



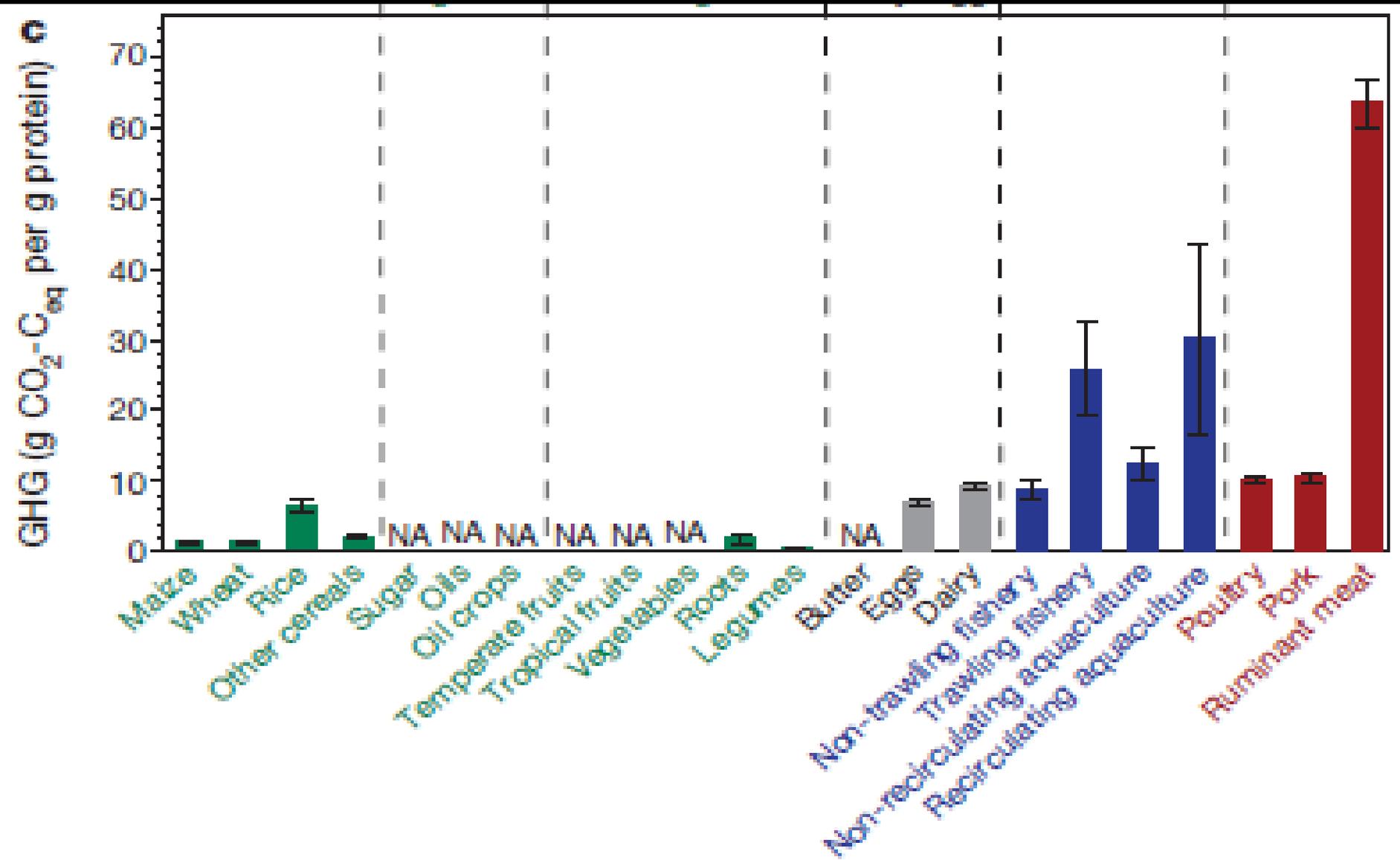
What is a sustainable food system – Considerations on efficiency, consistency and sufficiency

