The effect of increased production efficiency in beef production

I. Cow population size

II. **Greenhouse gas emissions**

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Introduction

- A simulation study
  - production strategies to meet domestic demand for milk and beef towards 2030

- Background:

✓Domestic milk quotas

✓Import restrictions on milk and beef

✓High annual increase in milk yield/dairy cow from ΔG/E-improvements

⇒ decrease in dairy beef production

✓To ensure domestic beef production to meet market demands:

⇒ increase in suckler beef production

⇒ undesirable due to increased greenhouse gas (GHG) emissions

- Key role: Annual milk yield/dairy cow

Project:
"Strategies in dairy and beef production for meeting the demand of food based on a climate- and cost efficient use of domestic feeds" (2013-2015).

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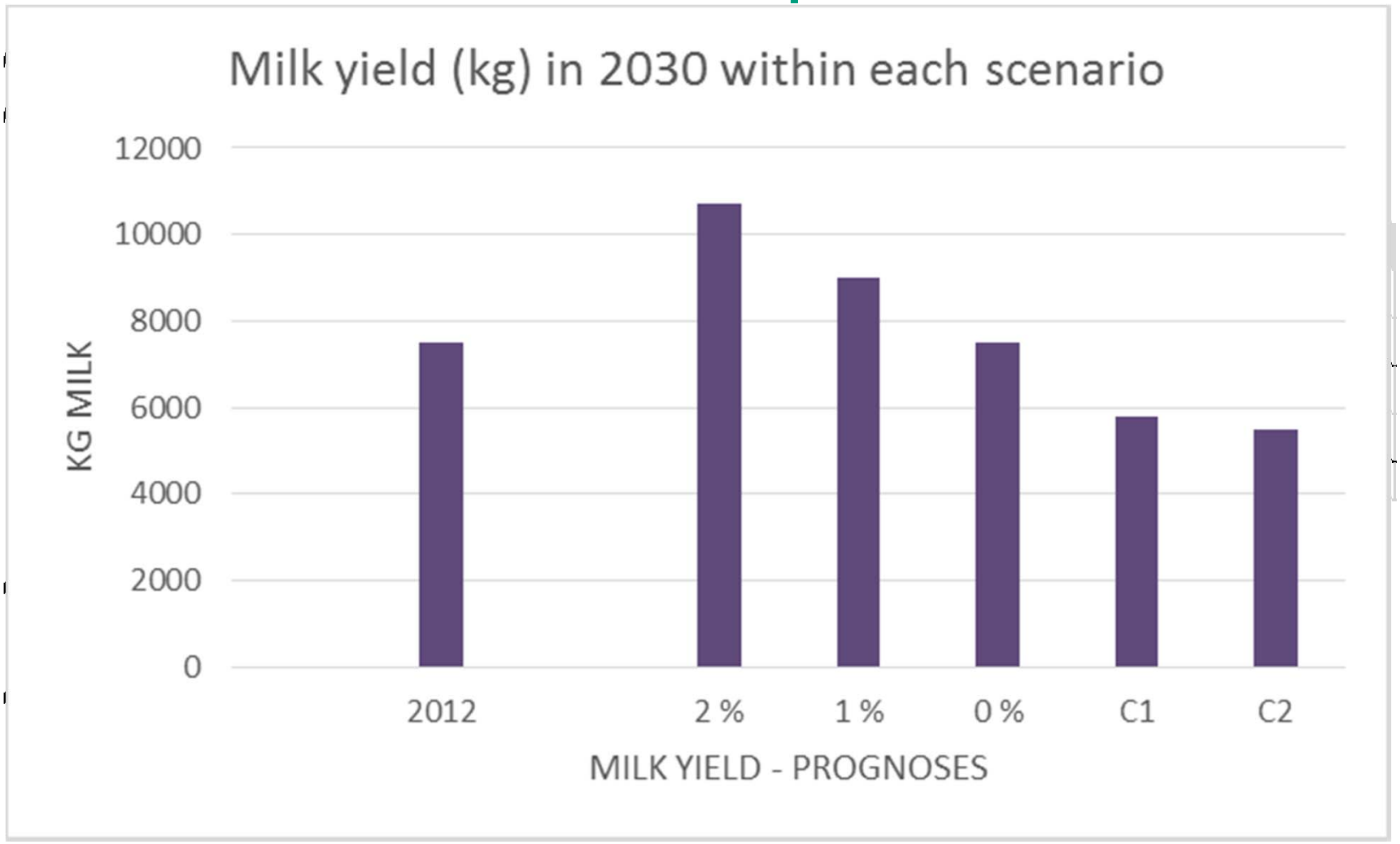
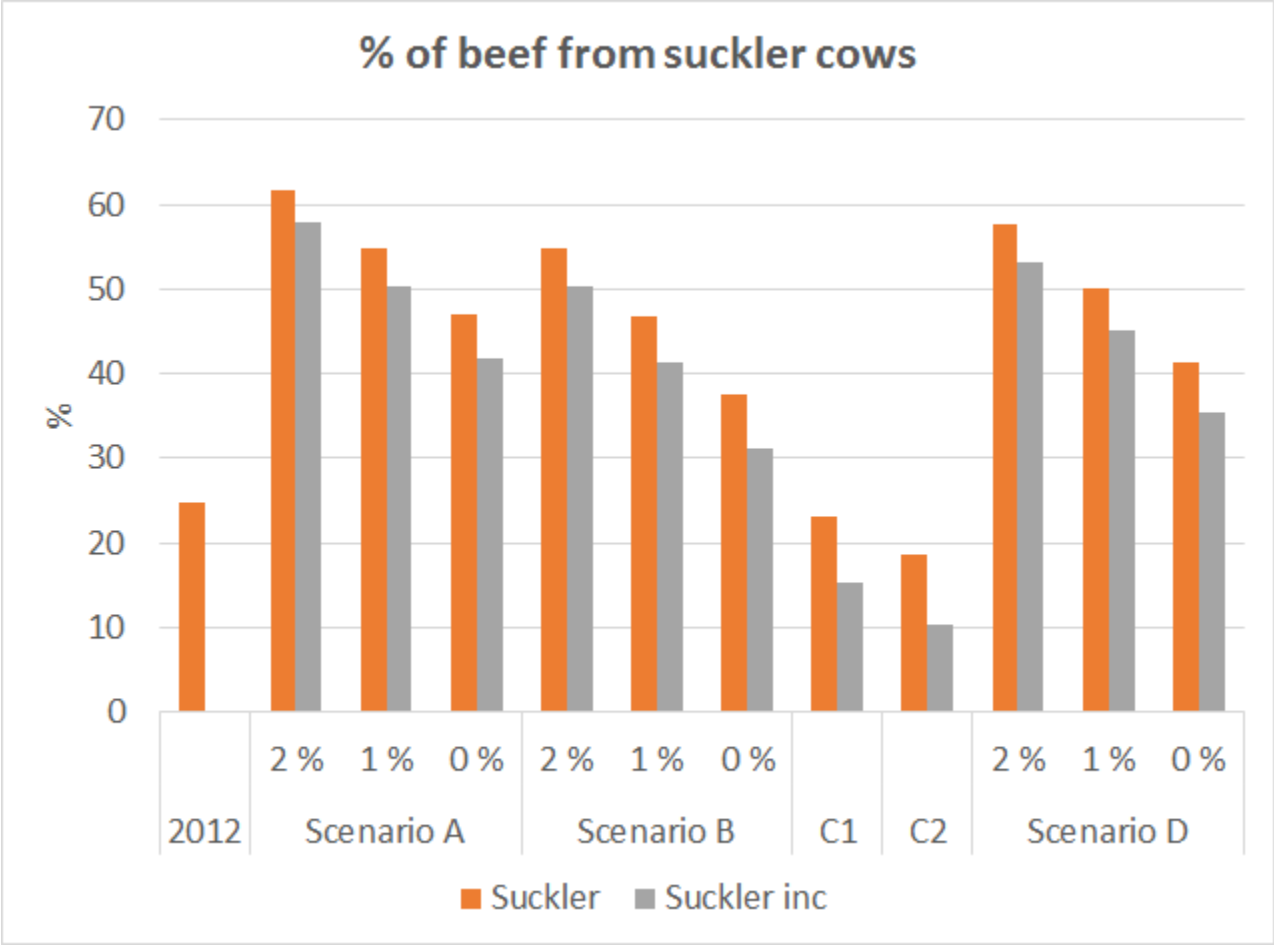
*The Foundation for Research Levy on Agricultural Products
*The Agricultural Agreement Research Fund
*The farmer cooperative industry partners: TINE SA, Nortura SA, NFK

