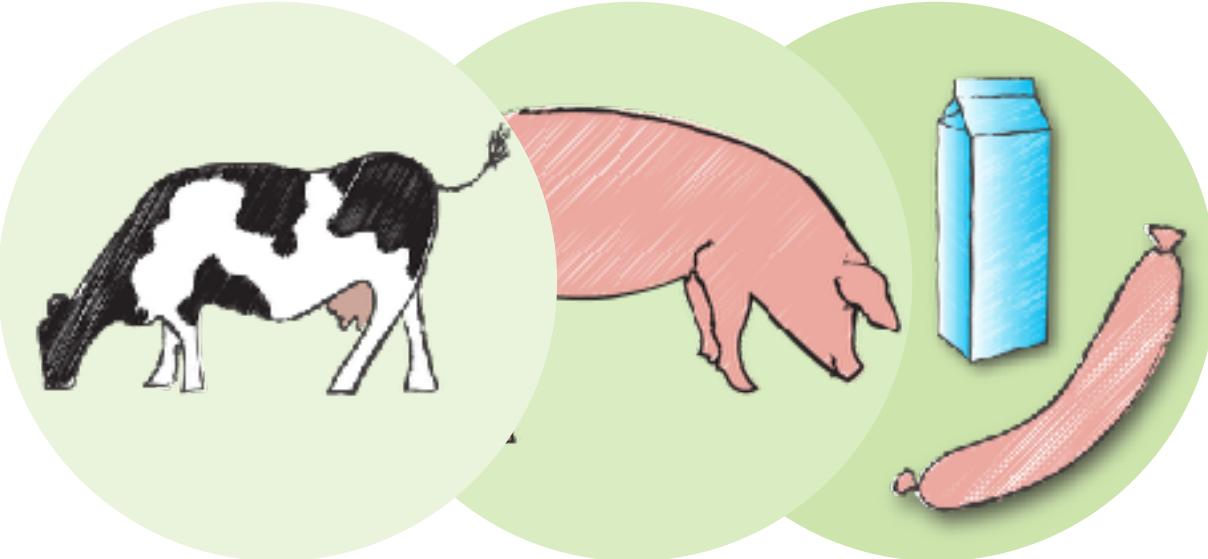
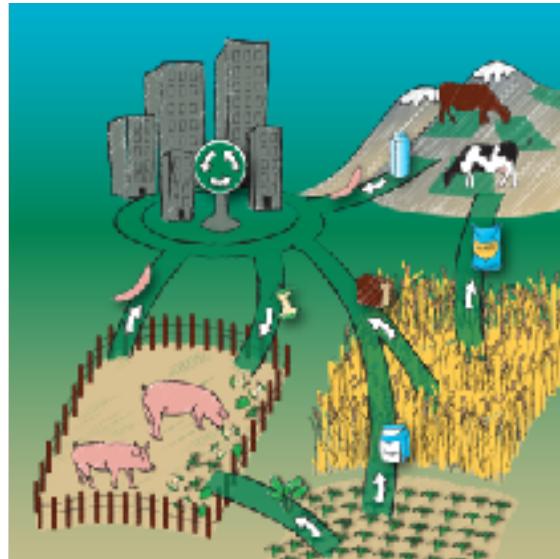


The role of animal source food in sustainable diets

Hannah van Zanten

Animal Production Systems group, Wageningen University, Wageningen
the Netherlands.

