A pilot study about integration of diet formulation software in dairy farm coaching in Kenya

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Research

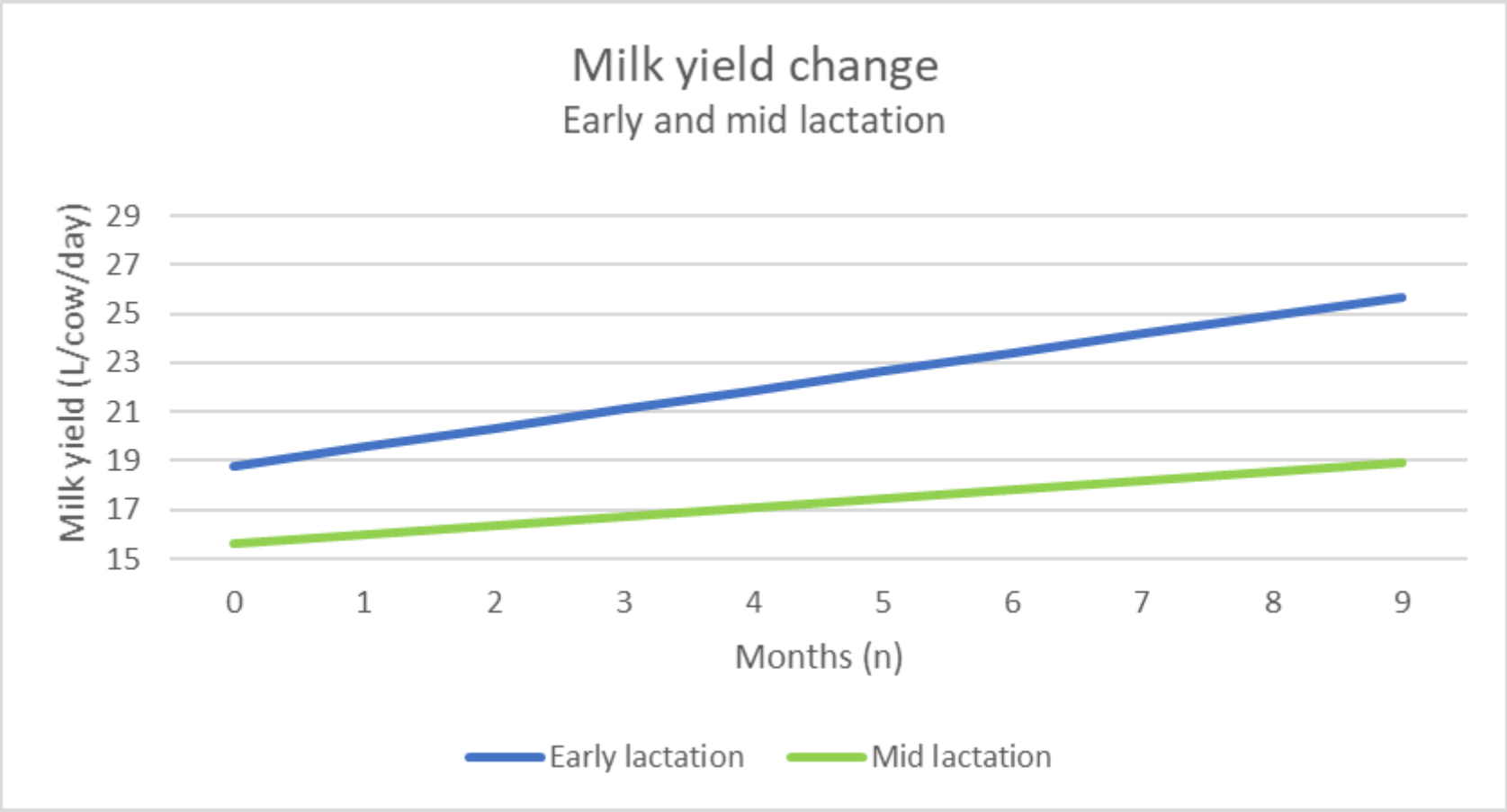
- A dietary intervention to improve milk yield (MY), and margin above feed costs (MAFC) and to reduce enteric methane emission intensity (EMEI) in Kenya
- 30 farms, 13 farms completed pilot of at least 7 monthly visits
  → average of 9 monthly visits
- 8 Medium scale farms (MSF), 5 Large scale farms (LSF)
- Data collection (July 2018 – June 2019)
- Farm walk
- Formulation recommended rations

Walk through the farm: observe, ask, listen, ..