The simulation - assumptions



Beef production from suckler cows



How will this influence GHG emissions?

GHG emissions

- Estimated using two farm scale models:
  - HolosNor (Bonesmo et al., 2013)
  - BEEFGEM (Foley et al., 2011)

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Livestock Science

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Greenhouse gas emission intensities of grass silage based dairy and beef production: A systems analysis of Norwegian farms

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Whole-farm systems modelling of greenhouse gas emissions from pastoral suckler beef cow production systems

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GHG emissions

- GHG emissions (CH_4, N_2O and CO_2)
  - direct
    - on farm livestock production activities
  - indirect
    - inputs used on farm and nitrate leaching and volatilization

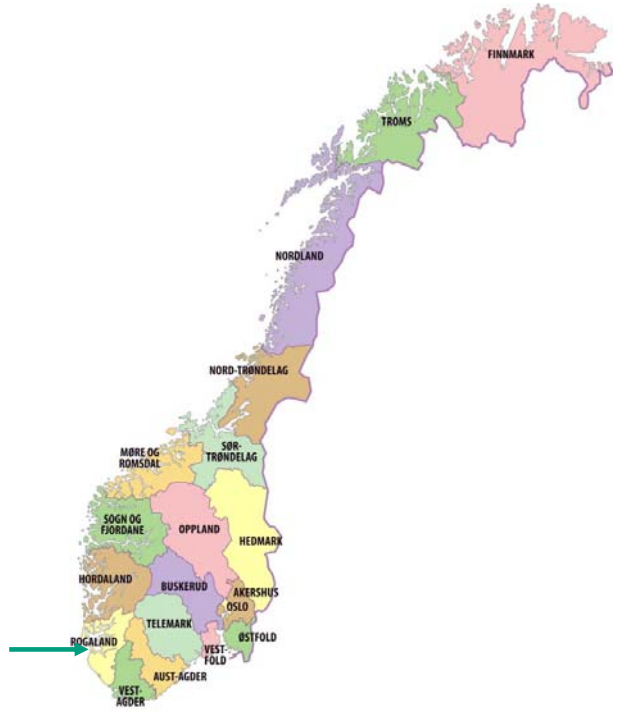
- GHG emissions calculated for the 4 scenarios and constant (1) or increased (2) beef production per cow
  - per kg milk and beef
  - total emissions from domestic milk and beef production

Assumptions

- Milk yield per cow
  - 2, 1 and 0% increase (except Scenario C)
    - no. of dairy cows to fullfil quota
    - use of feed (concentrate vs. roughage)
      - areas needed