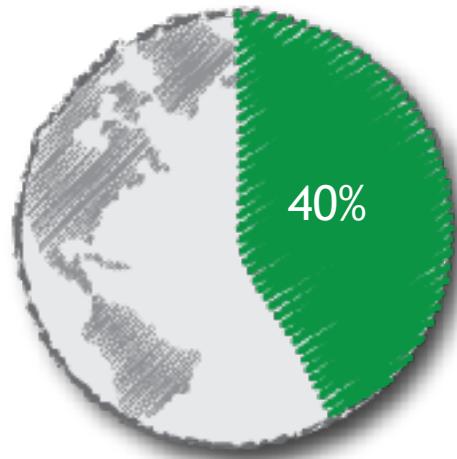


We agree on the challenge

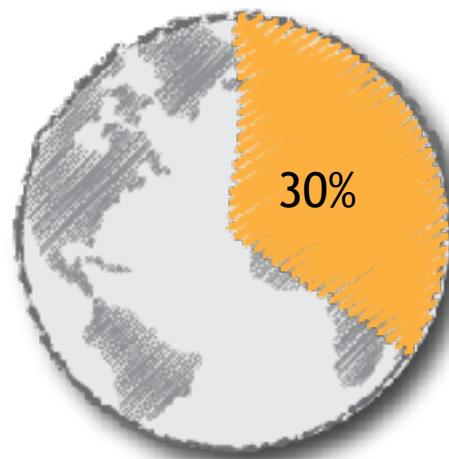
9-10 billion in 2050



Large environmental impact

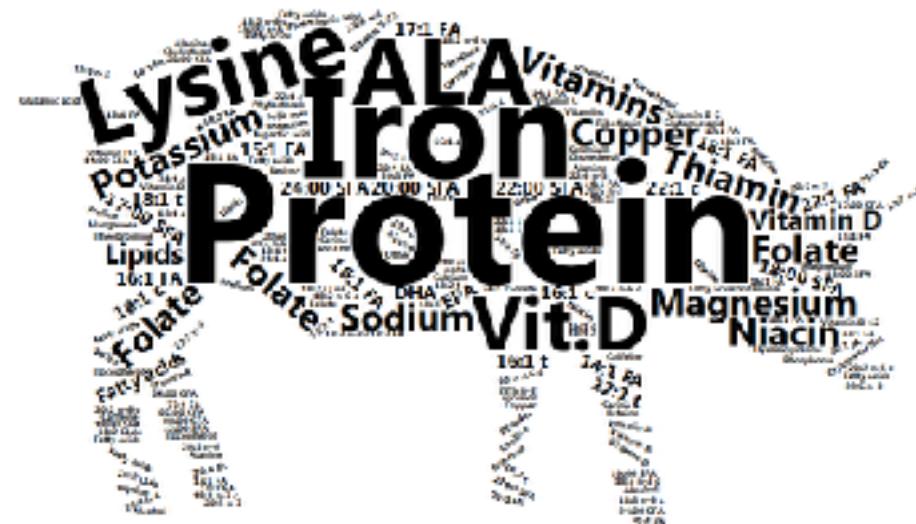
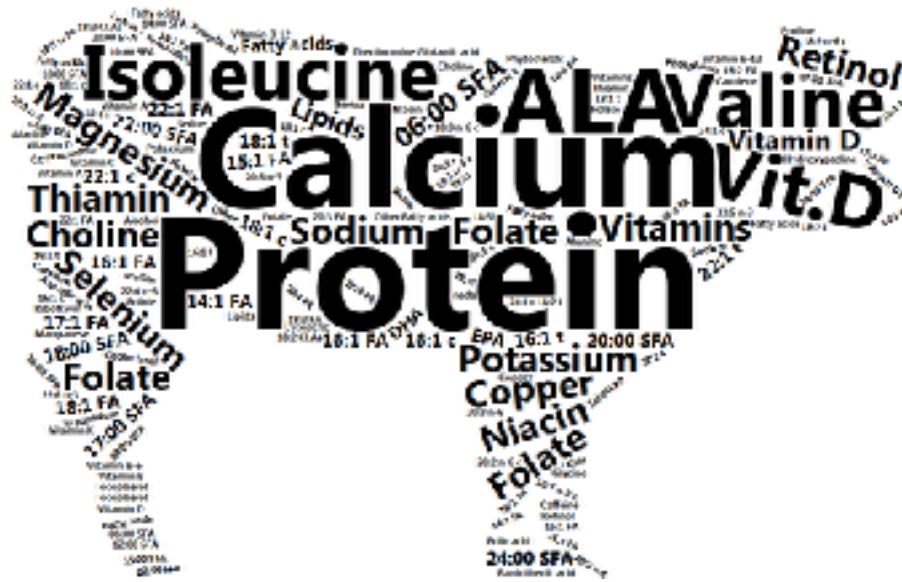


World arable land



World grain production

ASF provide macro- and micronutrients



What role, if any, can animals play?



Different narratives

Today.....

Production narrative
“Produce more with less”

Consumption narrative
“Eat less, no ASF”

Circular narrative
“efficient land use”

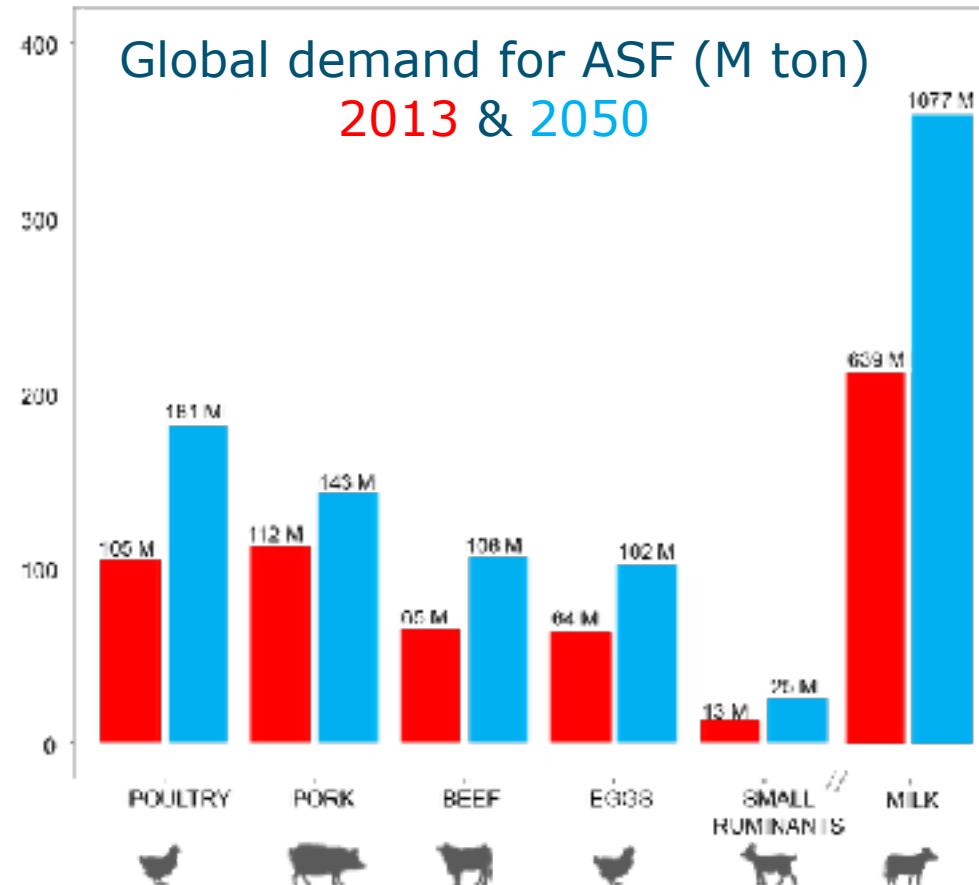
Feed sources for livestock:
Recycling towards a green planet