Adrian Muller

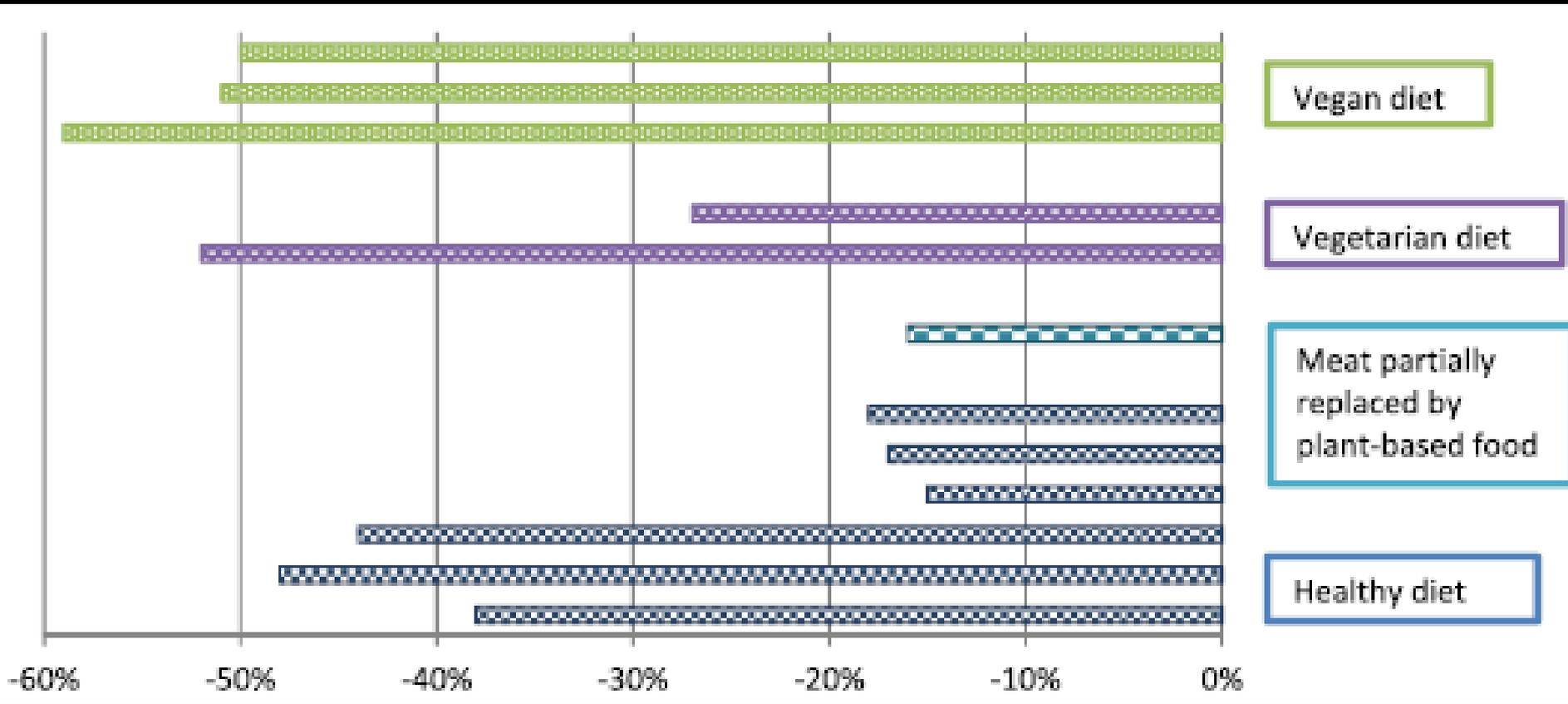
adrian.mueller@fibl.org

Working Seminar of The Finnish Organic Research Institute,
Helsinki, Finland (via Skype)