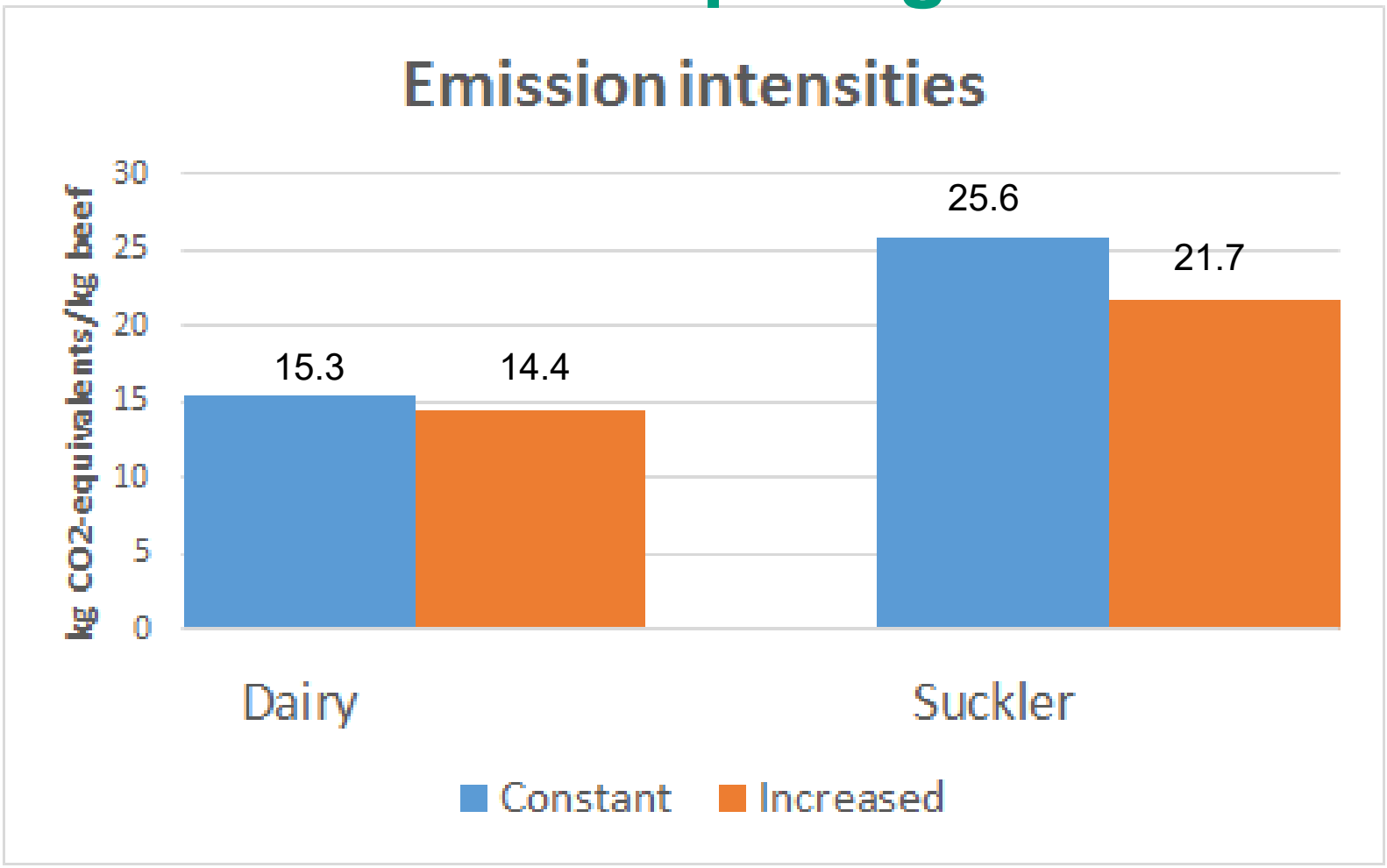
- Beef production per cow:
  - dairy: 1) 250 and 2) 277 kg
  - suckler: 1) 275 and 2) 318 kg