Produce more with less - production narrative -



Unarticulated assumptions: we **have** to meet global demand

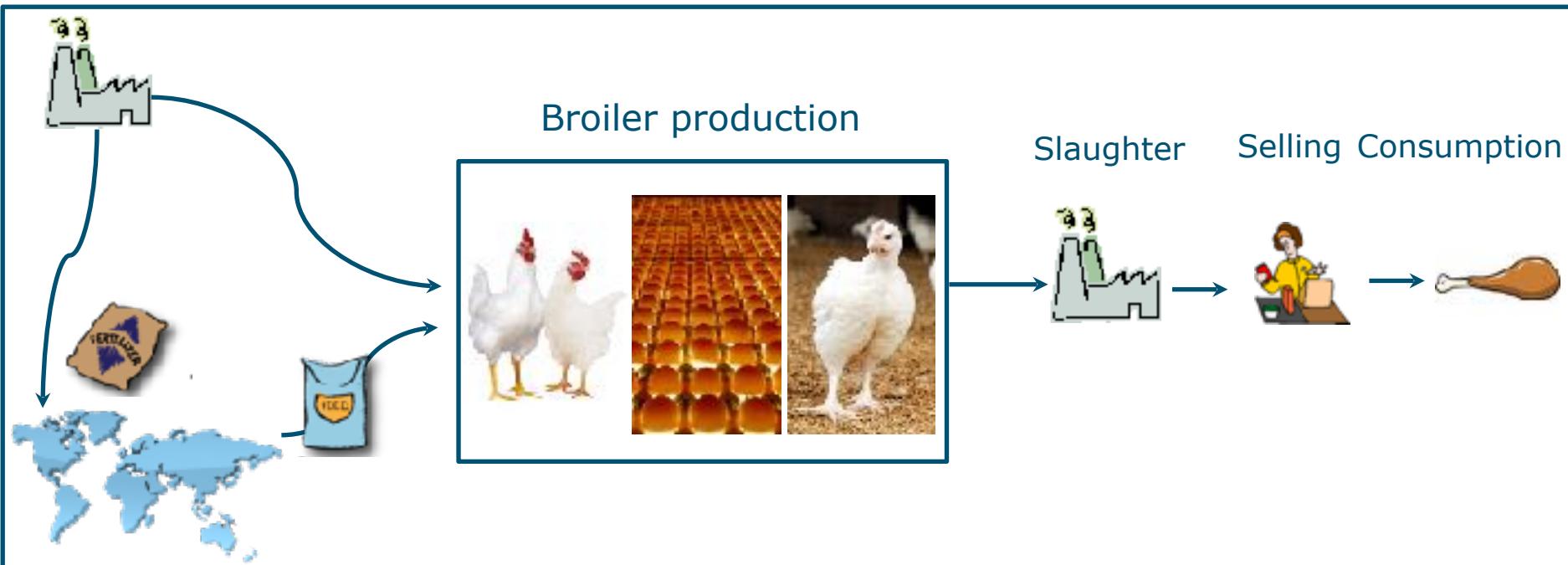


Scientific approach: reduce environmental impact per unit of ASF

Produce more with less

- production narrative -

Reduce environmental impact per unit of ASF



METRIC
resource use or emissions in chain
unit of ASF



Solutions

- production narrative -

- Higher crop yields per unit of land/energy/P - Nature 2011
- Improving feed efficiency - PNAS 2008
- Improving life-time productivity (rBST) - PNAS 2008
- Use fast-growing broilers – Poultry Science 2012
- From grass-based to mixed ruminant systems - PNAS 2014
- Improve animal health – Journal of Cleaner production 2017

