



Optimising protein production on dairy and beef cattle farms in mountainous areas

Interreg PROSCOR Project

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Switzerland: a Grassland-Based Country

- 601'732 ha of permanent grasslands and pastures
- 122'840 ha of temporary grasslands
- 550'000 ha of alpine pastures (summer grazing areas)

→ 31% of the country's surface area is covered by grasslands



STAT-TAB - BFS 2024

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Switzerland: a Grassland-Based Country

Only herbivores are able to convert grassland biomass into food for human consumption.



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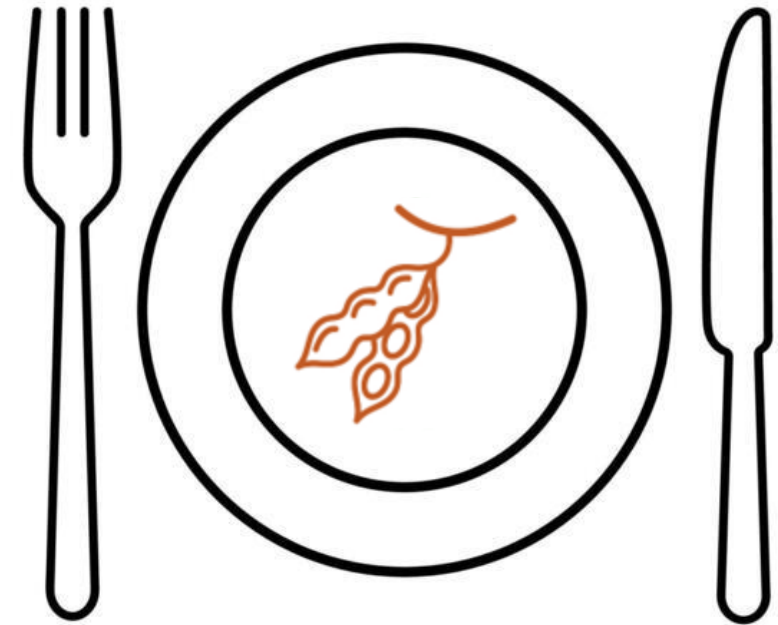
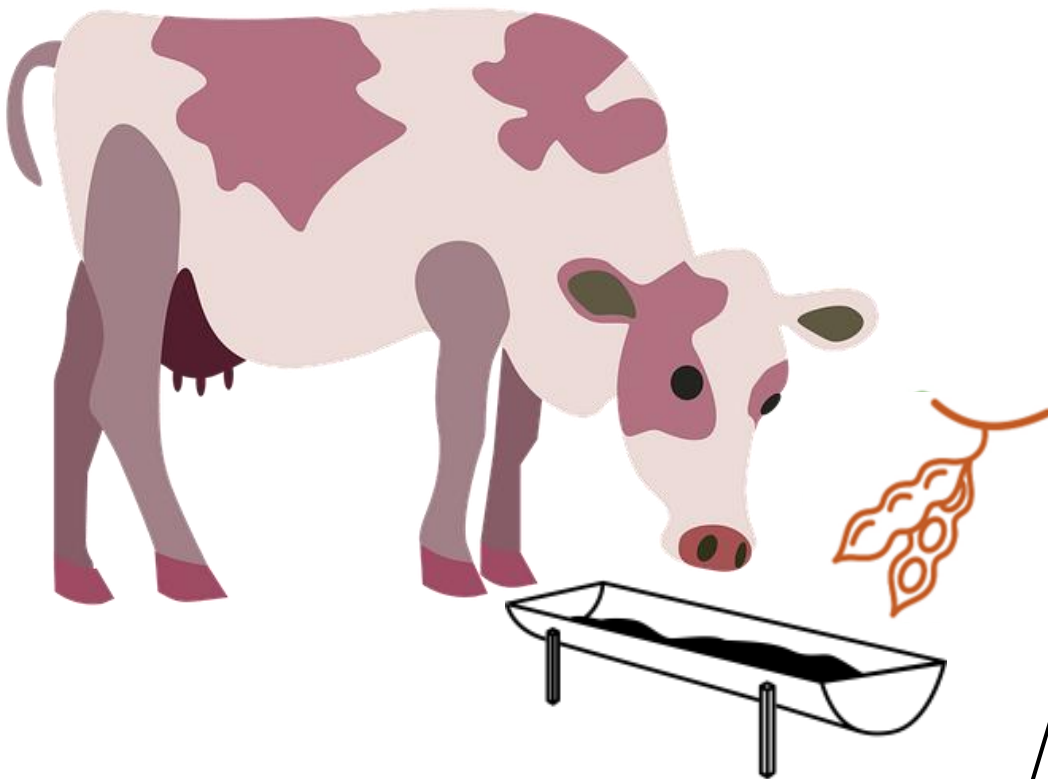