Weather and soil data →

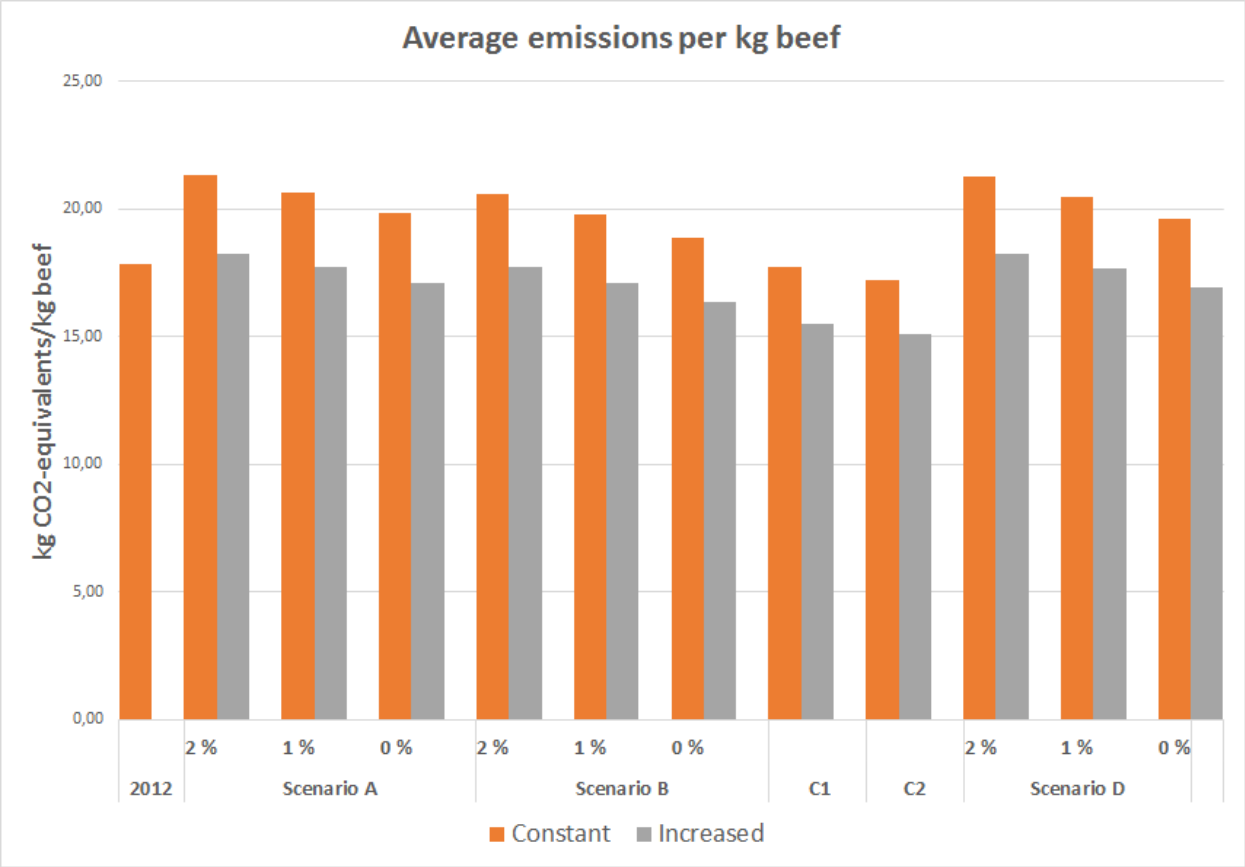


Results

Emission intensities per kg beef