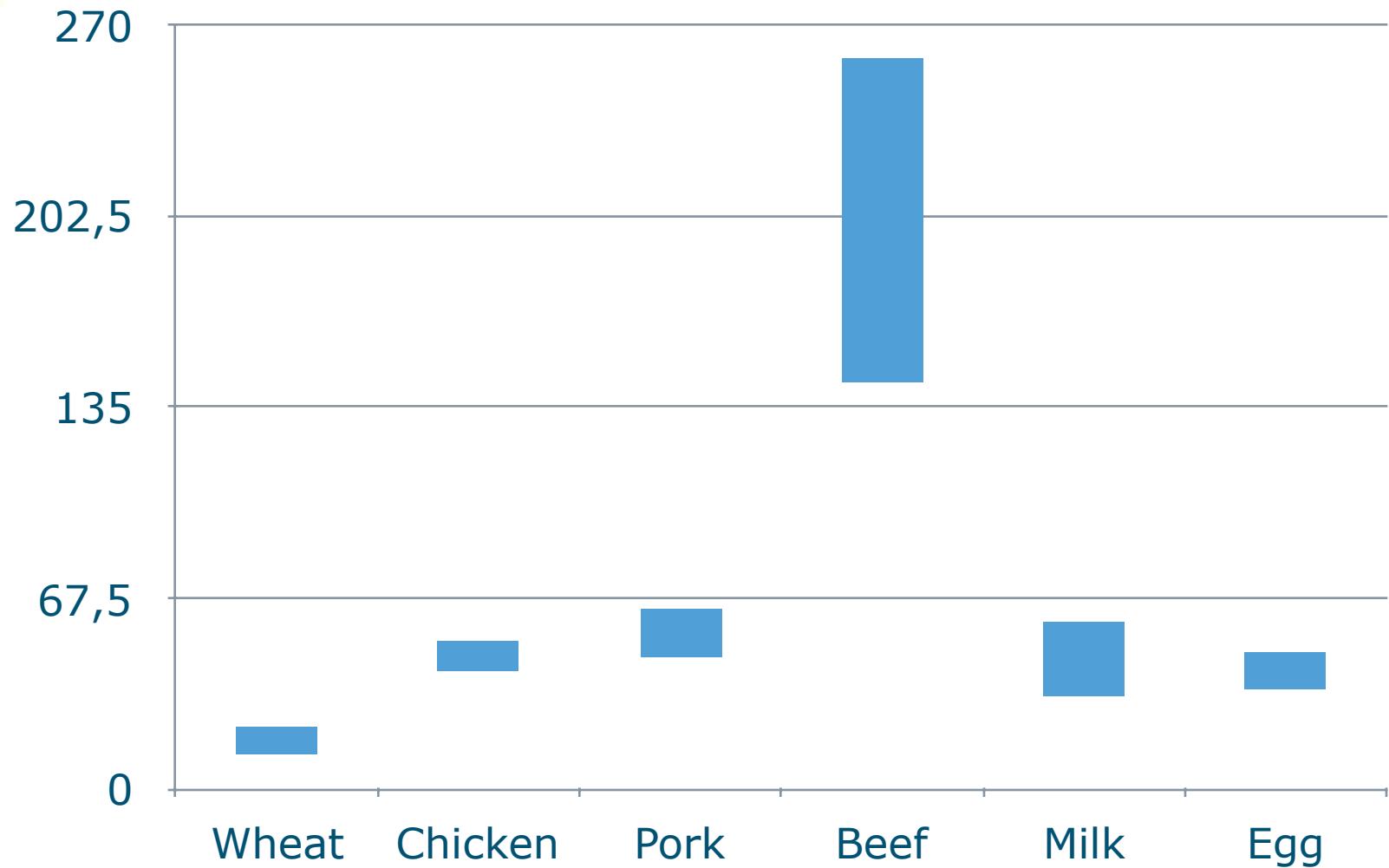
Sustainable intensification of crop and animal production

Consume less, better or no ASF

- consumption narrative -



- Land footprint: m² per kg edible protein -



Consume less, no or better ASF

