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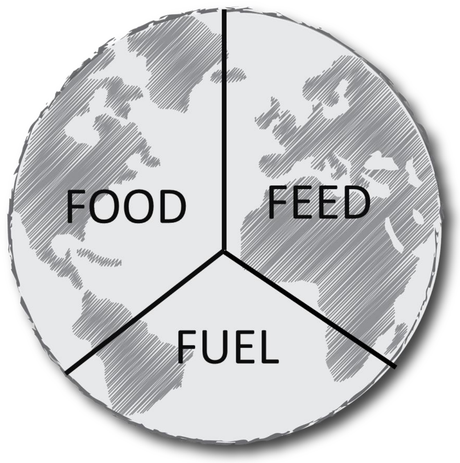
A systematic review of food-feed-fuel competition

A. Muscat[1], R. Ripoll-Bosch[1], E.M. de Olde[1], I.J.M de Boer[1]
[1]Animal Production Systems group, Wageningen University, PO Box 338, 6700 AH Wageningen, the Netherlands

Background



- **FOOD**: 9.7 billion people in 2050 means growing demand for food
- **FEED**: In 2050 humans will eat more animal protein than they do today
- **FUEL**: Bioenergy demand set to increase in EU to meet emission targets by 2050

- Resources such as **land, water, labour** and **capital** needed for the production of food, feed and fuel are **limited**

Aim

To identify when food, feed and bioenergy production compete for resources (trade-offs) or not (synergies), and solutions to address trade-offs

Methodology

- Used systematic review methods
- We found 2861 records based on three scientific databases
- We narrowed our selection down to 69 records using selection criteria

Trade-offs and Synergies

- At current rates of animal consumption, shifting use of industrial by-products from animal feed to bioenergy meant a higher environmental burden

- Ambitious bioenergy policies put pressure on land, increased land rents and food prices

- Planting bioenergy crops on marginal land reduced food price impacts but cost society capital

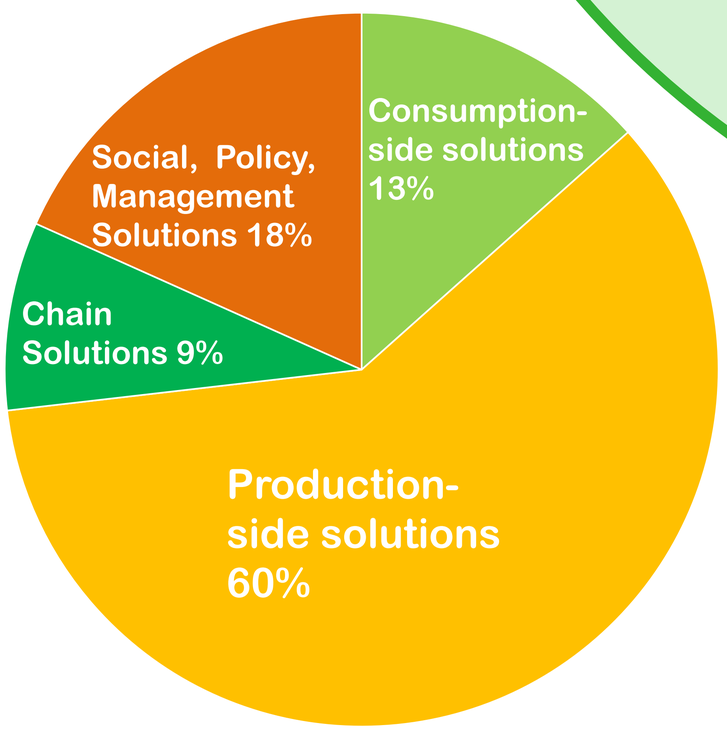
- Biofuel by-products used as animal feed reduced overall land use for animal production

- Feeding animals food we cannot eat resulted in better environmental performance

- Unlike maize, anaerobic manure digestion produces biogas without competition for food and feed production

Solutions

- Nearly half of the studies (48%) did not recommend any solution



Conclusions

- **Large number of trade-offs found in studies shows the challenge to balance food-feed-fuel uses in the future**

- **The presence of many production-side solutions shows more research needs to be done in a holistic way**

- **Large diversity of solutions shows that we will need multiple strategies to address the issue**

Societal Impact of Research

✓Contributes to discussions on the European bioeconomy and circular economy
✓Contributes to discussions surrounding SDG 2 and 7 on food and energy security

Contact: abigail.muscat@wur.nl

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