

# Effects of introducing balanced rations on greenhouse gas emissions from small-scale Indonesian dairy farms

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## Background

- Dairy production systems contribute about 30% to total greenhouse gas (GHG) emissions from the global livestock sector.
- Improved feeding is considered an important GHG mitigation strategy, but high-quality feed sources are often lacking or not accessible to small-scale farmers.
- Adjusting the feed ration of cows to their individual requirements can improve feed use efficiency, productivity and health, and reduce feeding costs and GHG emissions.
- The aim of this study was to evaluate effects of feeding balanced rations on GHG emissions of small-scale dairy farms in Lembang sub-district, West-Java, Indonesia.



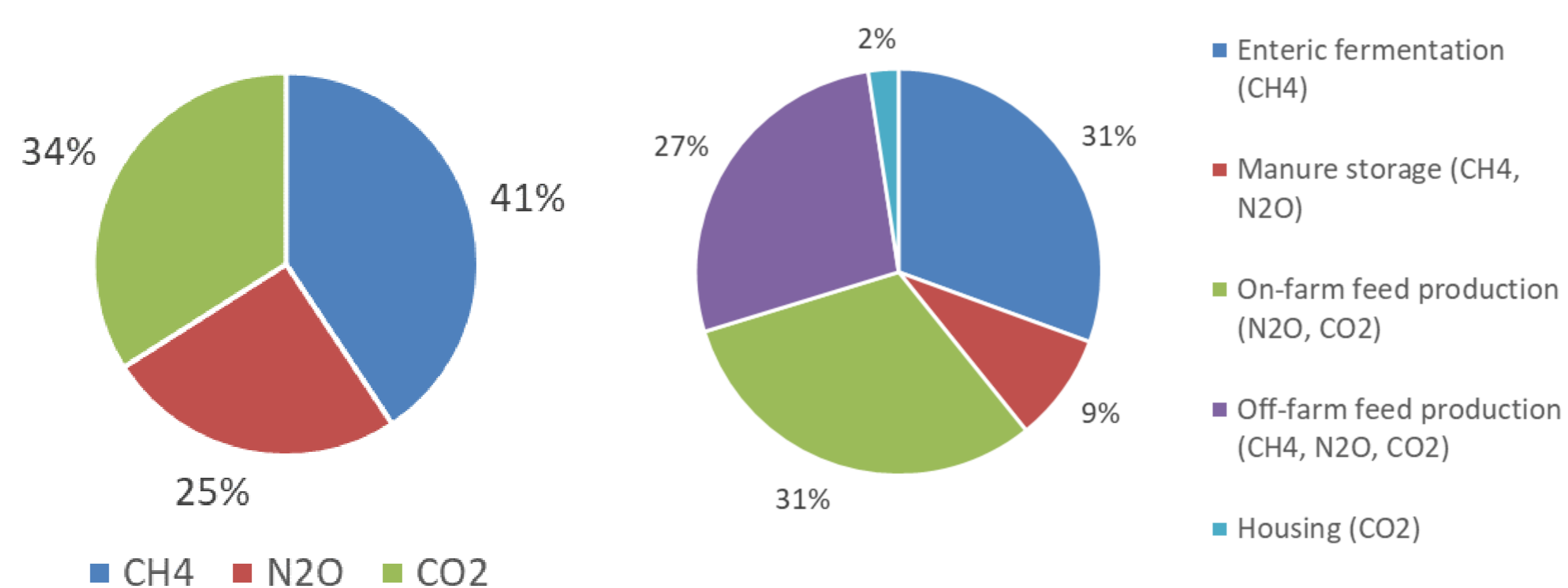
## Method

1. Data was collected from 15 dairy farms in Lembang about herd composition and performance, feed rations, land use and fertilization, and other farming practices.
2. A dry-season balanced ration was formulated for each individual dairy cow by a dairy nutrition expert, taking into account available dry-season feed resources.
3. For each farm, a life cycle assessment (LCA) was conducted to evaluate effects of changes in the feed ration on total cradle-to-farm gate CO<sub>2</sub>, N<sub>2</sub>O and CH<sub>4</sub> emissions per farm.
4. Effects of changes in the feed ration on milk production, health, or fertility were not included in the analysis.