- consumption narrative -

METRIC



Annual consumption per person

×

Footprint per product

kg milk

m² per kg milk

kg pork

m² kg pork

kg cod

m² kg cod

kg potatoes

m² kg potatoes

kg beans

m² kg beans

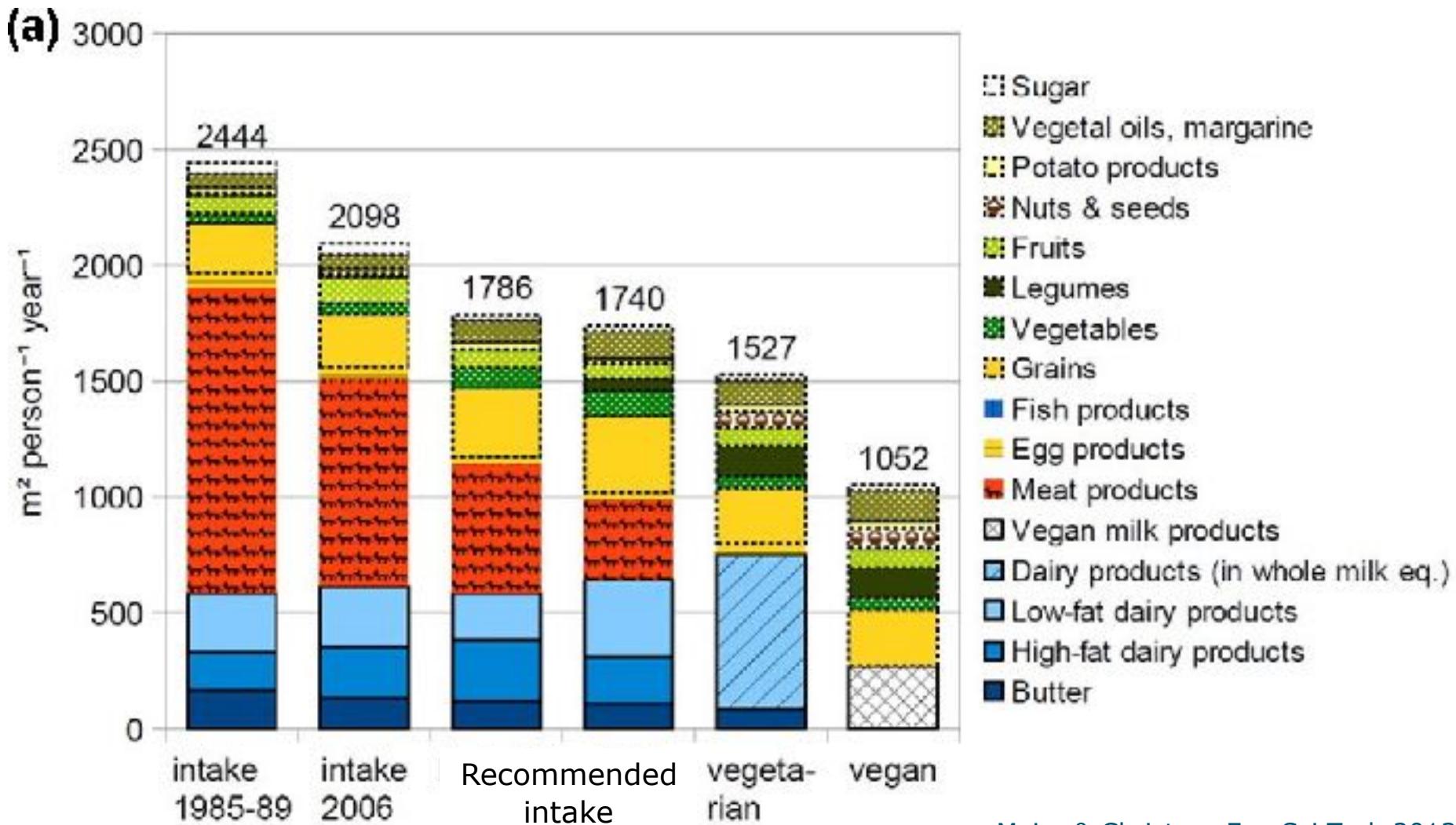
....