1. **Cow observations**: BCS, LW, udders, health, behaviour (abnormalities), rumination, manure score
2. **Feed & water availability**: quantity and quality: colour, smell, feel, moulds, chop length, etc.
3. **Environment**: barn climate, feeding area, feed storage, cubicles: cleanliness, abnormalities
4. **Milking parlour/equipment**: cleanliness, hygiene, state of milk units, etc.
5. **Scrutinise farm records:** milk yield, feeds & fodders, qualities, quantities, DMI, prices, fertility, ..
6. **Assess the level of management**: owner, manager, other workers (level of knowledge and skills)
7. **Rumen8 formulation**: focus on early & mid lactation, step by step approach: 1 month-objective
8. **Print recommended diet report**

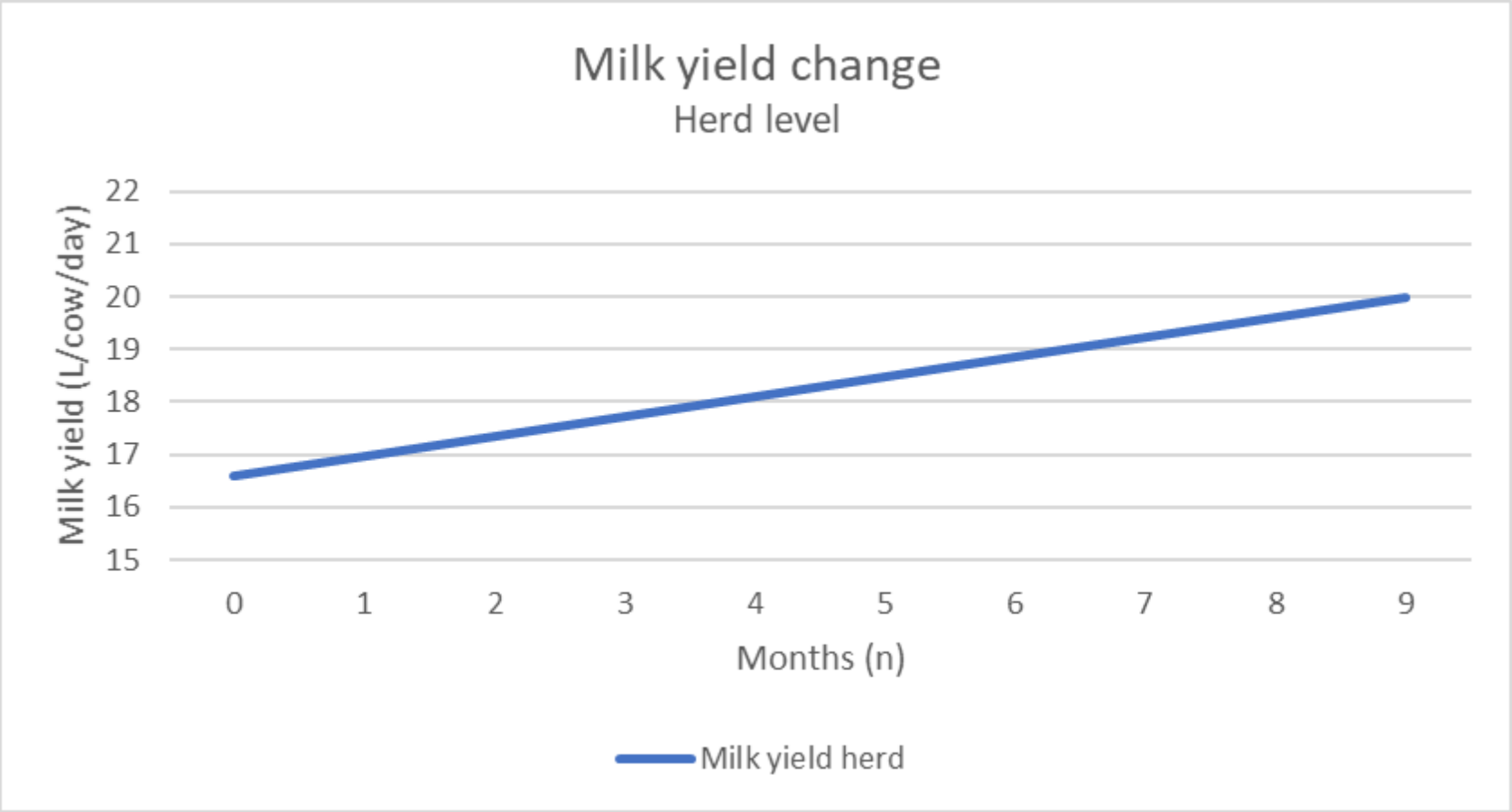
Milk yield early and mid lactation

- Early lactation: from 18.8 to 25.7 L/cow/day → + 0.77L per month (P < 0.05)
- Mid lactation: from 15.6 to 19.0 L/cow/day → + 0.37L per month (P < 0.05)



