Impact of subclinical ketosis and related diseases on greenhouse gases of dairy production

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Introduction

- Subclinical ketosis (SCK) after calving
- SCK increases risk on other diseases
- Impact on milk production, reproduction and culling
- Inefficient production impact on environment

See e.g. Chapinal et al. 2012, Duffield et al. 2009, McArt et al. 2012, Ospina et al. 2010, Roberts et al. 2012

Aim of this study

Assess the impact of subclinical ketosis and related diseases in dairy cows on greenhouse gases per kg milk

Material and Methods

- Development of stochastic, dynamic, simulation model
- Integrated environmental analyses (GHGs)

Dynamics of model

Parity 1-5+

P

Subclinical ketosis

P

No subclinical ketosis

P

P

- Clinical ketosis
- Displaced abomasum
- Metritis
- Mastitis*
- Lameness*

Attributable risk
Additional risk of other diseases included

* Weak relation with SCK

Calculation of greenhouse gases (GHGs)

Production input
- Milk production

Production input
- Milk production
- Calving interval
- Culling risk

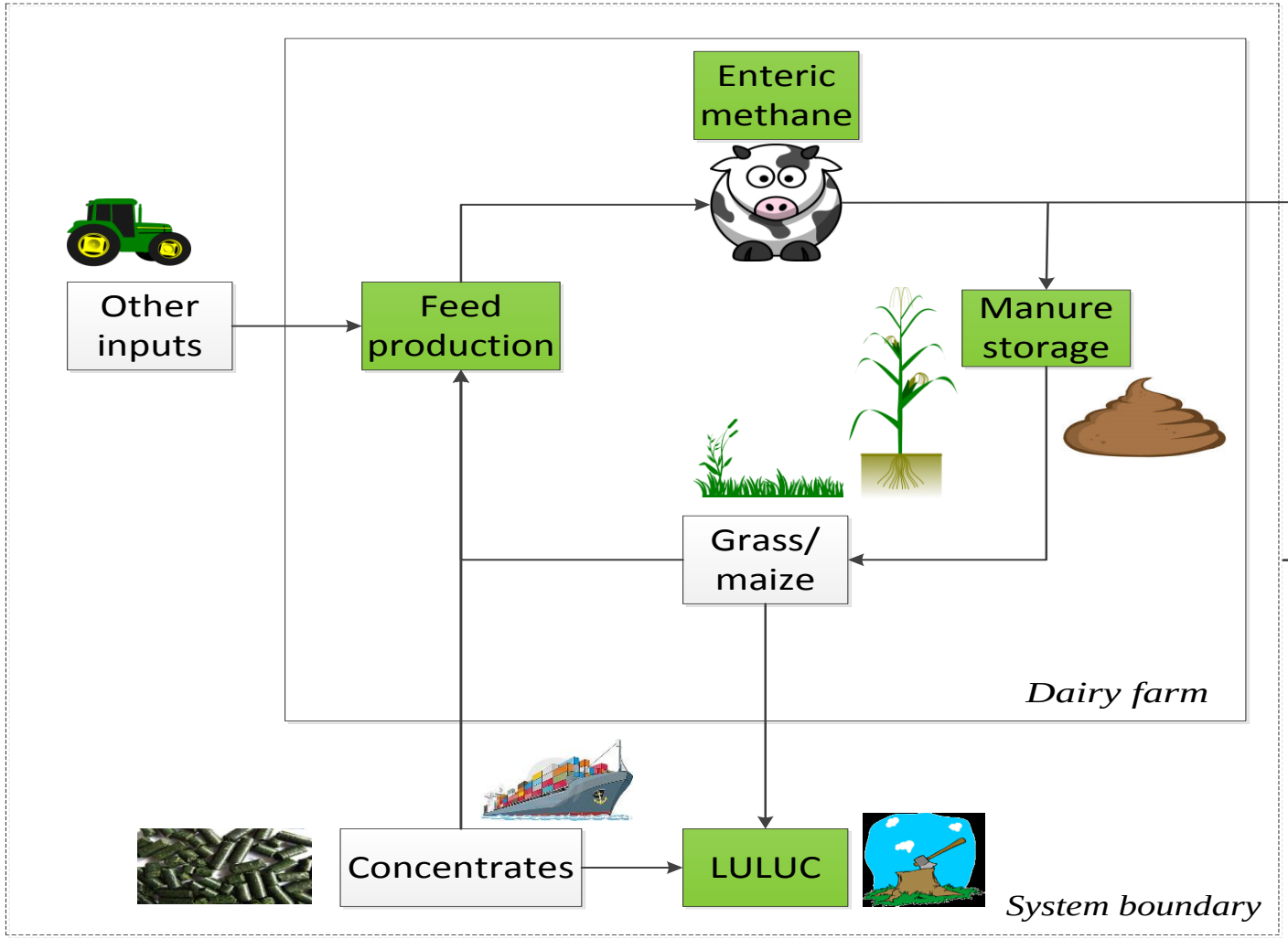
Greenhouse gases/FPCM
- Feed production, land use change
- Enteric methane
- Manure storage

