

Evaluating food-feed competition in Ireland's dairy sector

Donagh Hennessy^{1,2}, Hannah H.E. Van Zanten², Laurence Shalloo¹ and Imke J.H. de Boer²

¹Teagasc, Animal & Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork; ²Animal Production Systems group, Wageningen University & Research, Wageningen, the Netherlands

Summary

- Currently, Irish dairy farming is a net positive contributor to the global protein supply.
- The average Irish dairy cow produces significantly more protein from the same land than if it was used for crop production.
- For every 1 kg of human edible protein consumed by a dairy animal it produces 4.92 kg of human edible protein.

Introduction

There is a significant debate on the role that livestock will take in future food systems. Feed-food competition is said to occur when crop and land-area is used for livestock feed rather than more efficient food crop production. This can lead to the argument that land used for livestock feed instead of crops for human consumption may cause a net loss to the global supply of protein. This argument considers land-use efficiency, examining whether the potential protein from crop production that is foregone for livestock-feed, is greater than the protein provided by the livestock animal. While there is evidence supporting this argument in all livestock systems, much depends on the type of feed used to produce the protein. Therefore examining whether Ireland's current dairy system is an efficient use of land is important when assessing its future role in global protein production. This is done by assessing the feed footprint of an average dairy cow, calculating the area of land its feed was harvested from and calculating the potential yield of crop-based protein from that area.

The National dairy cow

Using production data from the 2015 National Farm Survey, an average dairy cow to represent the entire national herd was compiled, this includes the feed consumed as a heifer divided across all lactations, with an average lactation yield of 436 kg of milk solids.

The current edible protein efficiency of this cow was calculated as producing 4.92 kg of human edible protein for every 1 kg of human edible protein consumed. The cow's intake includes 3,840 kg DM in the form of grass and silage and 873 kg DM of ration, a blend of barley, soya, molasses and by-products. By-products are not included as they are not considered drivers of land-use.

Calculating the protein production from crop production

The land-use efficiency is calculated by using the Land-Use Ratio. This is done by dividing the potential crop protein yield from the land-area foregone against the protein produced by the dairy cow. Quantifying the plant protein foregone is done using FAOSTAT for national average yields to calculate the area of land used both nationally and internationally to feed the dairy cow. This included the land-area that is currently under pasture that is suitable for crops. This land-area is then replaced with crops, using the six most globally common annual crops with the highest protein yield chosen. The protein yields only consider human edible protein of the plant and animal protein.

Results

Figure 1 below illustrates a comparison animal protein against plant protein foregone for the National Farm Survey average dairy cow.

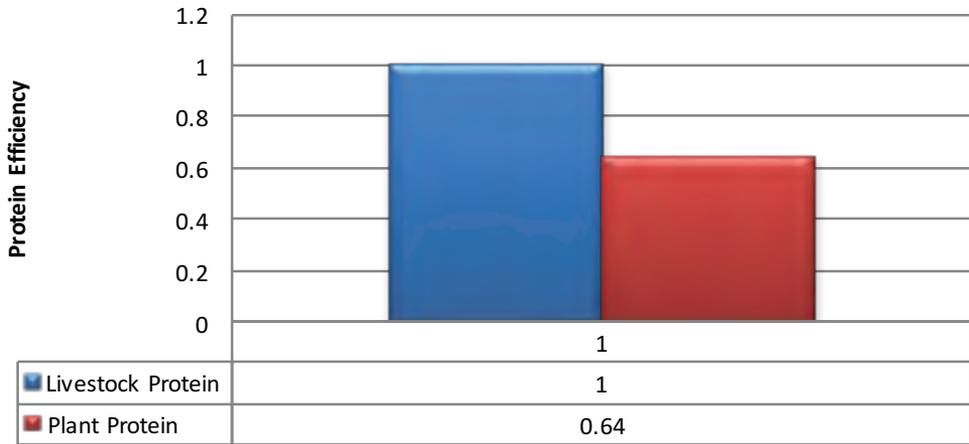


Figure 1. Land use ratio of the average Irish dairy cow

Currently the average Irish dairy cow is a more efficient use of land for protein than crop production. When taking into account actual human digestibility, plant protein could only replace 64% of the typical dairy animal protein from the same land area.

Conclusions

The average Irish dairy cow is a net contributor to the global protein supply. This is primarily due to the use of highly productive grasslands to feed the Irish cow, demonstrating that food feed competition does not occur in the Irish dairy sector. When considering the global environmental impact that agriculture has, efficient land-use and environmental efficiency may not be in direct plant production but instead from efficient animal production.