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Feed-Food Competition

Challenge: Producing animal protein without competing with human food resources



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The Interreg Proscor Project

- France-Switzerland project (2024-2026)
- Key objective: reducing competition between human food resources and animal feed protein resources



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The Interreg Proscor Project

■ Partner



■ Financier



■ Website

<https://idele.fr/proscor/>



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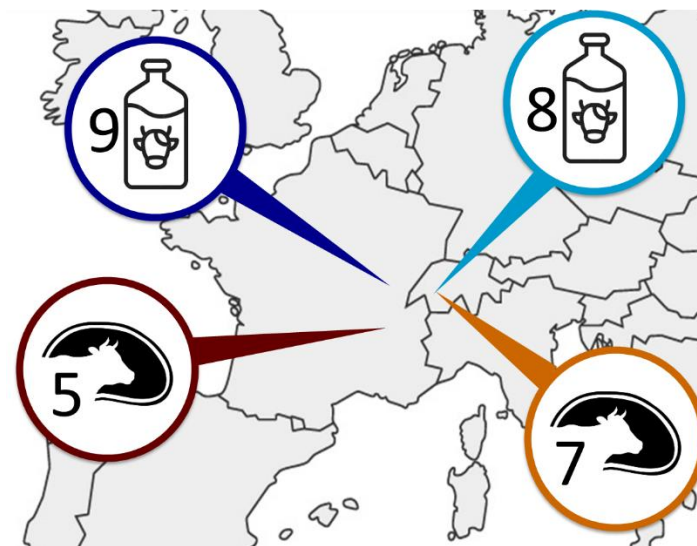


PROSCOR

PRODUCTION DE PROTÉINES POUR L'HOMME :
OPTIMISER L'UTILISATION DES SURFACES
EN ÉLEVAGES BOVINS

Method

- 4 farmer groups (29 farms)
- Ain (France), Vaud and Fribourg (Switzerland)



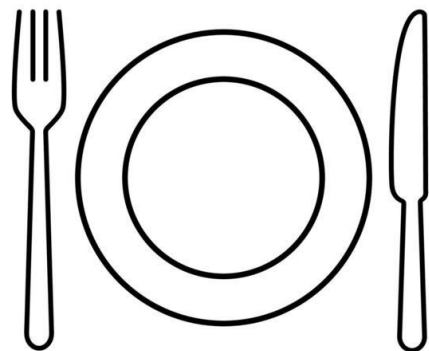
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Edible protein feed conversion efficiency (epFCE)



Wilkinson 2011, Rouillé et al. 2023

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What about land use?



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Land Use Ratio (LUR)



Van Zanten et al. 2016

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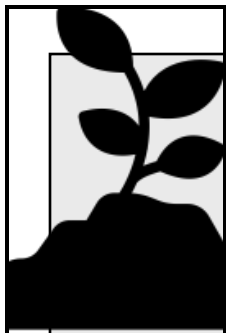
Steps to Calculate the LUR



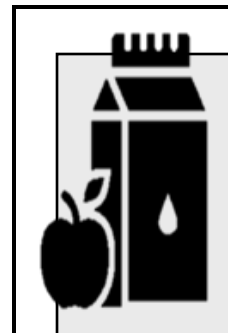
1. Determination of the land **area** required for cattle production



2. Determination of the **arable capacity** of this area (soil, climate, topography)



3. Determination of the **plant potential** (predefined crop rotations)



4. **Comparison** of protein from cattle production and plant protein potential

® Beat Reidy and Sebastian Ineichen (adapted from Van Zanten et al. 2016)