Diseases

Feed intake
- Diet composition
- Energy requirement

See e.g. Amory et al. 2008, Duffield et al. 2009, Gröhn et al. 2003, McArt et al. 2012, Raboisson et al. 2014, Raizman et al. 2002, Rajala & Gröhn 1998, Steeneveld et al. 2008.

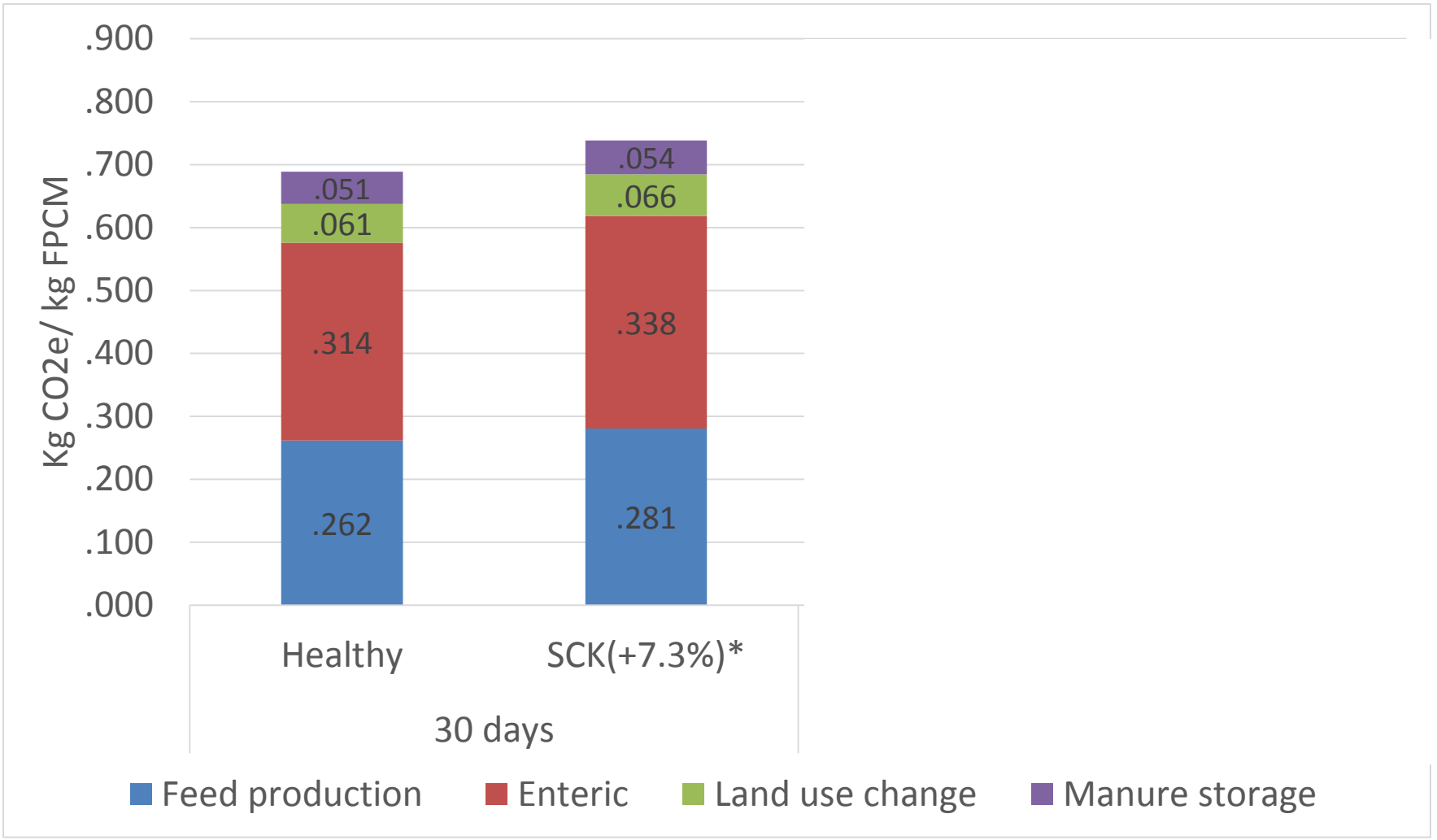
GHGs/kg FPCM


Enteric methane
Other inputs
Feed production
Manure storage
Grass/ maize
Concentrates
LULUC
