Protein conversion efficiency in French dairy small ruminant systems

CONTEXT

- Growing demand for animal products in the World + Inefficiency of animal production often reported in press
- However cattle valorize non human edible resources (forages, by-products)

***Aim*: a new approach dealing with the evaluation of human-edible from human non-edible feedstuffs in livestock feeding strategies**

A 3 STEPS METHOD

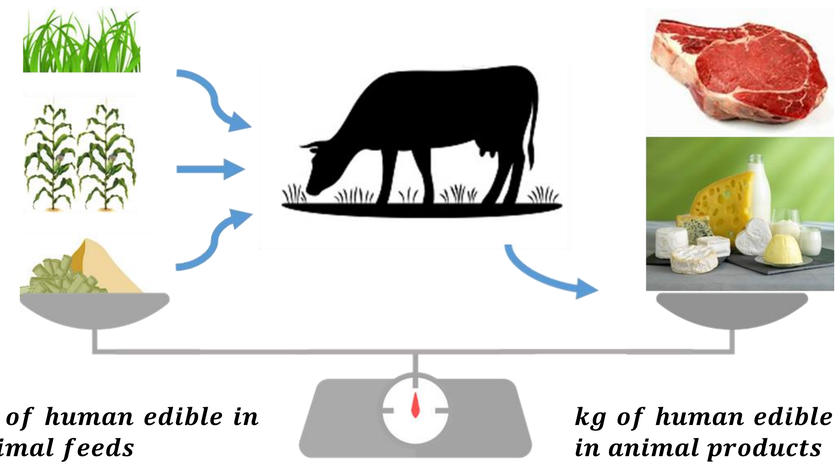
1ST STEP : TO USE OF A FRENCH DATABASE

- **DIAPASON** database from a reference farms' network (**INOSYS-Réseaux d'élevage**)
- Data collected in France between **2012 and 2016**.

2ND STEP : TO USE AND COMPLETE AN EXISTING TABLE OF HUMAN-EDIBLE PROTEIN FRACTIONS OF THE MAIN FEEDSTUFFS USED IN FRANCE

*PPC = Proportion of human-edible protein

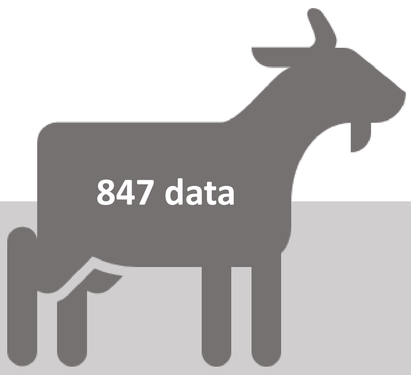
3RD STEP : TO CALCULATE FEED CONVERSION EFFICIENCY

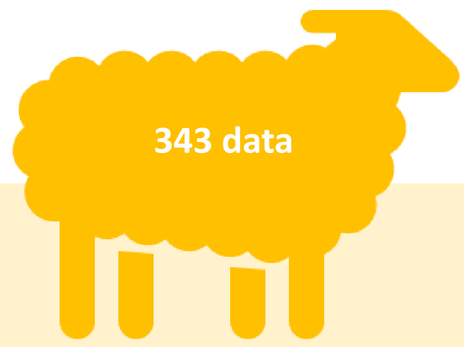


$$\textit{Net protein conversion efficiency (NPE)} = \frac{\textit{kg of human edible proteins in animal products}}{\textit{kg of human edible in animal feeds}}$$

Goal to reach: net conversion efficiency > 1

RESULTS IN FRANCE





GOAT AND SHEEP DIETS IN France (average)

60% Hay, silage, fresh grass **PPC* : 0%**	**80%** Hay, silage, fresh grass **PPC* : 0%**
6% mais silage **PPC* : 10%**	**2%** mais silage **PPC* : 10%**
34% Concentrate **PPC* : 15% - 95%**	**18%** Concentrate **PPC* : 15% - 95%**

85%
of proteins consumed by animals are not human edible

89%

PRODUCTIONS

NPE = **1,14**	NPE = **1,16**
0,88 **kg of human edible proteins to produce 1 kg of animal proteins for human food**	**0,86**
50% **of farms are net producers of protein for human consumption**	**52%**

CONCLUSION

Protein feed conversion efficiency is **a critical issue for the future for ruminant production**, as it is part of the competition between feed and food uses. For the future, more issues have to be addressed on this database like **land use ratio** to estimate land use efficiency of livestock systems and **animal protein quality for human nutrition**.
Another step of this project deals with a better **understanding of the variability of these indicators**, with technical factors. The variations in net efficiency can be explained mainly by (i) the **level of grass** in the diet, (ii) the **ratio between milk production and the amount of concentrates** and (iii) **forage quality**.

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