

# Uncertainty analysis of cattle-based product LCA related to model variables: case study of milk production in Belgium

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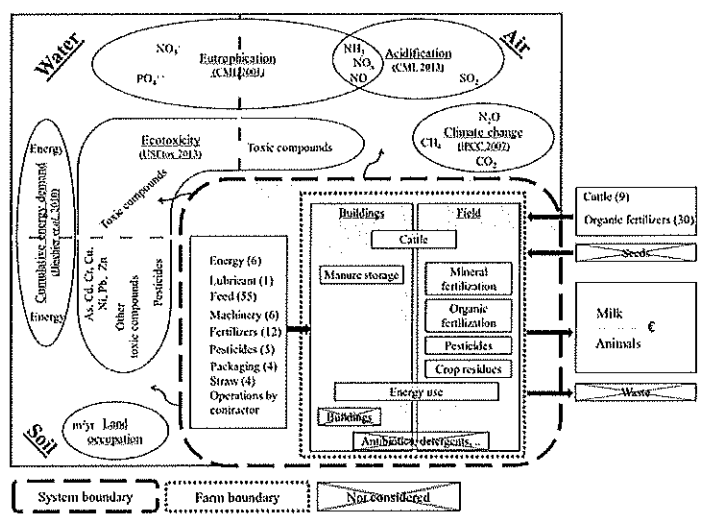
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**Purpose :** Uncertainty evaluation related to model variables for milk production (fig1)

## Material and methods

- 1000 Monte-Carlo simulations for model variables (the 12189 variables tested can be grouped as illustrated in fig 3).
- Influence of individual variables by using the 50<sup>th</sup> ( $X_{0.5}$ ) and 75<sup>th</sup> ( $X_{0.75}$ ) percentiles of its distribution :
  - $Var = (Y_{0.75} - Y_{0.5}) / Y_{0.5}$  (Var)
  - $Sensitivity = Var / ((X_{0.75} - X_{0.5}) / X_{0.5})$  (Sen)

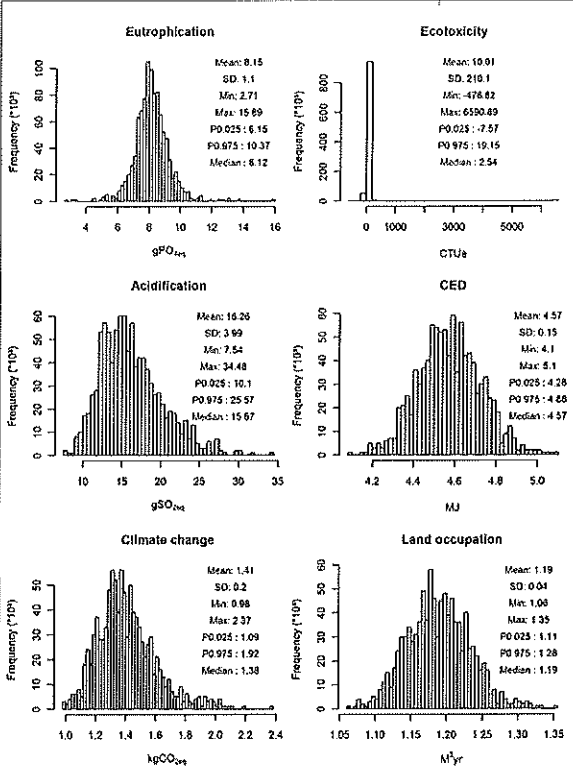
Y is the impact value. Indices indicate the percentile in the distribution corresponding to the X variable used.
- One farm.



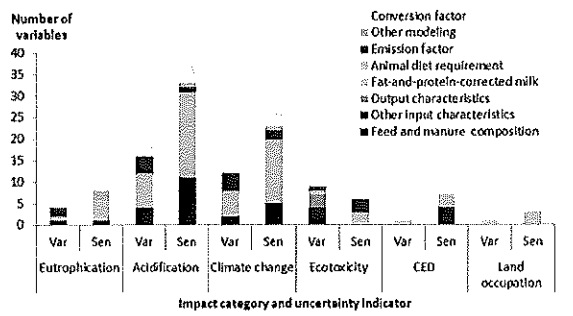
**Figure 1:** System boundaries, impact categories and related damaging compounds and resources considered. Numbers in parentheses indicate the number of items considered in the inventory after aggregation (e.g., 63 machinery alternatives recorded on farms were aggregated into 6 groups).

## Results and discussion

- Many variables (1084) influenced the results.
- CED and land occupation were normally distributed (Shapiro test) and uncertainty can be very high for some impact categories (fig 2).
- Influencing variables = fct (impact category (fig 3)).
- Variables linked to animal requirement and feed composition influence mainly acidification and climate change.



**Figure 2:** Distribution of values recorded in 1000 Monte-Carlo simulations and main statistics.



**Figure 3:** Number of variables influencing the impacts more than  $|\pm 1\%|$  for Var and more than  $|\pm 10\%|$  for Sen.

## Conclusion

- Importance of feed variables on acidification and climate change.
- Input variables have to be tested.

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