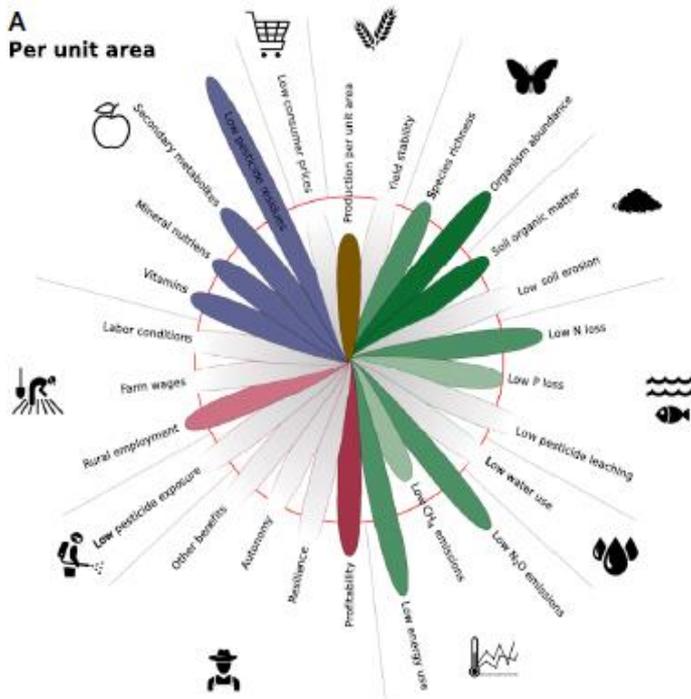
24.4.2018



Land use



A Per unit area

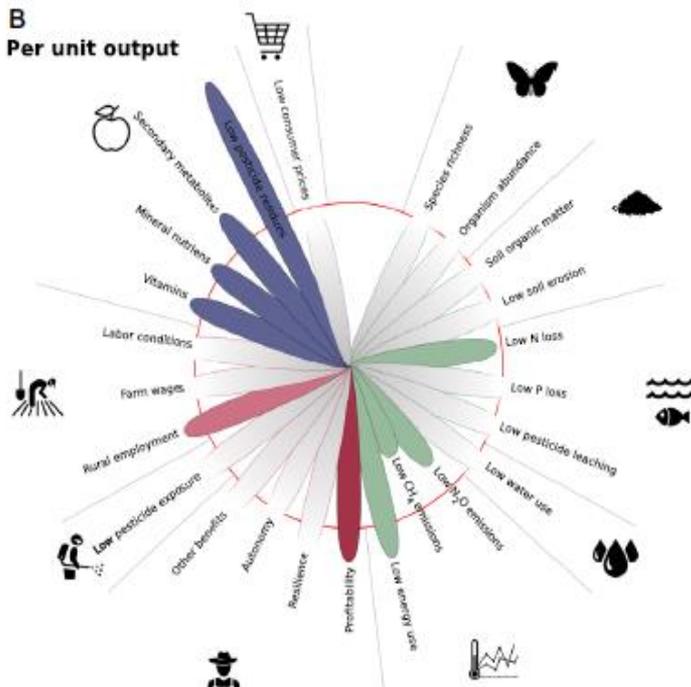


Uncertainty

Low
Medium
High

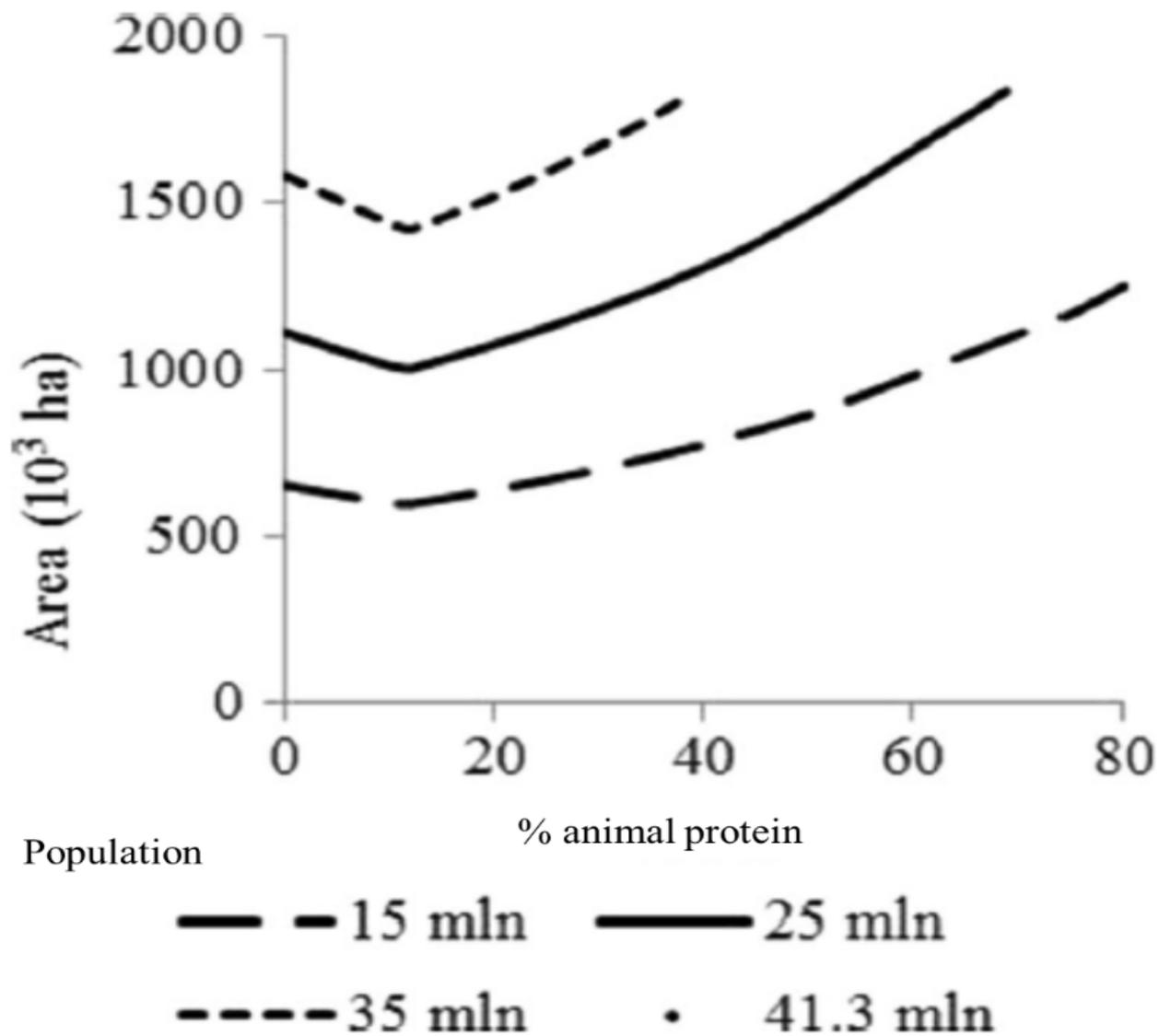


B Per unit output



What is a sustainable food system?

Vegan and organic?



land use

billion hectares

land occupation:

■ current situation: base year
 ■ 2050: reference scenario
 ■ 2050: food - not feed



diets

energy supply

kcal per cap per day

● livestock products
 ● plant products

total: 2763

total: 3028

total: 3028



current situation:
base year

2050:
reference scenario

2050:
food - not feed

protein supply

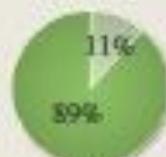
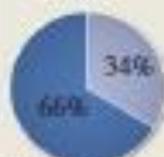
g protein per cap per day

