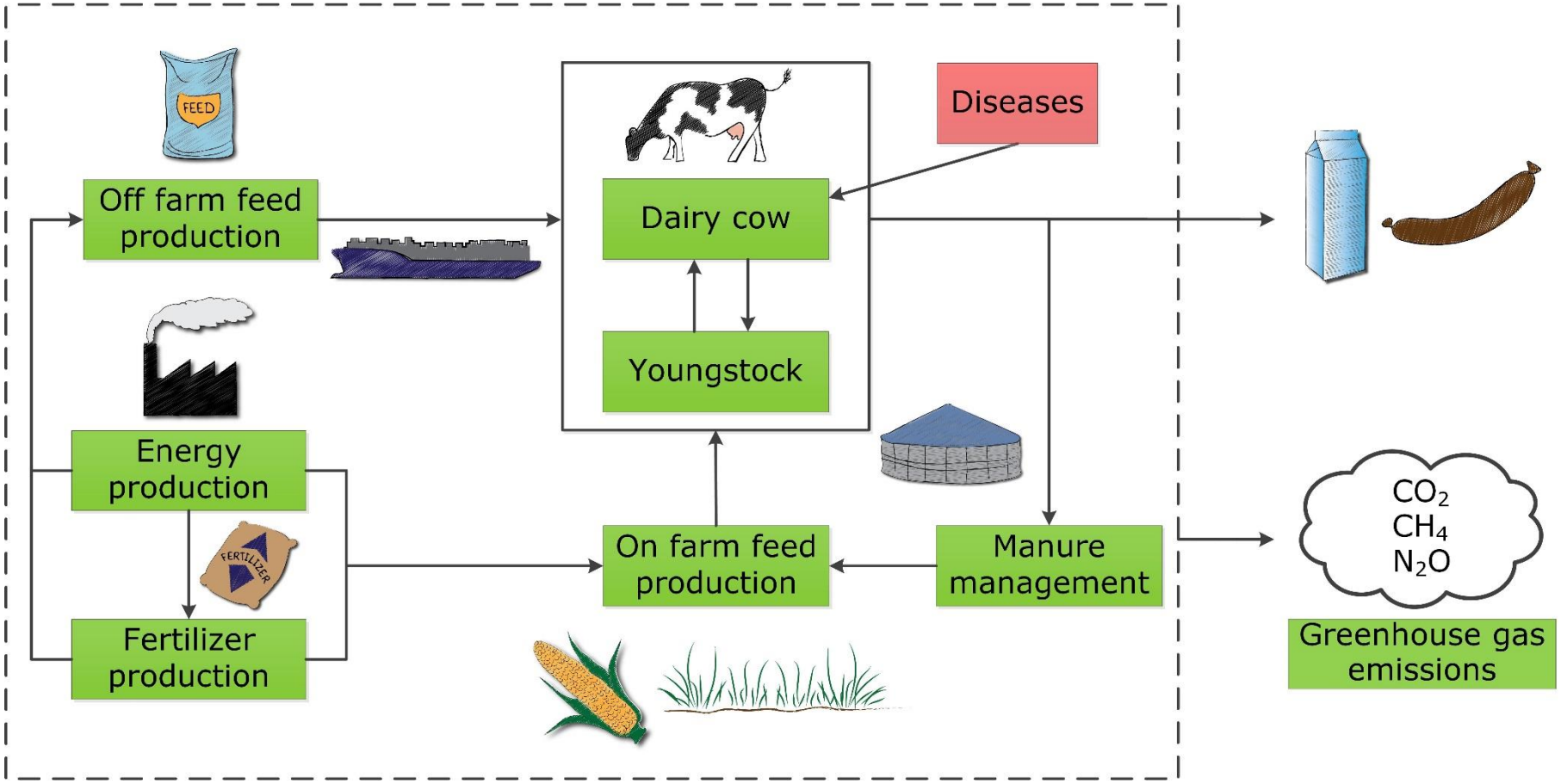
Life of a dairy cow



Milk loss clinical mastitis