Dairy farm
System boundary
MILK
Kg CO_2e/kg FPCM
CO_2
CH_4
N_2O

Input model

Disease	Incidence first 30 days (%)	Odds Ratio SCK
SCK	29.6	
Clinical ketosis	2.0	
Displaced abomasum	3.7	3.4
Metritis	9.3	1.5
Mastitis	6.3	1.9
Lameness	3.0	1.7

Healthy cow & cow with SCK preliminary results



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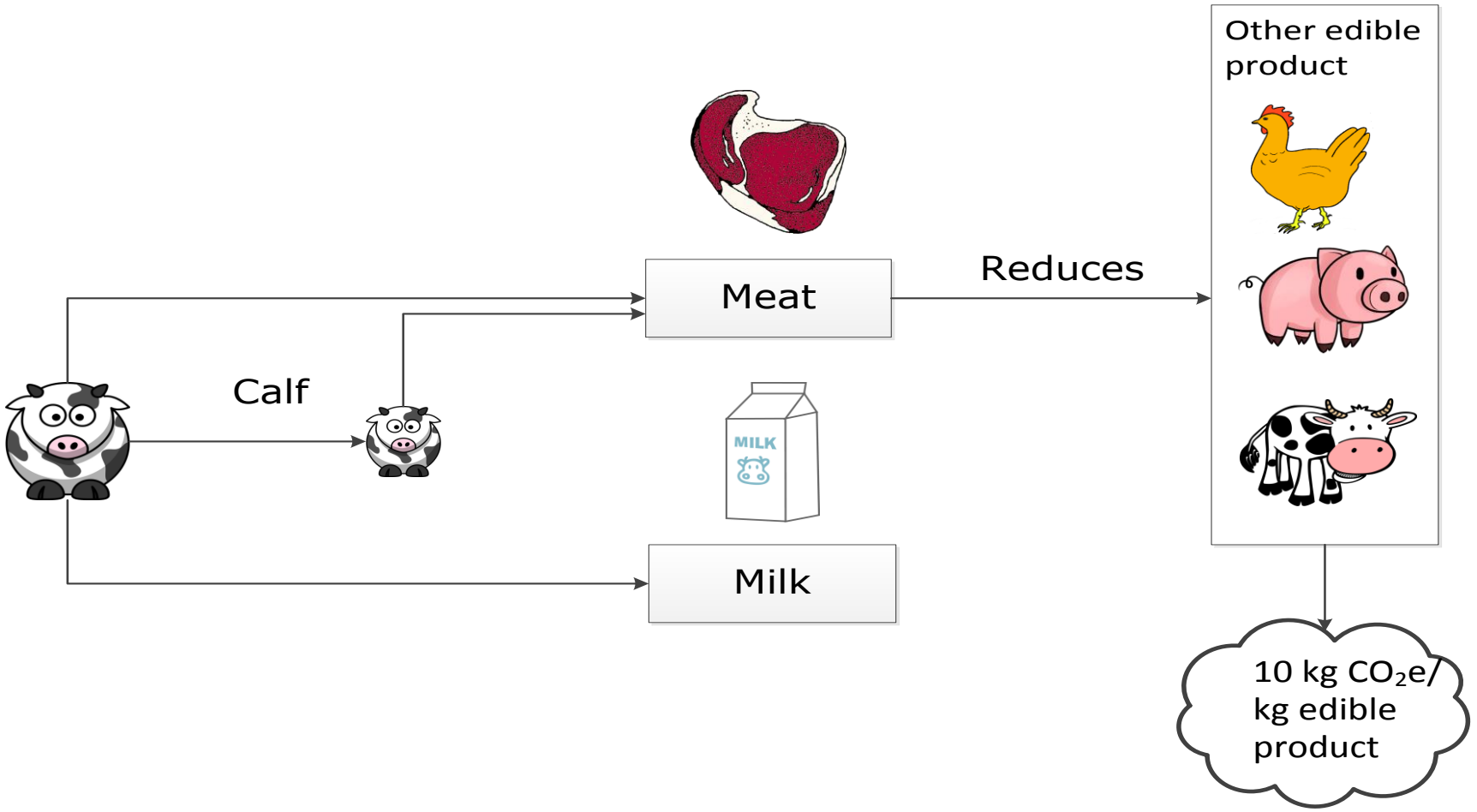
* P <0.001