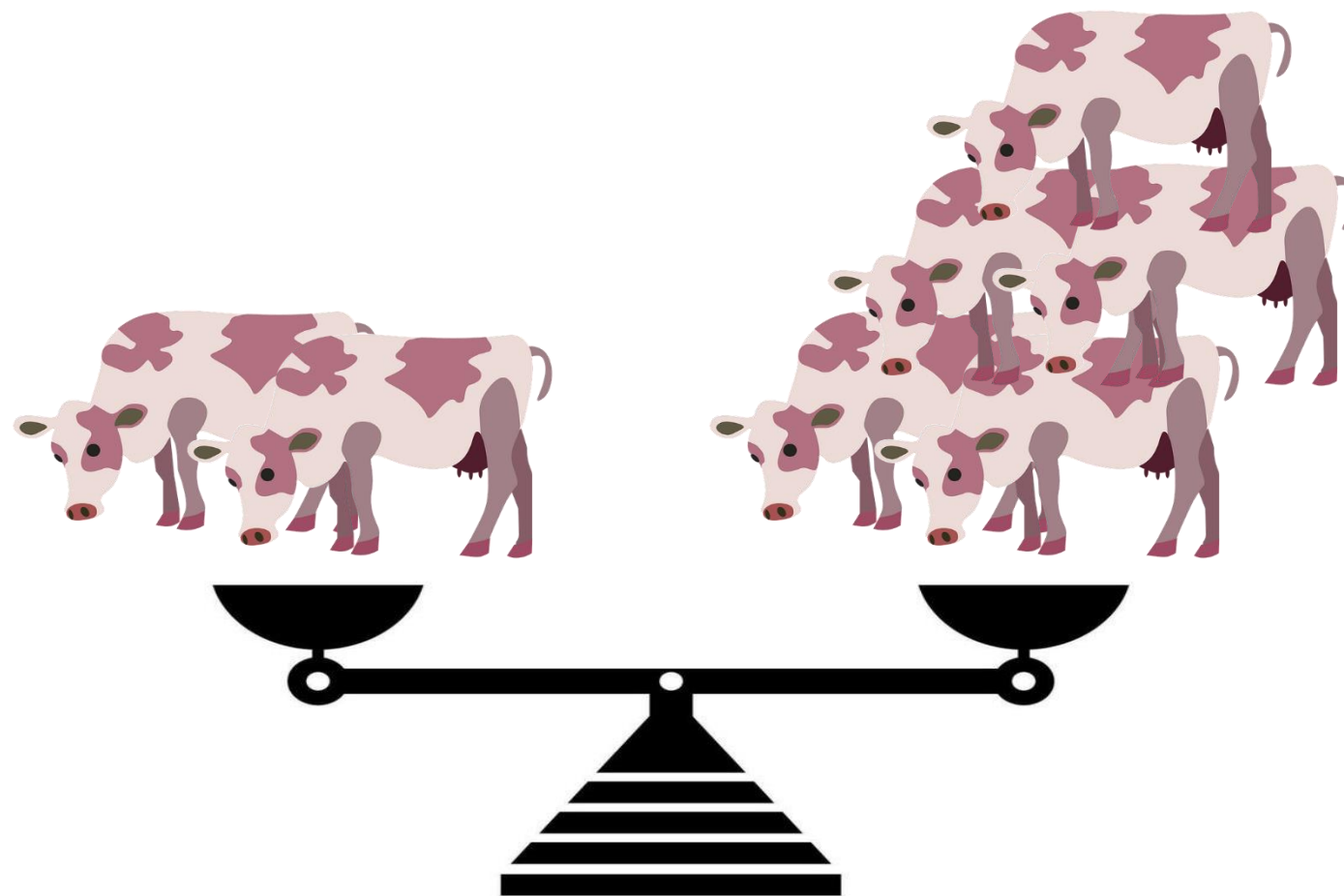
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Efficiency yes... but also yield



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Net protein yield of the production system (nPYPS)

Net protein yield of the
production system (nPYPS)