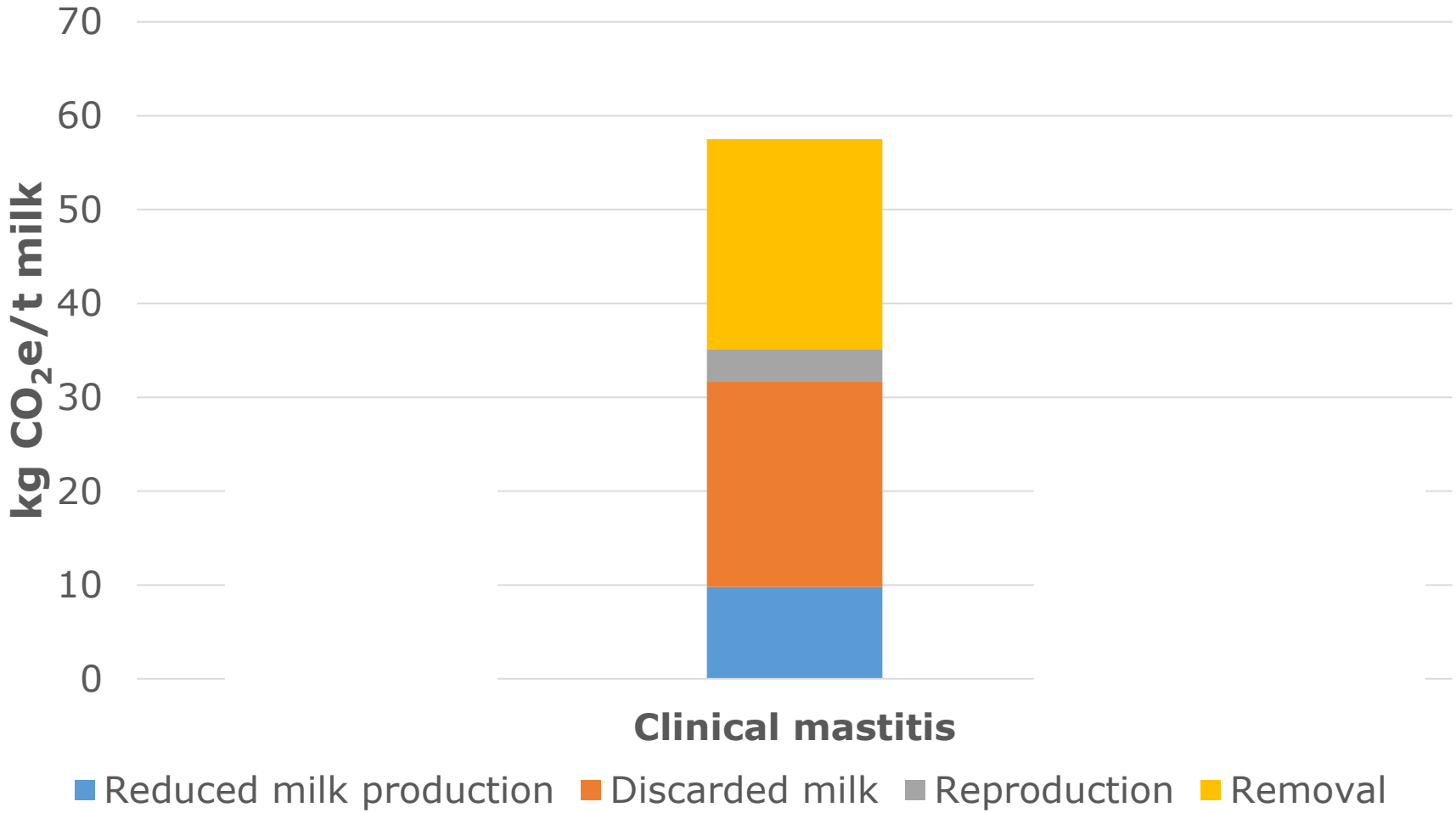


Methods: Estimation of GHG emissions



Illustrations by Birgit Boogaard (www.kuwona.nl)

