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Introduction

The agricultural sector represents around 14% of greenhouses gas (GHG) emissions ⁽¹⁾. The objective of this study was to highlight, in 21 dairy farms in Walloon Region (Belgium), the correlations between farm structure and 3 environmental indicators:

- Nourishing performance index (NPI- number of people fed by animal protein per hectare);
- Excess nitrogen balance (NB -kg of nitrogen per hectare);
- Net carbon footprint of milk (CF -CO₂ equivalent per kg of energy corrected milk - ECM).

Material and Methods

More than 150 data per farm in 2018 are collected and put in CAP'2ER® tool ⁽²⁾.

Several indicators were calculated. Those of interest were:

- NPI
- NB
- Milk CF



Milk yield (kg) was converted in ECM (fat%: 4% and protein%: 3.3%).

The CO₂ conversion factors are estimated at 25 for methane (CH₄) and 298 for nitrous oxide (N₂O).

Statistical analysis was performed using SAS 9.3 to study the correlations between these indicators

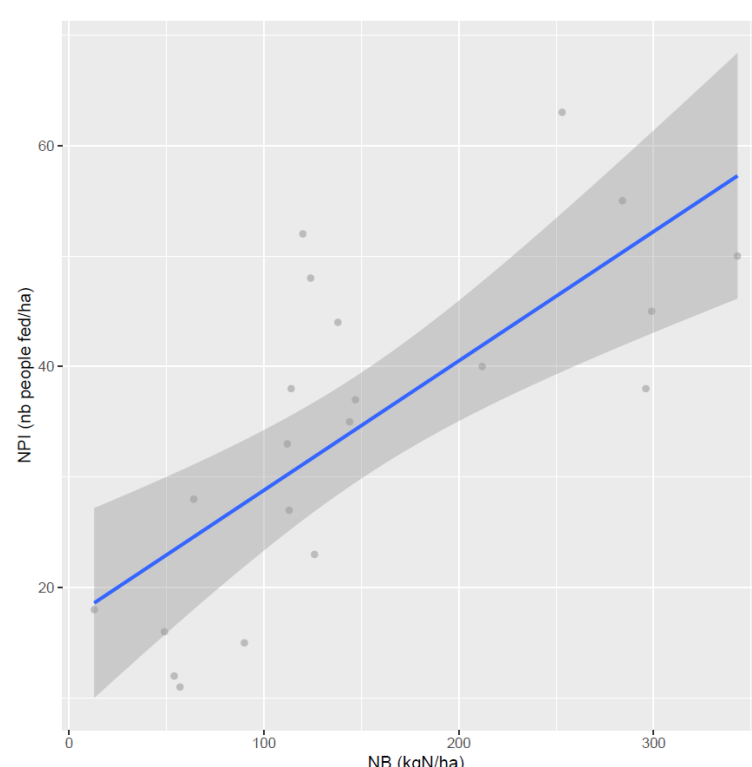
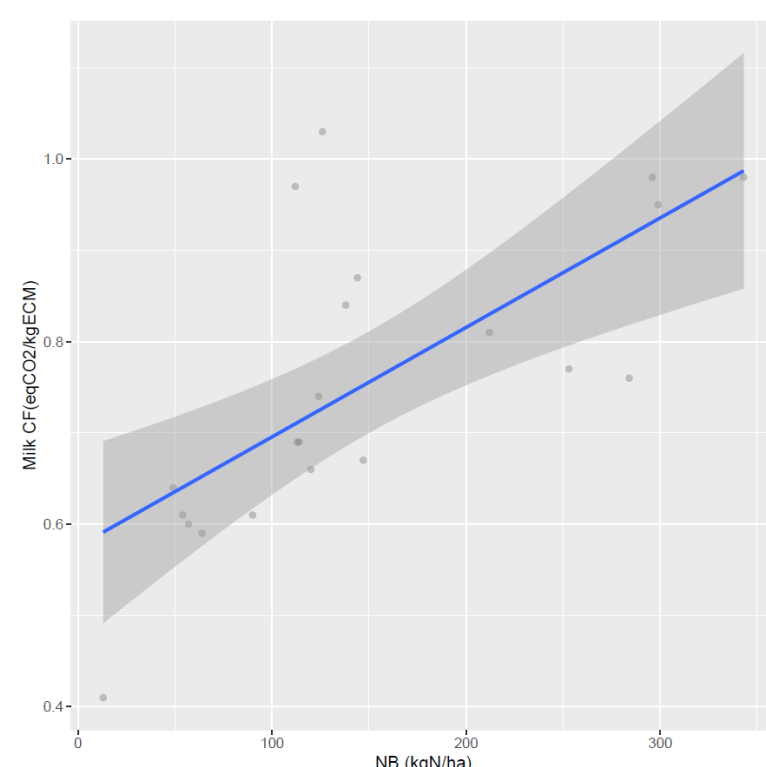
Results

	Mean ± SD	Pearson Correlation coefficients (%)					
		Statistical significance (p<0.05=*; p<0.01=**; p<0.001=***)					
		Surface (ha)	N cows/farm	Milk performance (ECM/cow)	NPI (N people fed/ha)	NB (kg N/ha)	Milk CF (CO ₂ eq/ECM)
N= 21							
Surface (ha)	83.7 ± 34.9	/	85 ***	62 **	43	36	14
N cows/farm	99 ± 51	85 ***	/	83 ***	80 ***	63 **	36
Milk performance (ECM/cow)	7441 ± 1894	62 **	83 ***	/	91 ***	62 **	37
NPI (N people fed/ha)	34.7 ± 15.0	43	80 ***	91 ***	/	73 ***	43 *
NB (kg N/ha)	150 ± 94	36	63 **	62 **	73 ***	/	69 ***
Milk CF (CO ₂ eq/ECM)	0.76 ± 0.16	14	36	37	43 *	69 ***	/

Relationships between Milk CF and NB (A) and between NPI and NB (B) were graphically analysed. A linear relationship was highlighted and R and R² were determined.

R: 0.670 Adjusted R-squared: 0.449 (A)

R: 0.718 Adjusted R-squared: 0.515 (B)



Conclusion

In conclusion, the NPI of a farm, the excess nitrogen balance per ha and the net carbon footprint of milk demonstrated positive correlation between each other, in these 21 Walloon farms. However, it is interesting to note that the CF per kg ECM is not influenced by farm factors like the surface, the milk yield per cow and the number of cows per farm.

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References

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