....

Underlying metric is the same as for production narrative

Consume less, no or better ASF

- consumption narrative -



Solutions

- consumption narrative -

- Become vegetarian or vegan
- Replace “red meat” by “white meat” or “fish”

Lower footprint per kg protein & kcal

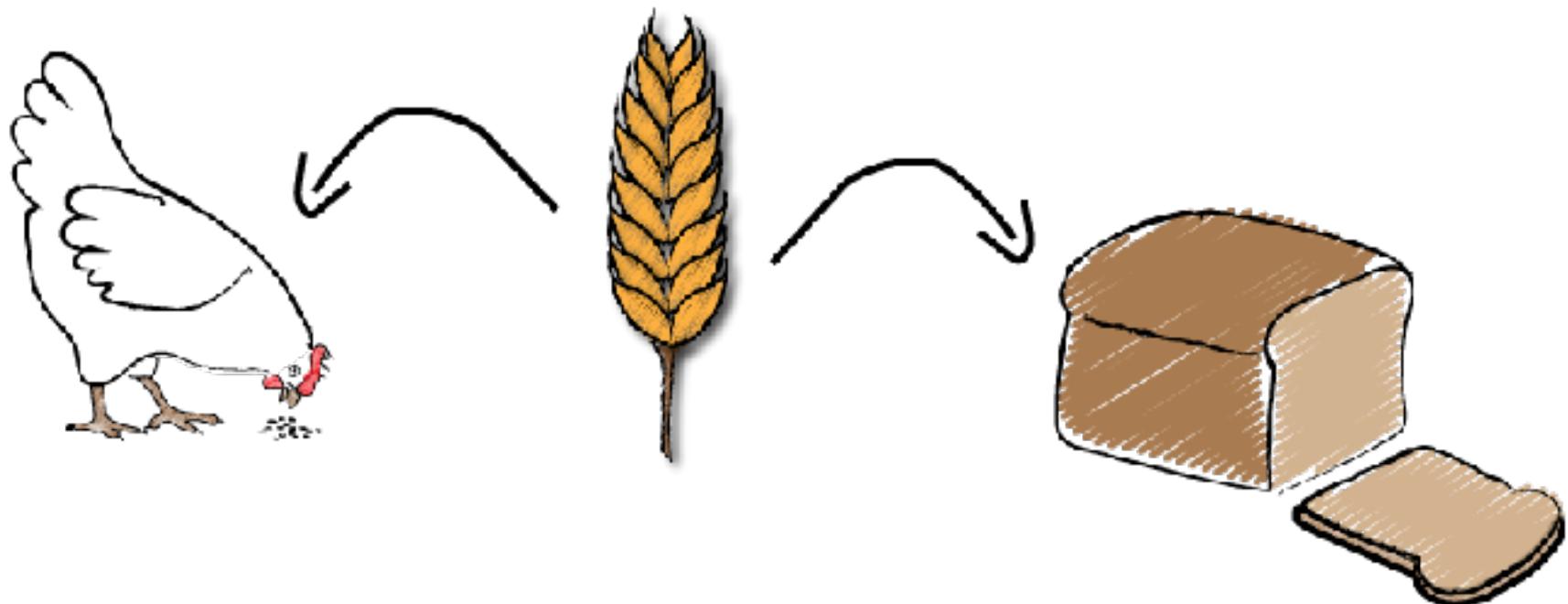




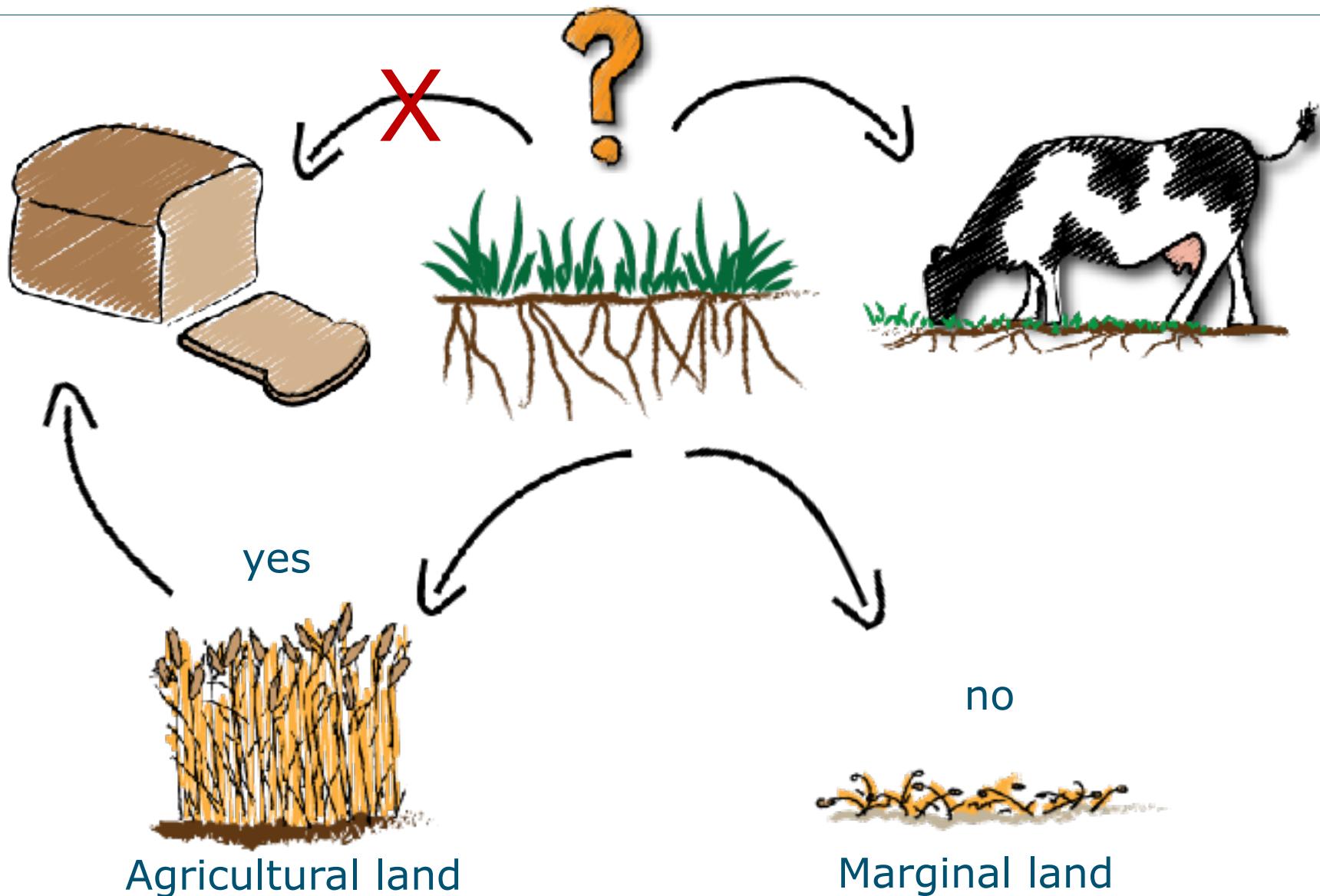
Footprint studies ignore

- “product-packages”
no milk without meat, no sugar without beet-pulp
- “feed-food” competition

Direct competition



Indirect competition



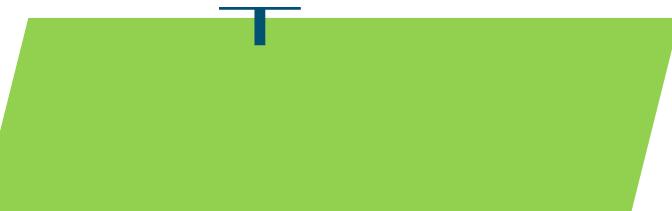
Land use ratio

Van Zanten et al. (2016; IJLCA)