Results: Kg CO_2e/t milk per cow



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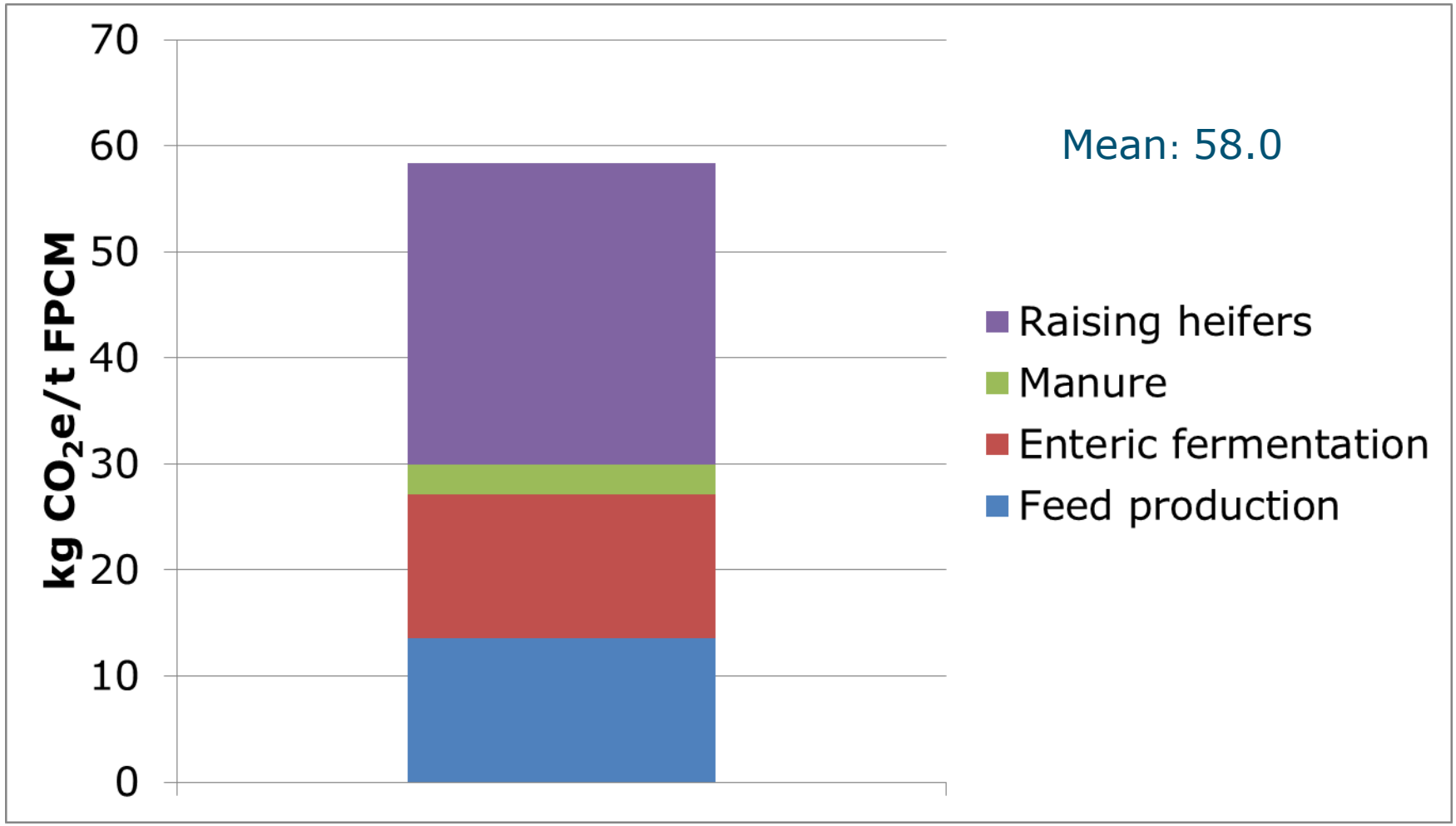
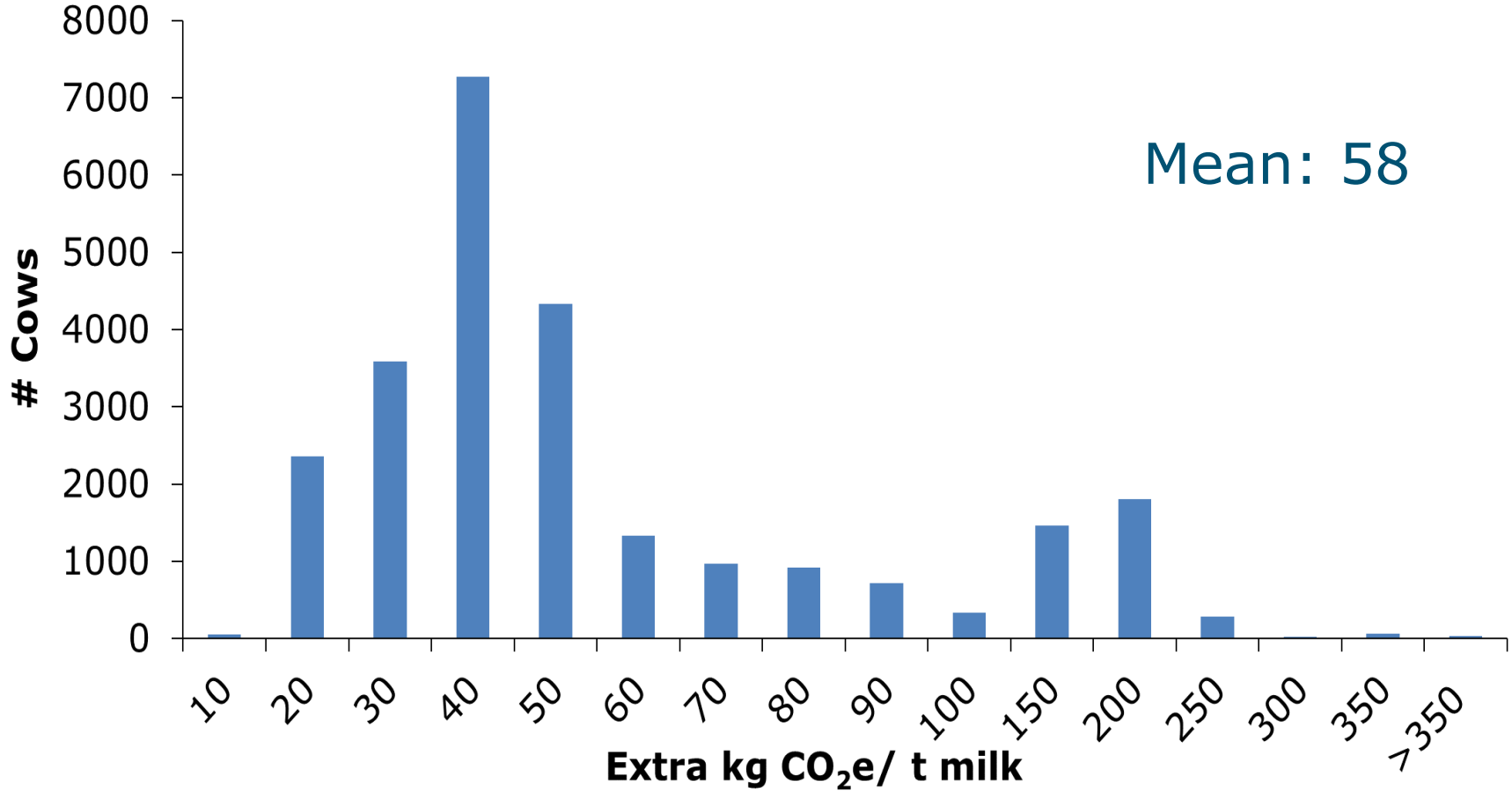
Mostert et al. 2018