● livestock products
 ● plant products

total: 77

total: 82

total: 78



current situation:
base year

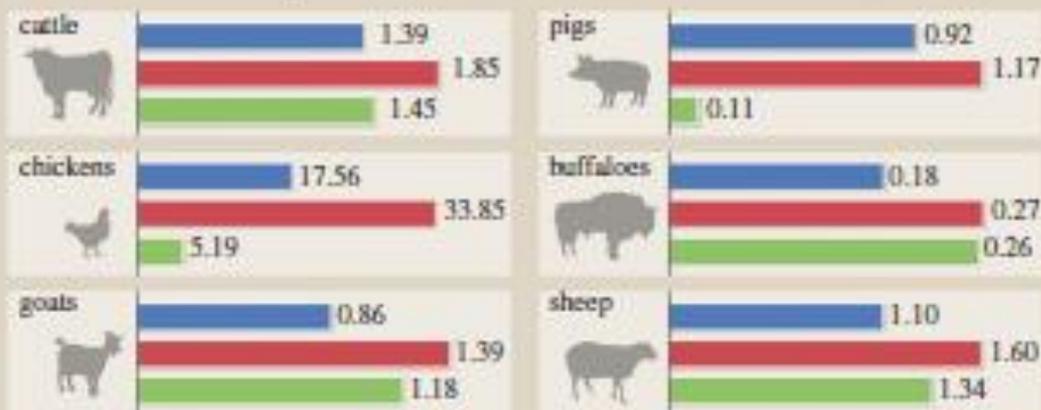
2050:
reference scenario

2050:
food - not feed

livestock

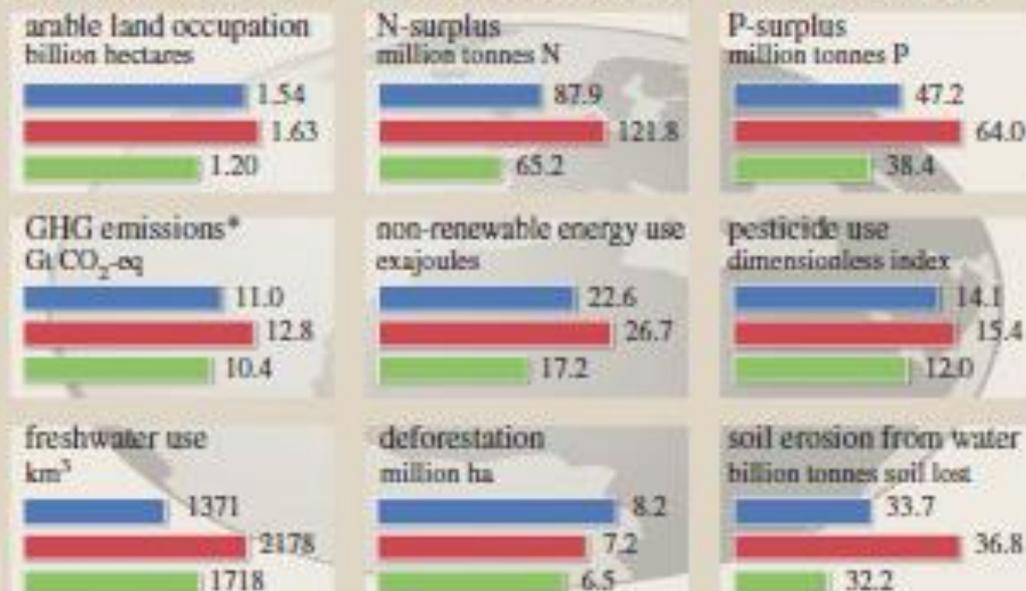
billion animals

■ current situation: base year ■ 2050: reference scenario ■ 2050: food - not feed



environment

■ current situation: base year ■ 2050: reference scenario ■ 2050: food - not feed



* GHG emissions include emissions from input provision, deforestation and organic soils.