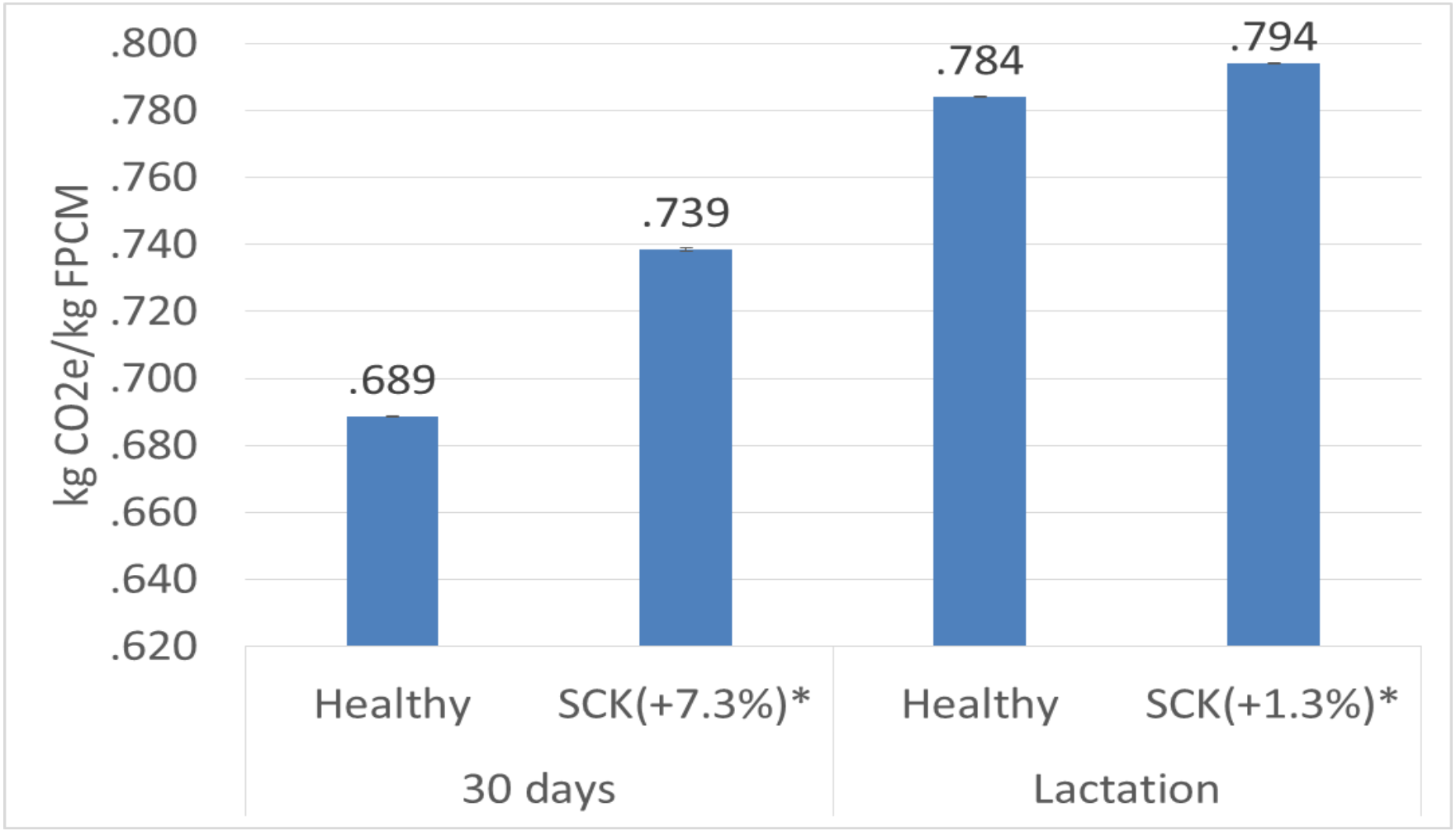
System expansion for meat production



Van Middelaar et al, 2014;
StatLink, 2015

Healthy cow & cow with SCK