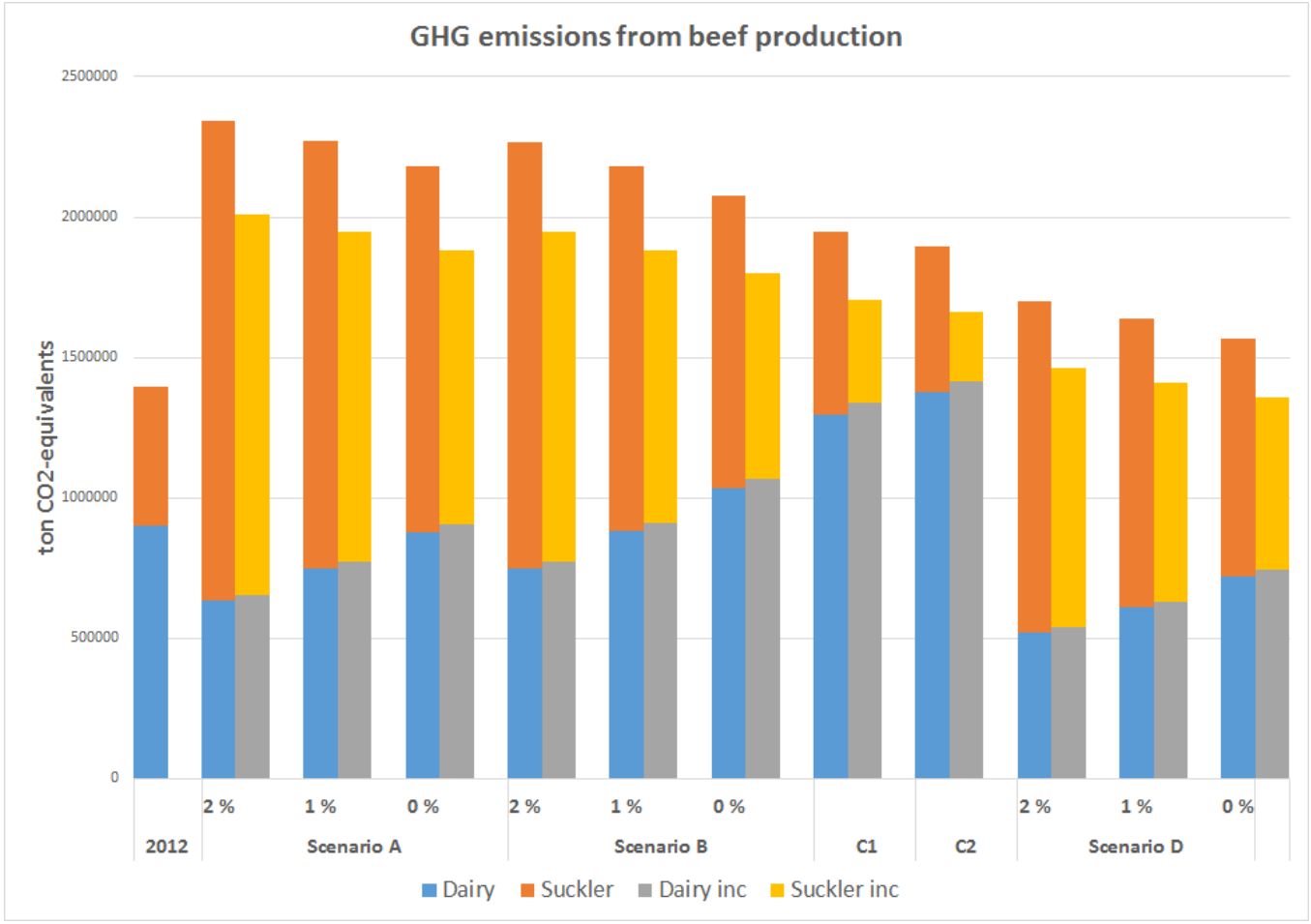


Average emissions per kg beef



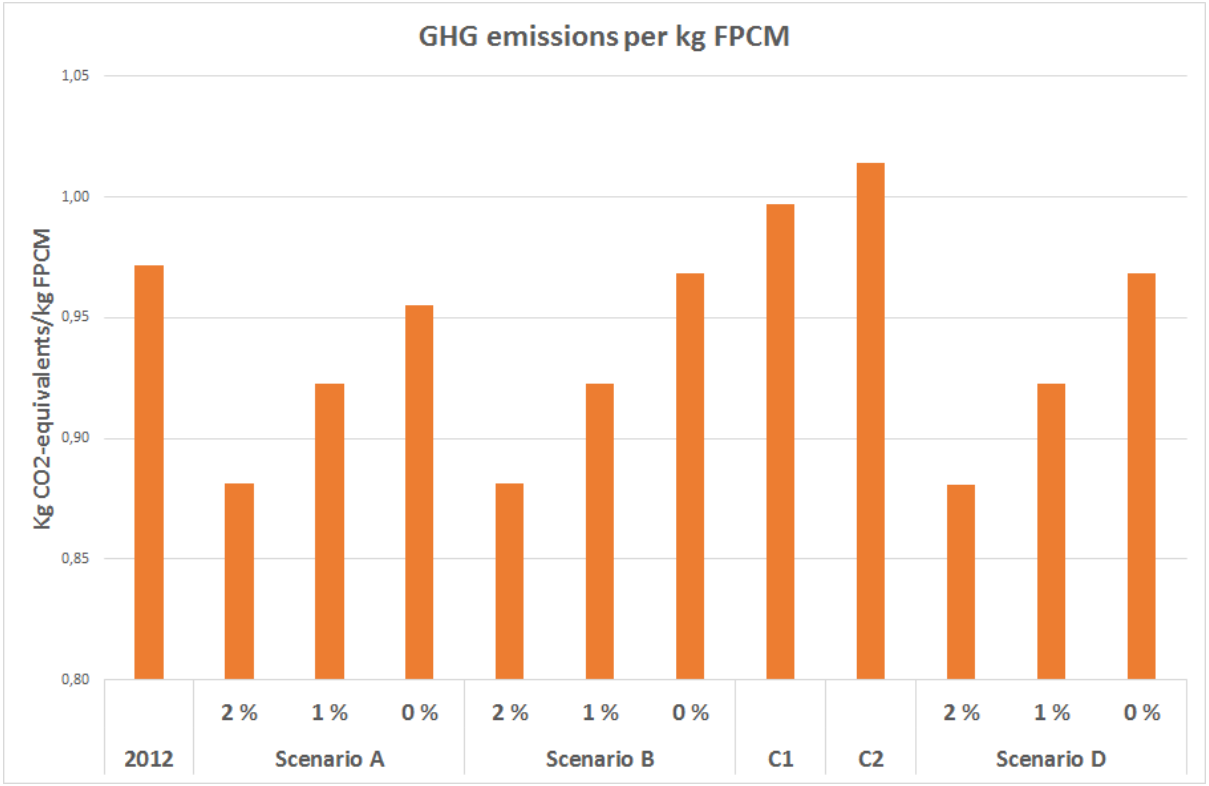
- Highest emissions per kg beef with 2% yield increase
- Lowest emissions with low yield (scenario C)
- Increased efficiency=lower emission intensity