=



On-farm land area used



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Results

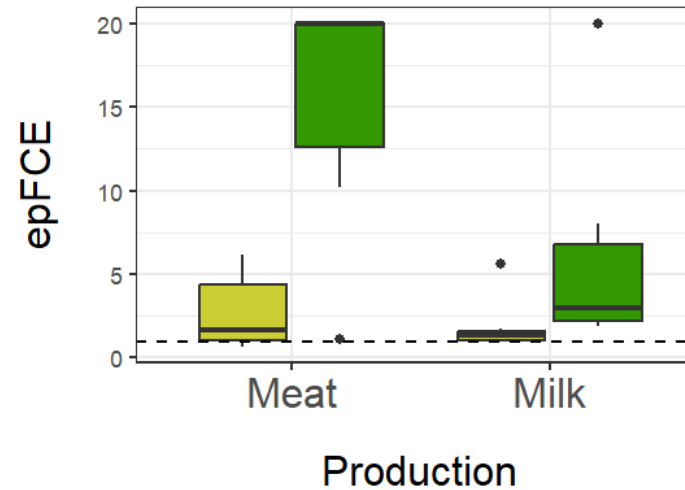
epFCE

- $>1 \rightarrow$ net protein producer
- A value of 2 indicates that 2 kg of animal protein are produced from 1 kg of human-edible animal feed.

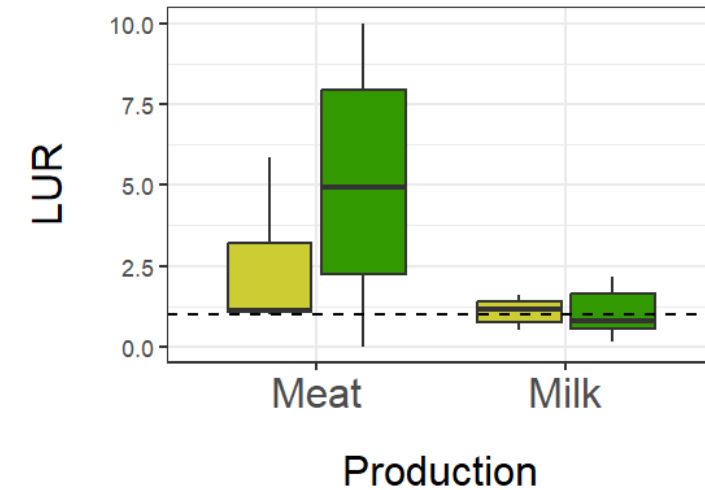
LUR

- $<1 \rightarrow$ net protein producer
- A value of 2 means twice as much human-edible protein could be produced with crops than with the cattle system.

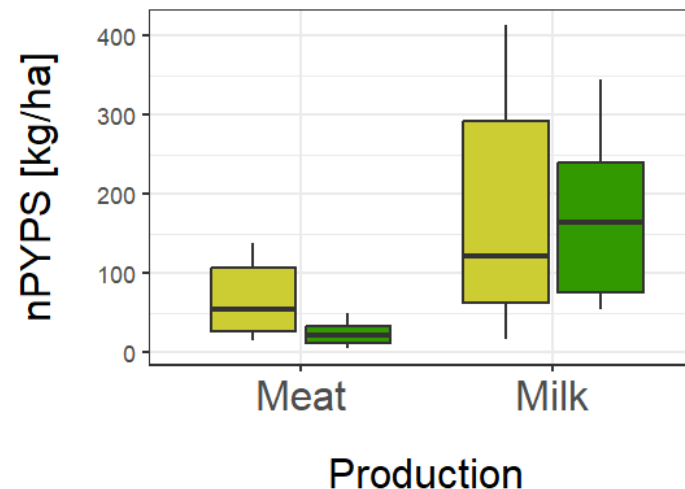
Edible protein feed conversion efficiency (epFCE)