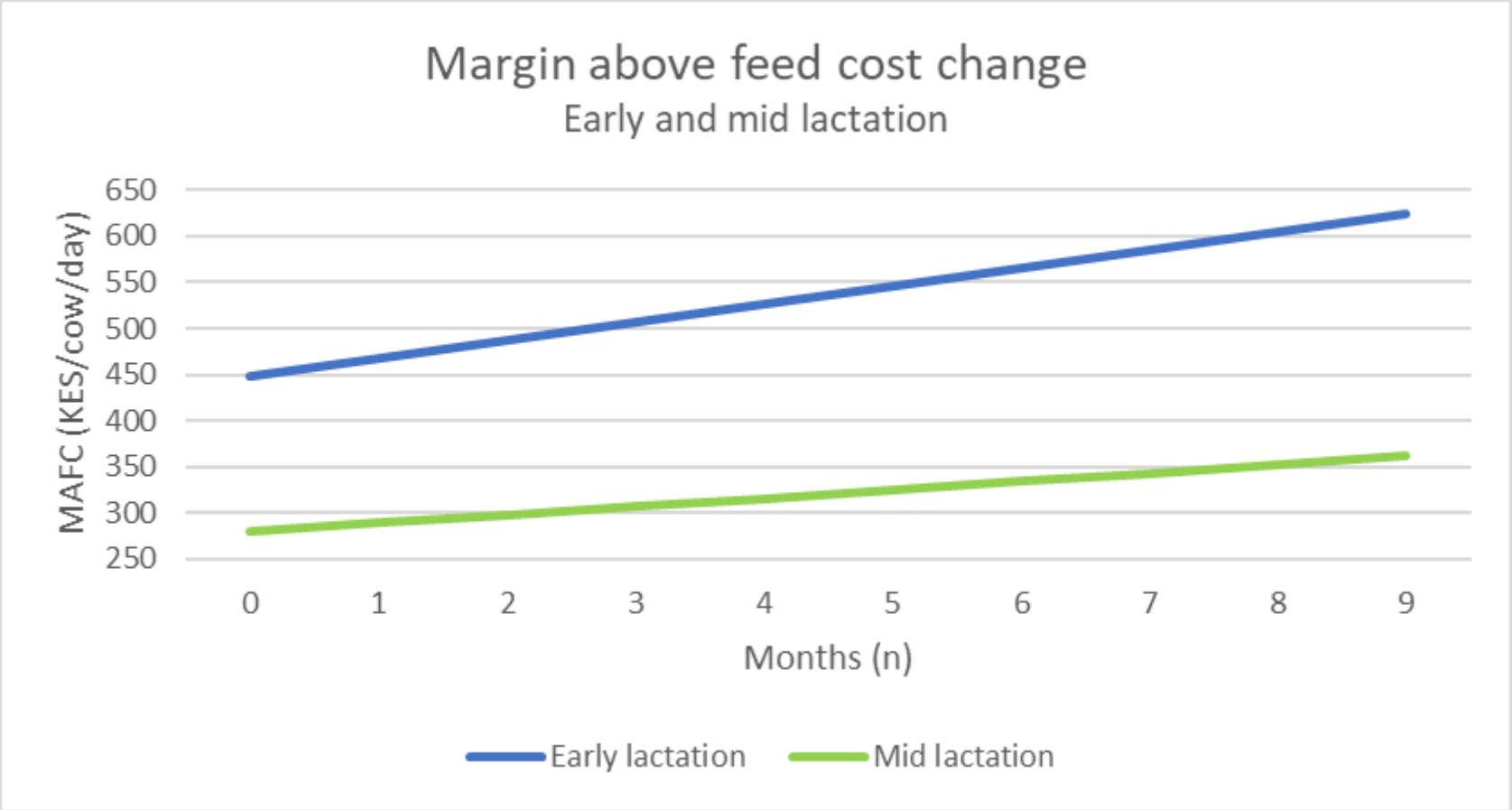
Average milk yield entire herd

- Herd level: from 16.6 to 20.0 L/cow/day → + 0.38L per month (P < 0.05)
  (*Early, mid and late lactation)*



Margin above feed costs

- Early lactation: from KES 449 to 624 /cow/day → + KES 20 per month (P < 0.05)
- Mid lactation: from KES 280 to 361 /cow/day → + KES 9 per month (P > 0.05)