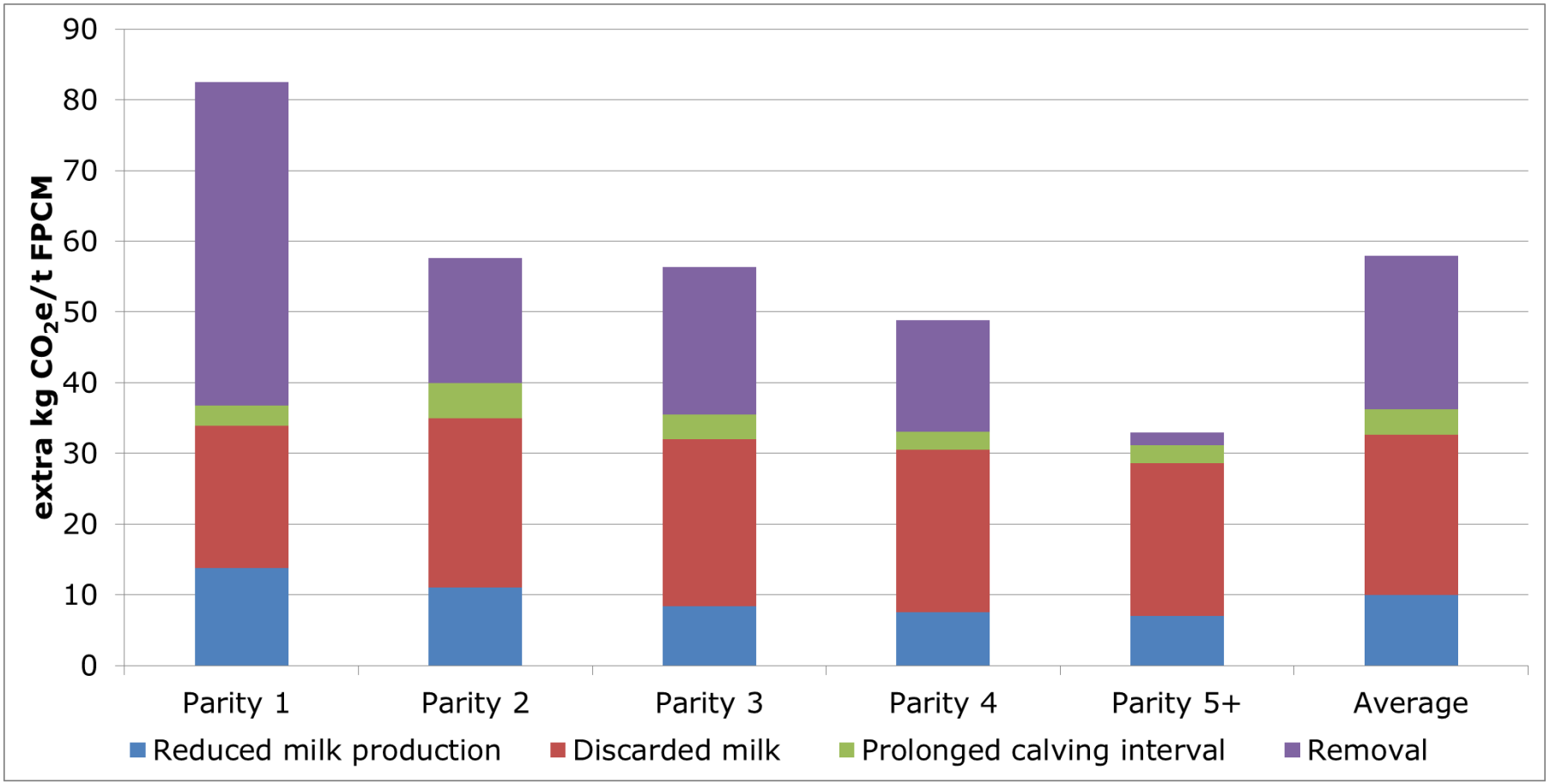
Average extra GHG emissions CM



Extra kg CO_2e/t milk per case CM



Impact CM per parity on GHG emissions



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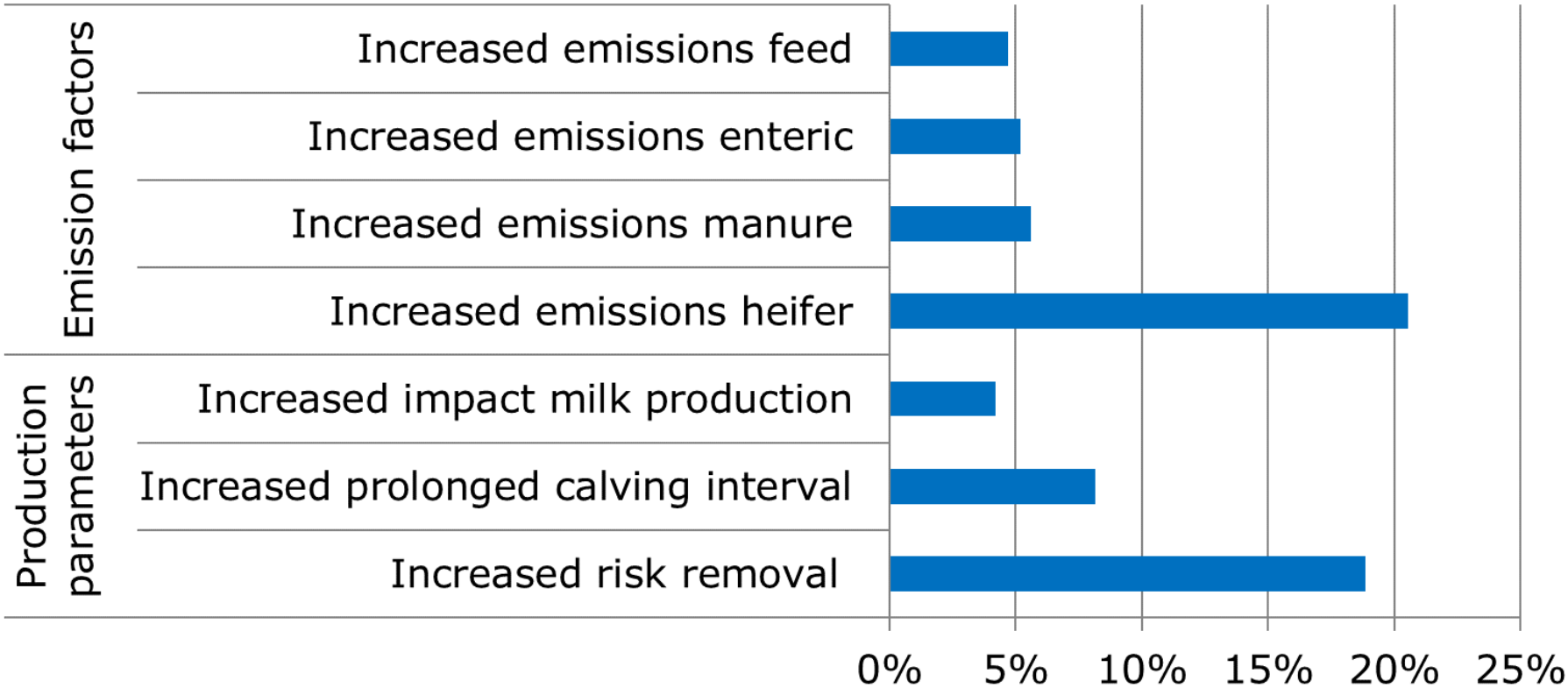
Sensitivity analyses



Examples other mitigation options

	Emissions (kg CO_2e/t milk)	Income (€/cow/year)
Clinical mastitis (case/cow)	-58[g]	€ 333[a]
Subclinical ketosis (case/cow)[b,c]	-21	€ 130
Foot lesions (case/cow)	-14[f]	€ 80

a. Raboisson et al. (2015); b,c,f. Mostert et al. (2018abc)
d,e. Van Middelaar et al. (2014ab) g. Mostert et al. (2019)

Take home message

- Reducing diseases can reduce GHG emissions
- Removal and discarded milk high impact
- Estimate per situation or per farm

Thank you for listening

Questions?

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