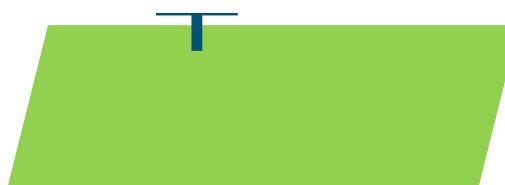
Land feed



→ kg HDP plant prod



→ kg HDP plant prod



→ kg HDP plant prod

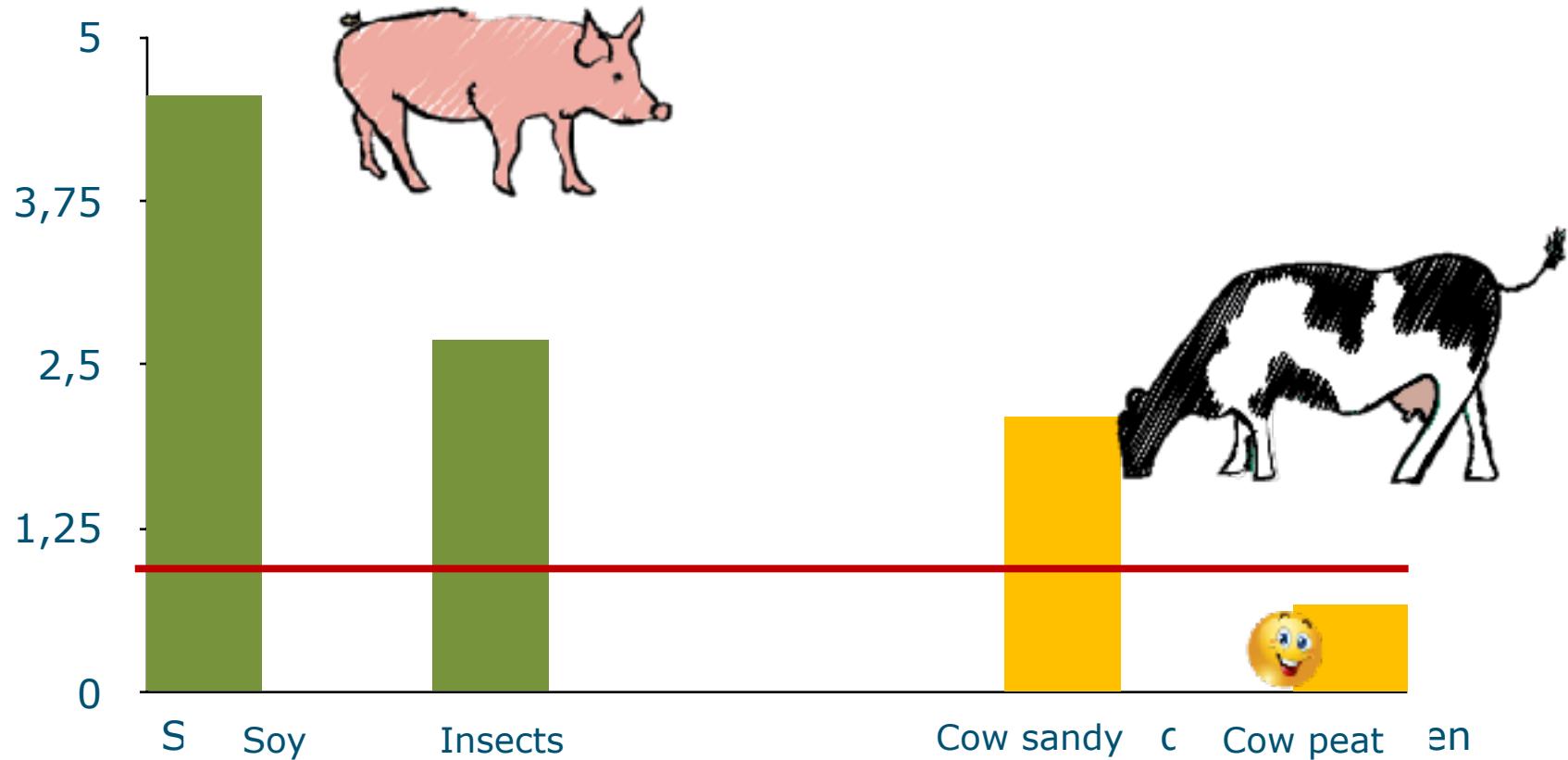


1 kg human digestible protein
(HDP) from animal

$$\frac{\sum \text{HDP plant prod}}{\text{HDP kg from animal}}$$

Results

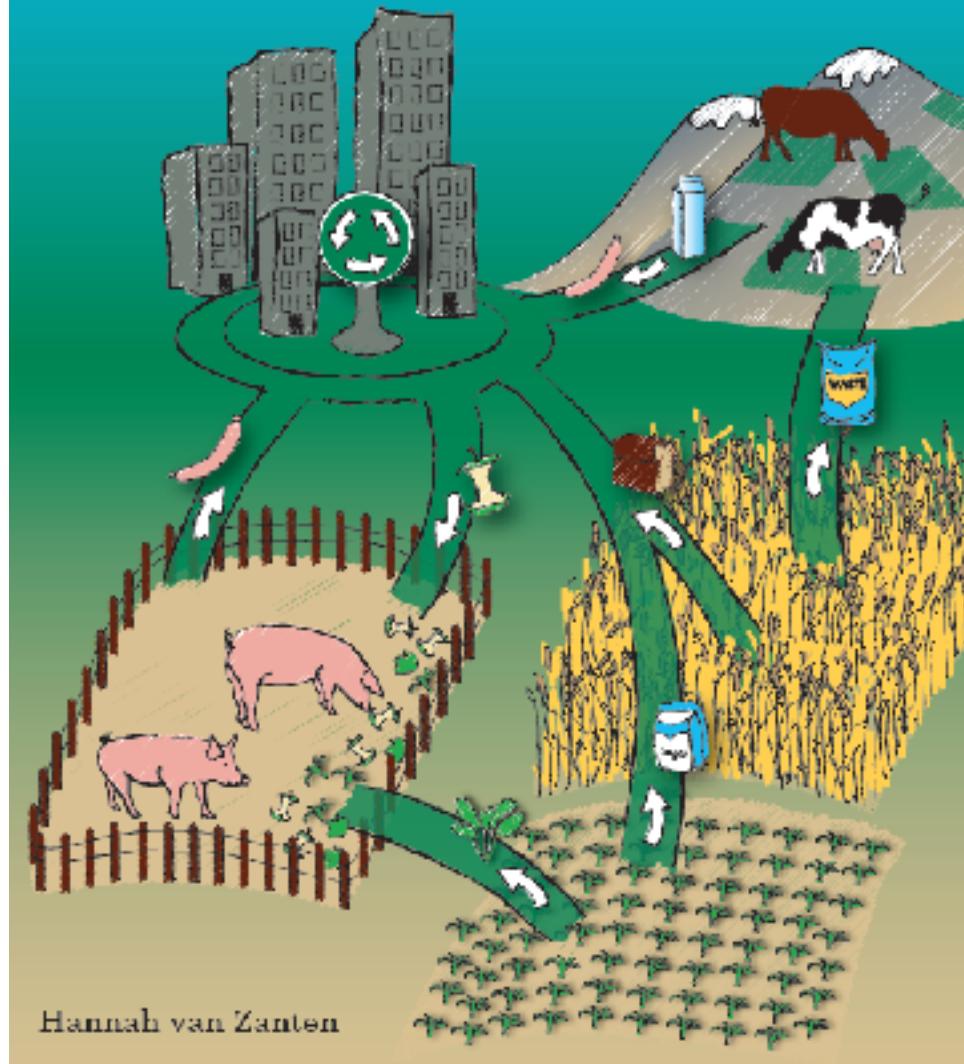
<1 animal production more efficient



Conclusion: livestock production can be more efficient than crop production but systems should change

How Much?

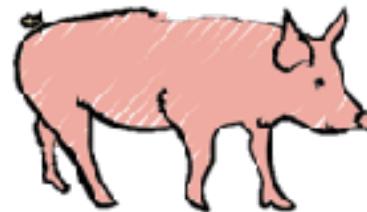
Feed sources for livestock:
Recycling towards a green planet.



How
much?

How much??

- Co-products



14 g protein per day

- Food-waste



3 to 7 g protein per day