GHG emissions from beef production



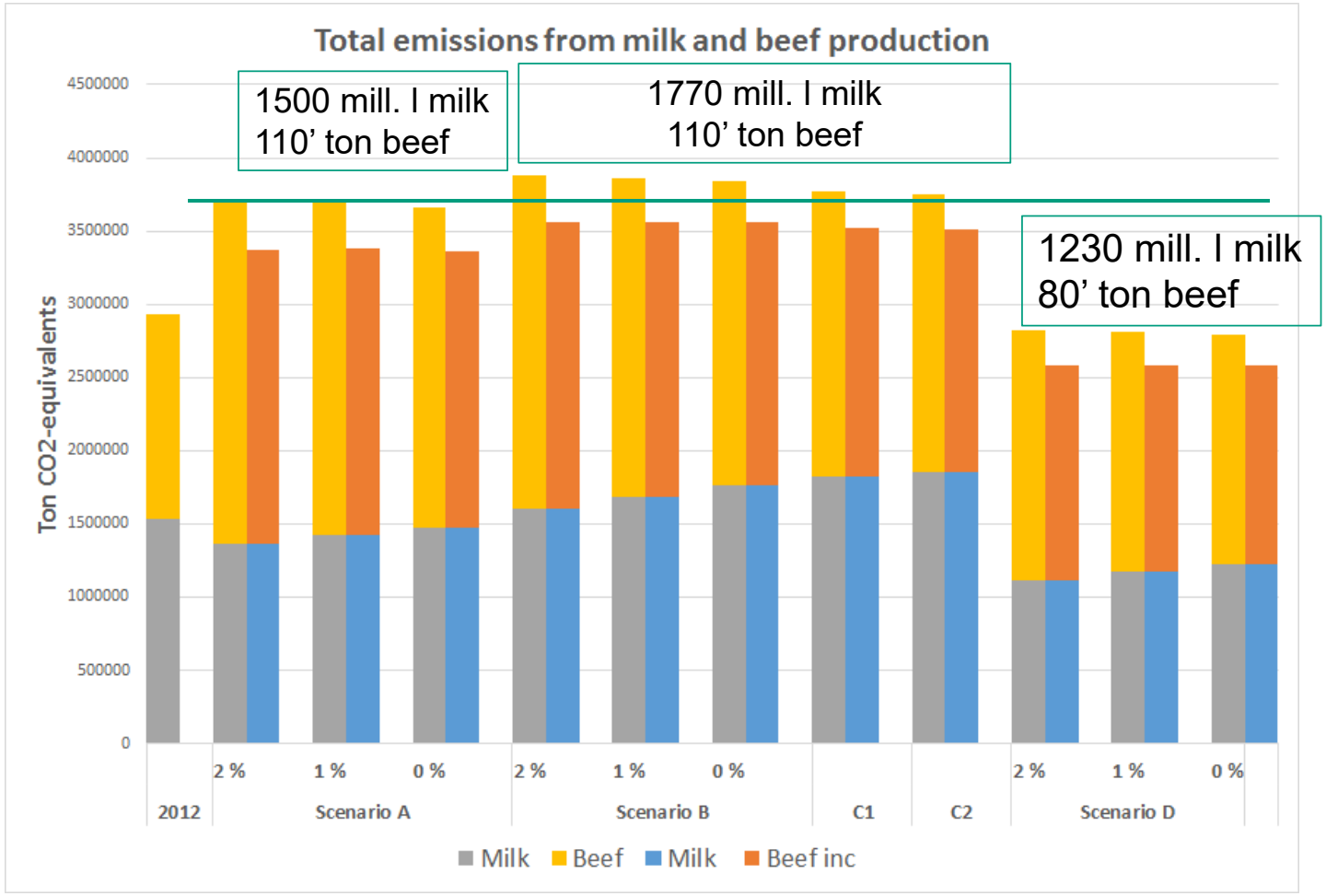
Effect of increased efficiency:
-274' tons CO_2-equivalents

Emission intensities for milk



- Increased yield reduces emissions
  - fewer dairy cows ⟶ reduced enteric methane and manure
  - reduced ley area ⟶ reduced soil N_2O and energy use
  - higher emissions from concentrates

Total emissions from milk and beef



- Increased efficiency: 6% of the total emission from agriculture (~4.4 mill. tons CO_2-eq.)

Conclusions

- In a system with milk quotas:
  - **annual milk yield per dairy cow** determines the size of the dairy and suckler cow populations, **and GHG emissions from milk and beef production**
  - beef: lowest emissions with low milk yields per cow
    - high proportion of dairy beef
  - milk: lowest emissions with high milk yields
    - fewer cows to meet quota
  - small effects on total emissions

- Increased efficiciency in beef production (dairy and suckler) reduces GHG emissions and is therefore an important mitigation option.
  - 6% of the emissions from agriculture

Thank you for your attention!