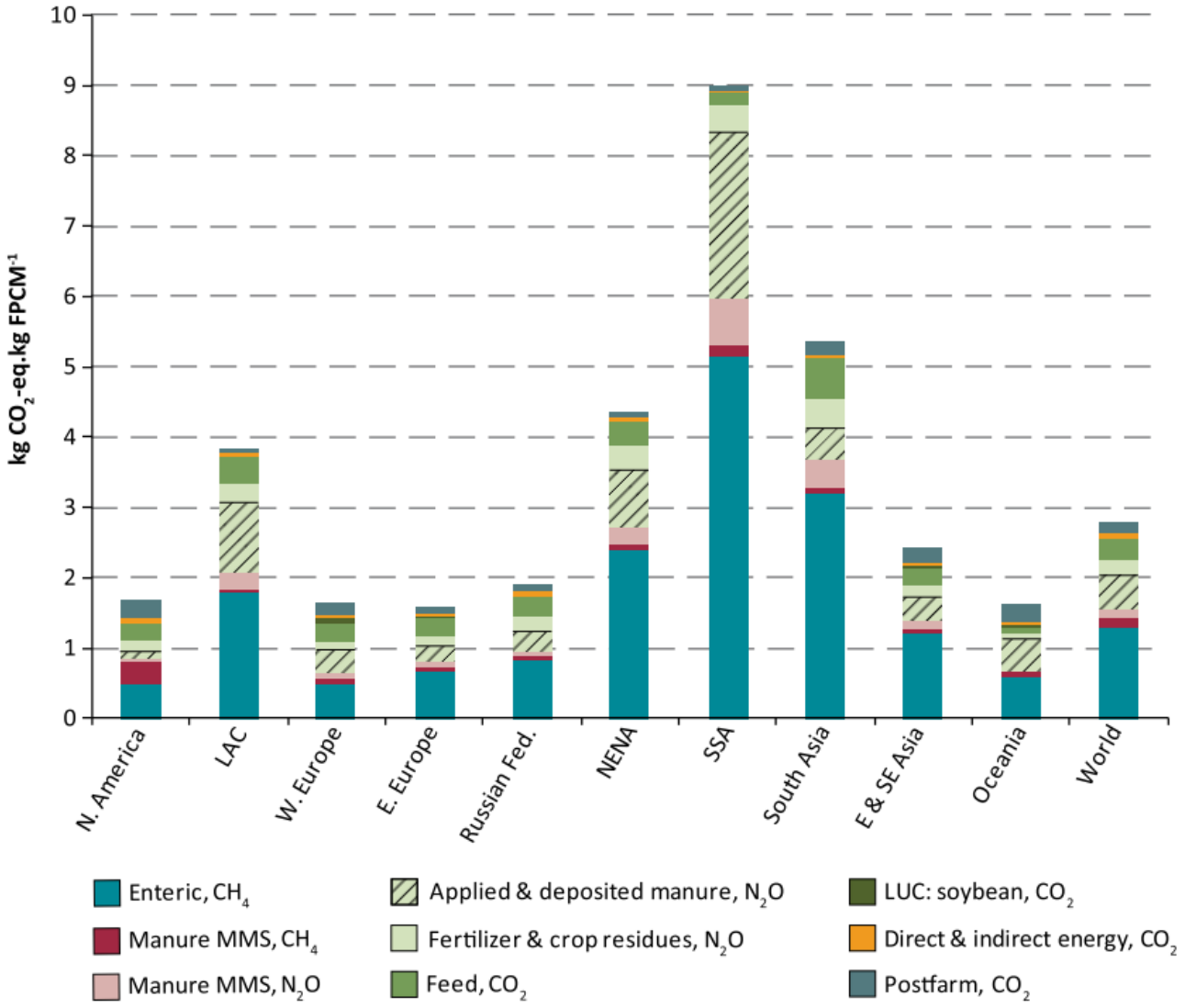
Greenhouse gas emission

- Global warming potential (GWP) of main greenhouse gases:

	GWP	Lifetime in yrs
Carbon dioxide (CO_2)	1	5-200
Methane (CH_4)	28	12
Nitrous oxide (N_2O)	265	114

IPCC, 2014

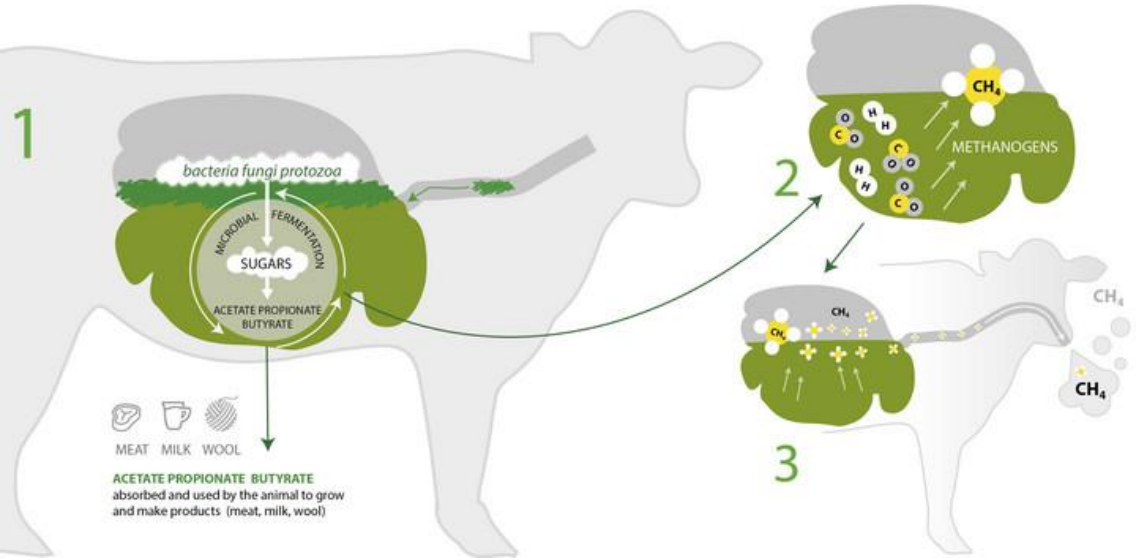
- The high Carbon Footprint of milk in SSA offers room for improvement
- Lowering of emission of enteric methane has the most potential



Opio et al. 2013

Enteric methane emission

- Enteric fermentation
- Depends on diet ingredients, more fibre (NDF)→ more methane
- High quality diets → high milk production
- Lower emission per unit of animal product