**Table 1.** Average (standard deviation) dry season feed ration (kg fresh/cow/day)

Ingredient	Current	Advised
Fresh grass	16.8 (17.6)	21.9 (17.4)
Rice straw	13.2 (8.1)	13.2 (8.2)
Tofu waste	14.8 (11.4)	11.9 (9.9)
Cassava waste	8.1 (5.8)	0 (0)
Concentrates	6.9 (2.3)	7.3 (2.4)
Other	3.4 (7.1)	3.9 (8.6)

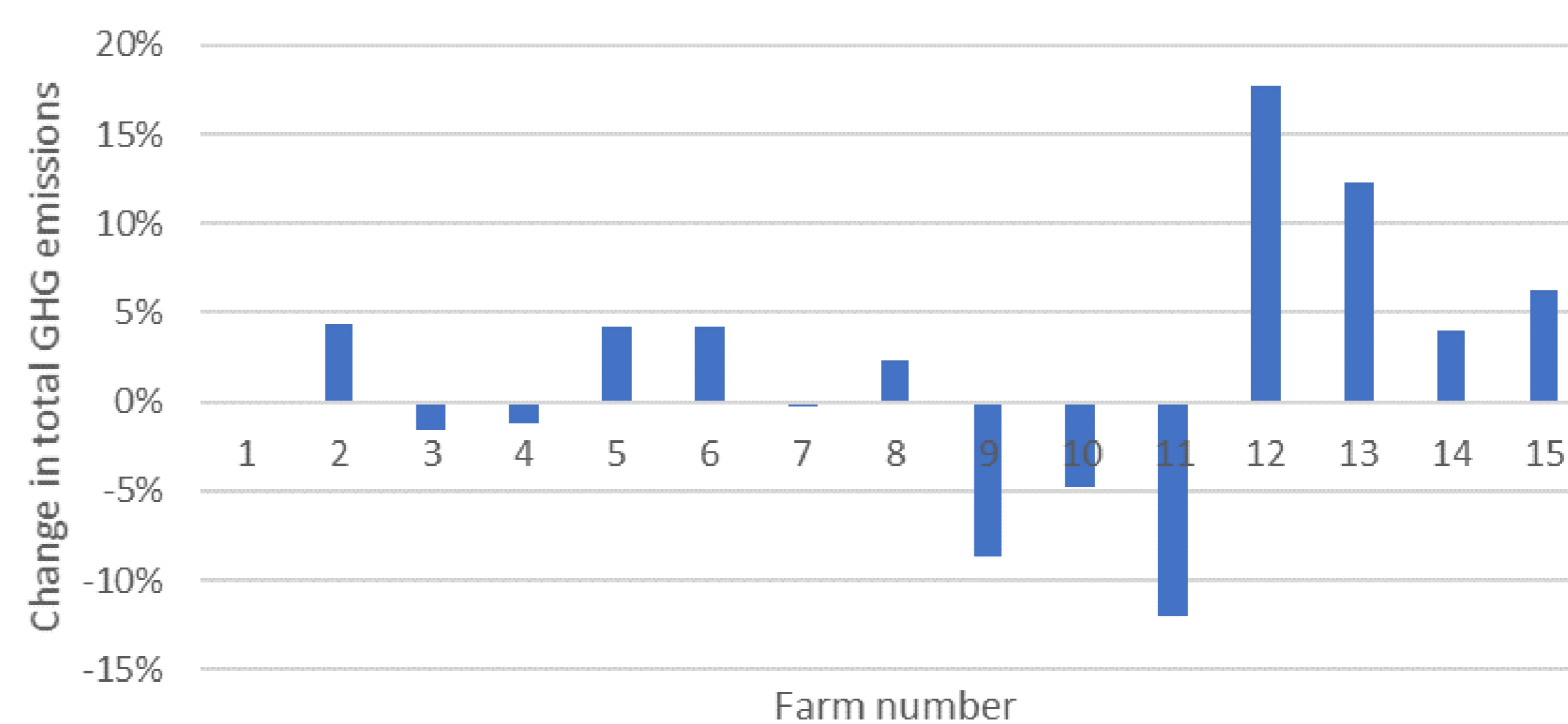
## Results



**Figure 1.** Sources of greenhouse gas emissions (average CO<sub>2</sub>e/farm/year).

## Effects of balanced rations on GHG emissions

- GHG emissions per farm decreased by 0.3 to 9.4% on 6 farms, and increased by 0.2 to 9.8% on 9 farms.
- Reductions in GHG emissions were mainly due to a reduced amount of compound feed per cow.
- Increases in GHG emissions were mainly due to an increased amount of roughage per cow.



**Figure 2.** Changes in total greenhouse gas emissions per farm.

## Conclusions

- Feeding balanced rations can both increase or decrease total GHG emissions per farm, depending on the type of change in feed ration composition.
- GHG emissions per kg milk may decrease, however, when improved rations are leading to increased milk yields. Therefore, effects of balanced rations on GHG emissions per kg of milk need to be evaluated by including changes in milk yield in the analysis.

## Acknowledgements

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