preliminary results



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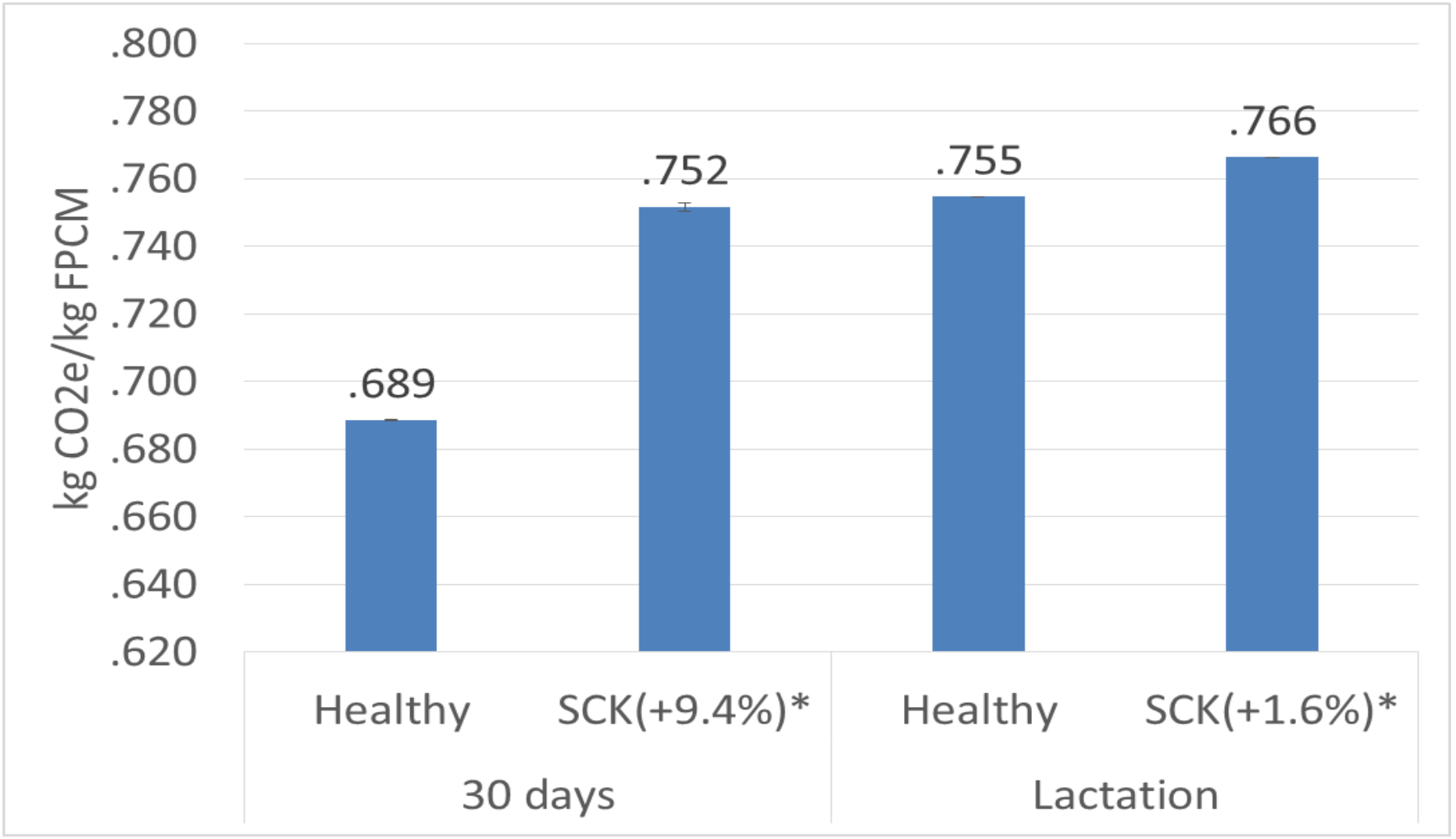
Healthy cow & cow with SCK corrected for meat products