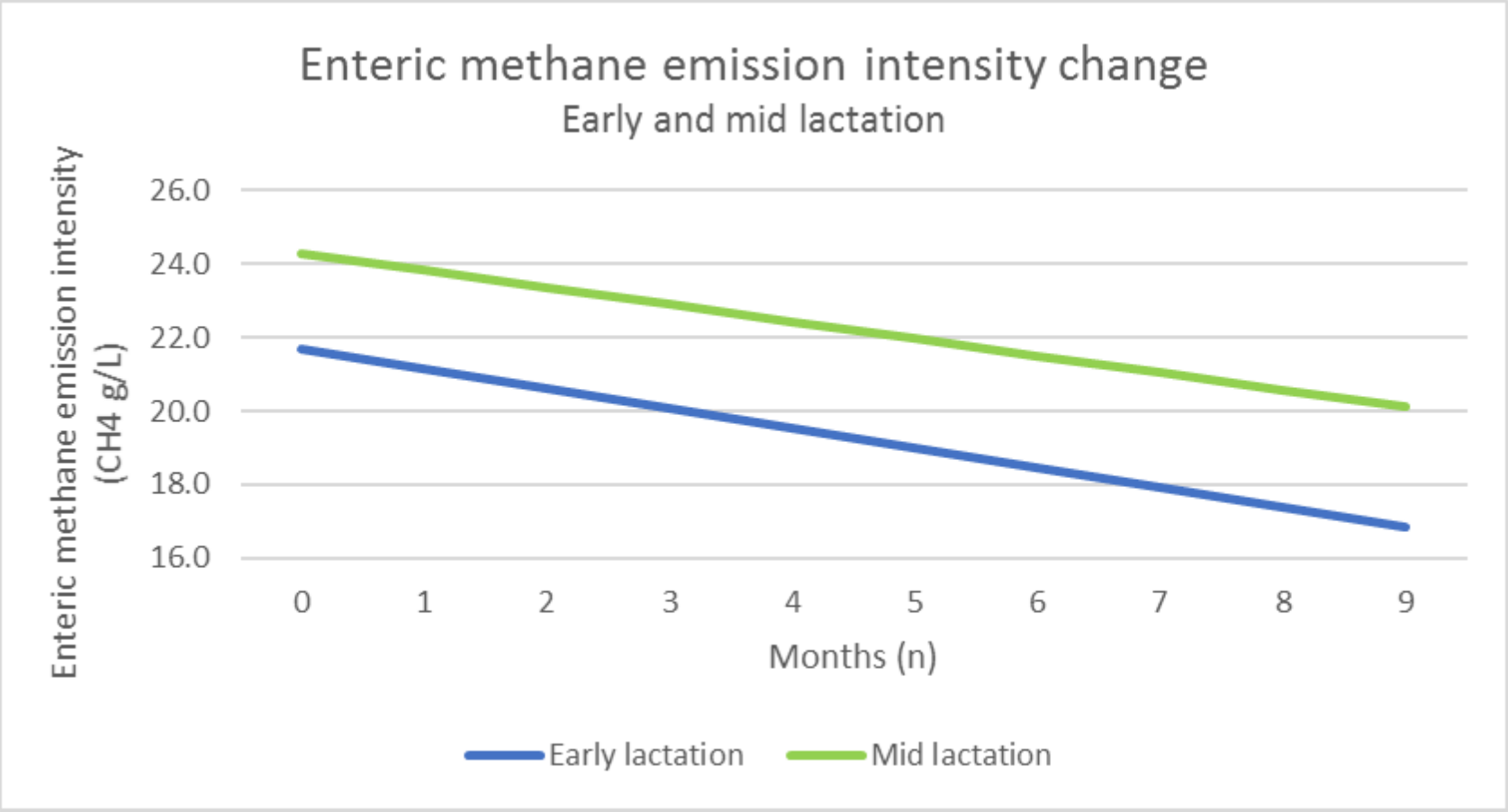


- Estimating enteric methane emission
- Implementation of equation
- Depends on:
  - Dry matter intake
  - NDF and fat content of diet
  - Body weight of the cow
  - Milk fat content

Niu et al. 2018

Enteric methane emission intensity

- Early lactation: from 21.7 to 16.8 CH_4 g/L → - 0.54 CH_4 g/L per month ($P < 0.05$)
- Mid lactation: from 24.3 to 20.1 CH_4 g/L → - 0.47 CH_4 g/L per month ($P < 0.05$)



Lessons learned

- Motivation of farm owner and manager is key
- Willingness to initially invest in diet
- Fluctuation in price of milk and diet, and thus MAFC due to market changes
- Availability of well-preserved quality forages throughout the year
- Feed analysis and accurate cost price figures are needed to improve reliability of diet recommendation

<u>Conclusion:</u>

- Monthly visits with management advice and well-balanced rations helped to improve milk yield and margin above feed costs
- Increase in milk production leads to a reduction in estimated enteric methane emission intensity