21 g protein per day

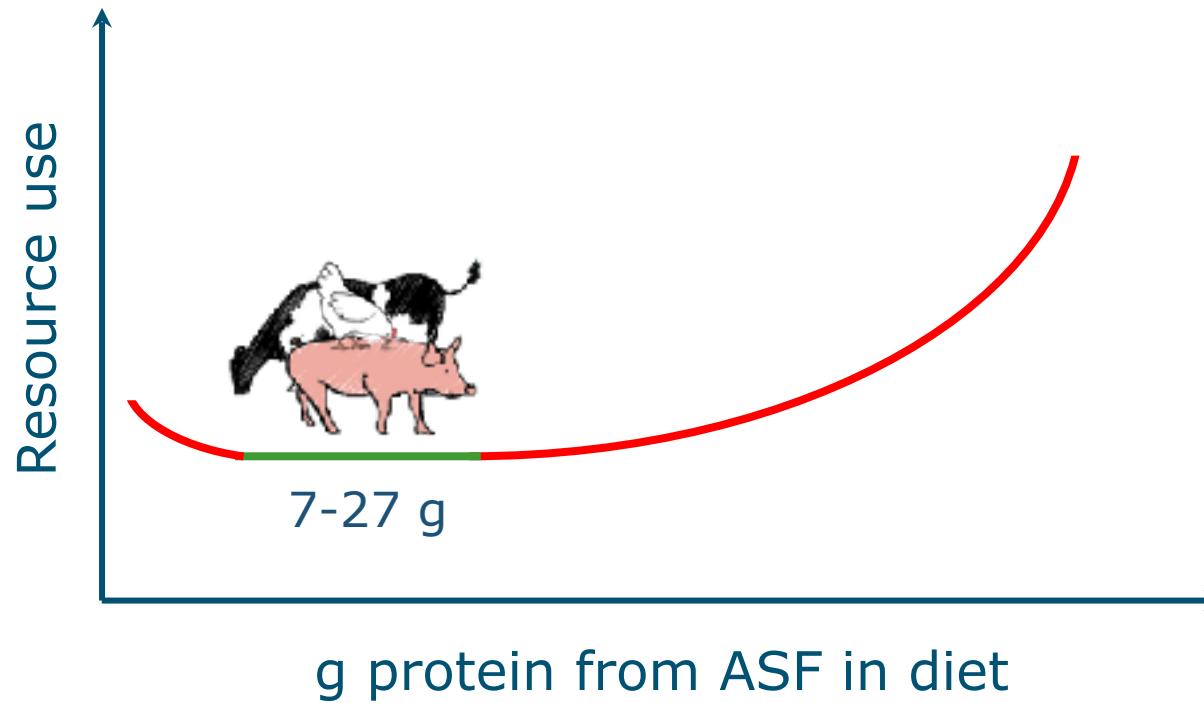
60 g protein needed

Livestock important role in global food supply

Animals are essential for food production

- circular narrative -

Unarticulated value: animals value “leftover” streams



Not increasing efficiency of the animal but
increasing efficiency of food system

Solutions

- circular narrative -

- Biomass at highest utility ≠ highest animal productivity
- Improve utilization of leftovers
 - breeding: animals efficiently convert leftovers
 - fungi, insects on manure, food waste
 - role of fish, algae?
- Moderate consumption of ASF

Thank you

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