preliminary results



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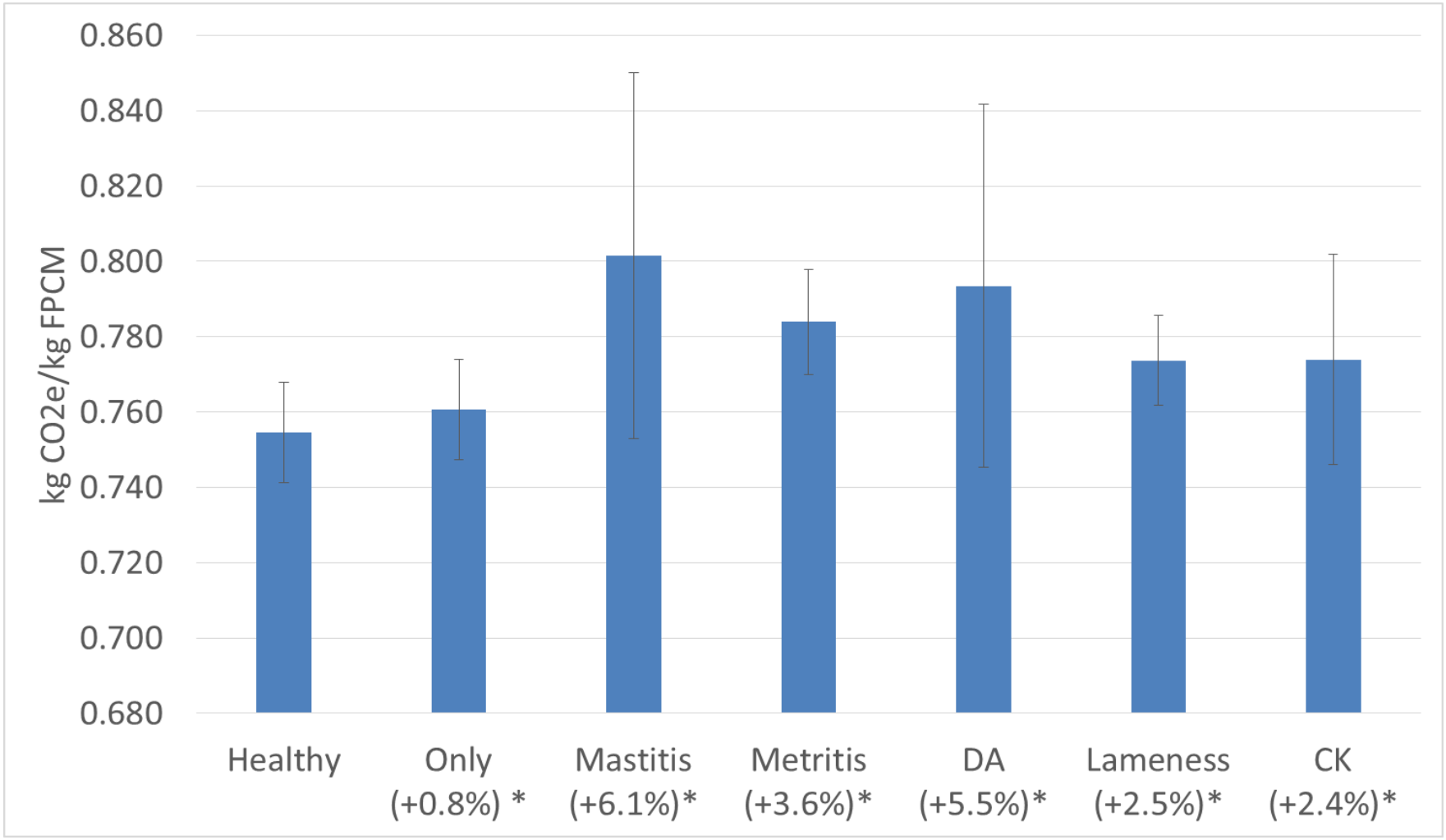
Impact of SCK+another disease (SD) preliminary results



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* P <0.001

Conclusion

- Impact of SCK of 1.6% whole lactation or 9.4% first 30 days with current input
- Difficult to have an average result of SCK
- Reducing diseases will reduce the environmental impact of dairy production

Questions?

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