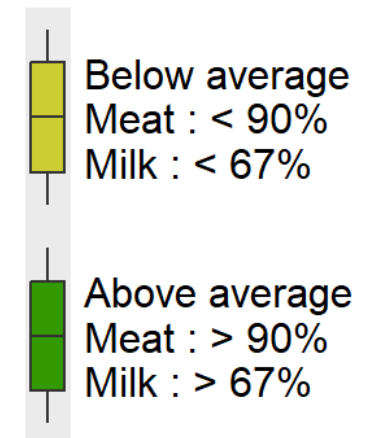
Land Use Ratio (LUR)



Net Protein Yield of the Production System (nPYPS)



Grass share



Improvement pathways

Edible protein feed conversion efficiency

- Non-human-edible concentrates
- Maximise grass in animal diets (reduce concentrates)
- Improve grassland management

Land Use Ratio

- Adapted land use
- Integrate food crops into crop rotations
- Valorise cover crops and temporary grasslands through livestock

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What's next?

- Advice / discussions with farmers to optimise one aspect of their system
- Combine human-edible protein crops with grasslands / catch crops
- Assess the financial implications of these changes

→ Increase total protein production
(animal and plant)

→ Reduce competition with human
food resources

*It is possible to reduce the
amount of cereals in cattle
diets without reducing
productivity, thereby increasing
cereal availability for sale.*

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References

- Ertl, P., Klocker, H., Hörtenhuber, S., Knaus, W., & Zollitsch, W. (2015). The net contribution of dairy production to human food supply : The case of Austrian dairy farms. *Agricultural Systems*, 137, 119-125. <https://doi.org/10.1016/j.agsy.2015.04.004>
- Ertl, P., Knaus, W., & Zollitsch, W. (2016). An approach to including protein quality when assessing the net contribution of livestock to human food supply. *Animal*, 10(11), 1883-1889. <https://doi.org/10.1017/S1751731116000902>
- Ertl, P., Zebeli, Q., Zollitsch, W., & Knaus, W. (2015). Feeding of by-products completely replaced cereals and pulses in dairy cows and enhanced edible feed conversion ratio. *Journal of Dairy Science*, 98(2), 1225-1233. <https://doi.org/10.3168/jds.2014-8810>
- Ineichen, S. M., Zumwald, J., Reidy, B., & Nemecek, T. (2023). Feed-food and land use competition of lowland and mountain dairy cow farms. *Animal*, 17(12), 101028. <https://doi.org/10.1016/j.animal.2023.101028>
- Laisse, S., Baumont, R., Dusart, L., Gaudré, D., Rouillé, B., Benoit, M., Veysset, P., Rémond, D., & Peyraud, J.-L. (2019). L'efficience nette de conversion des aliments par les animaux d'élevage : Une nouvelle approche pour évaluer la contribution de l'élevage à l'alimentation humaine. *INRA Productions Animales*, 31(3), 269-288. <https://doi.org/10.20870/productions-animales.2018.31.3.2355>
- Rouillé, B., Jost, J., Fança, B., Bluet, B., Jacquaroud, M. P., Seegers, J., Charroin, T., & Le Cozler, Y. (2023). Evaluating net energy and protein feed conversion efficiency for dairy ruminant systems in France. *Livestock Science*, 269, 105170. <https://doi.org/10.1016/j.livsci.2023.105170>
- Van Zanten, H. H. E., Mollenhorst, H., Klotwijk, C. W., Van Middelaar, C. E., & De Boer, I. J. M. (2016). Global food supply : Land use efficiency of livestock systems. *The International Journal of Life Cycle Assessment*, 21(5), 747-758. <https://doi.org/10.1007/s11367-015-0944-1>
- Wilkinson, J. M. (2011). Re-defining efficiency of feed use by livestock. *Animal*, 5(7), 1014-1022. <https://doi.org/10.1017/S175173111100005X>
- Zumwald, J., Nemecek, T., Ineichen, S., & Reidy, B. (2019). Indikatoren für die Flächen- und Nahrungsmittelkonkurrenz in der Schweizer Milchproduktion : Entwicklung und Test zweier Methoden.

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A scenic autumn landscape featuring a grassy field in the foreground with three black cows grazing. The field is bordered by a wire fence. In the background, there are trees with some autumn-colored foliage and a building partially visible through the trees under a clear blue sky.

Thank you for your
attention!