Relative change in land use

Climate change impact on yields

Zero

Medium

High

% Organic

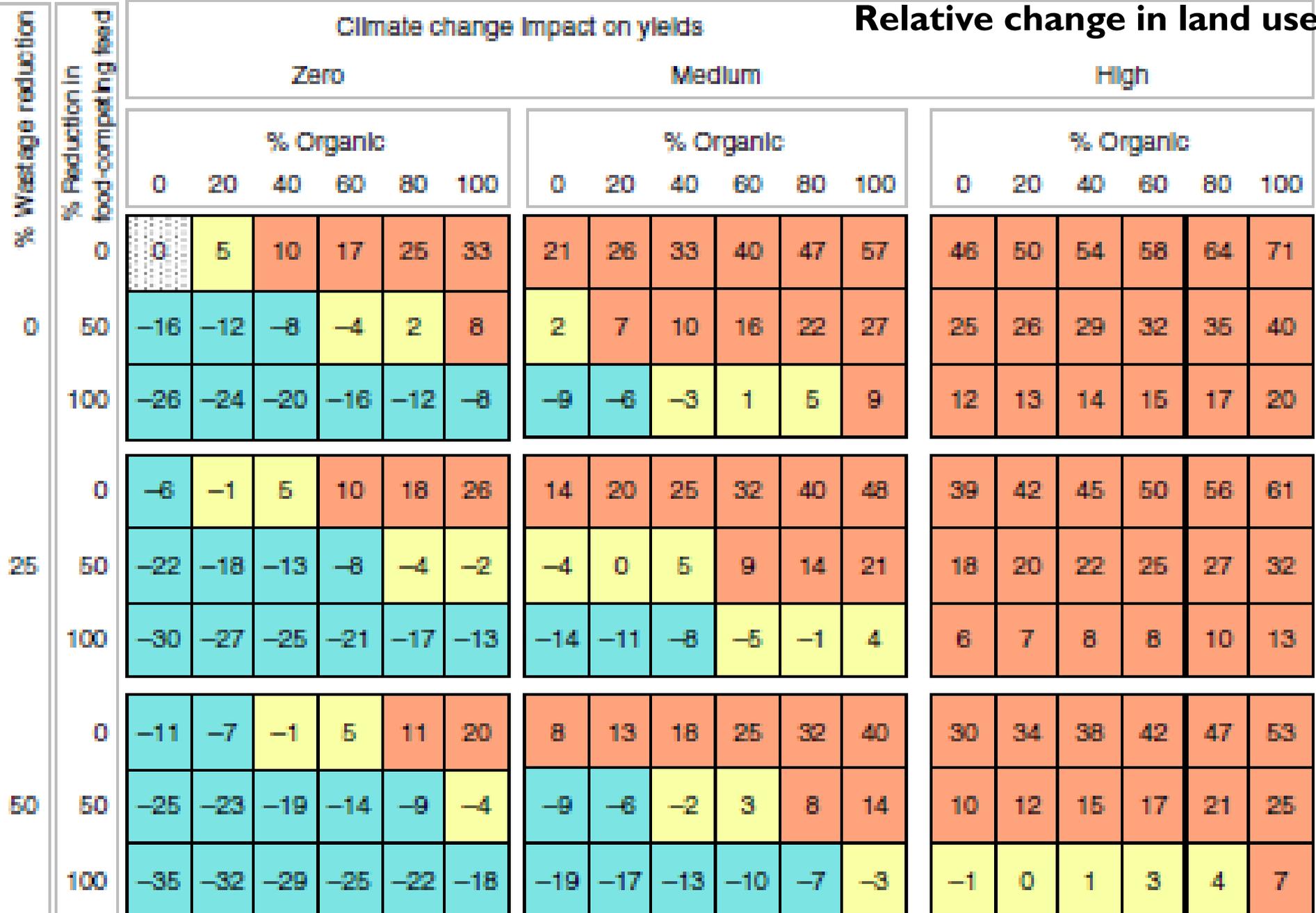
% Organic

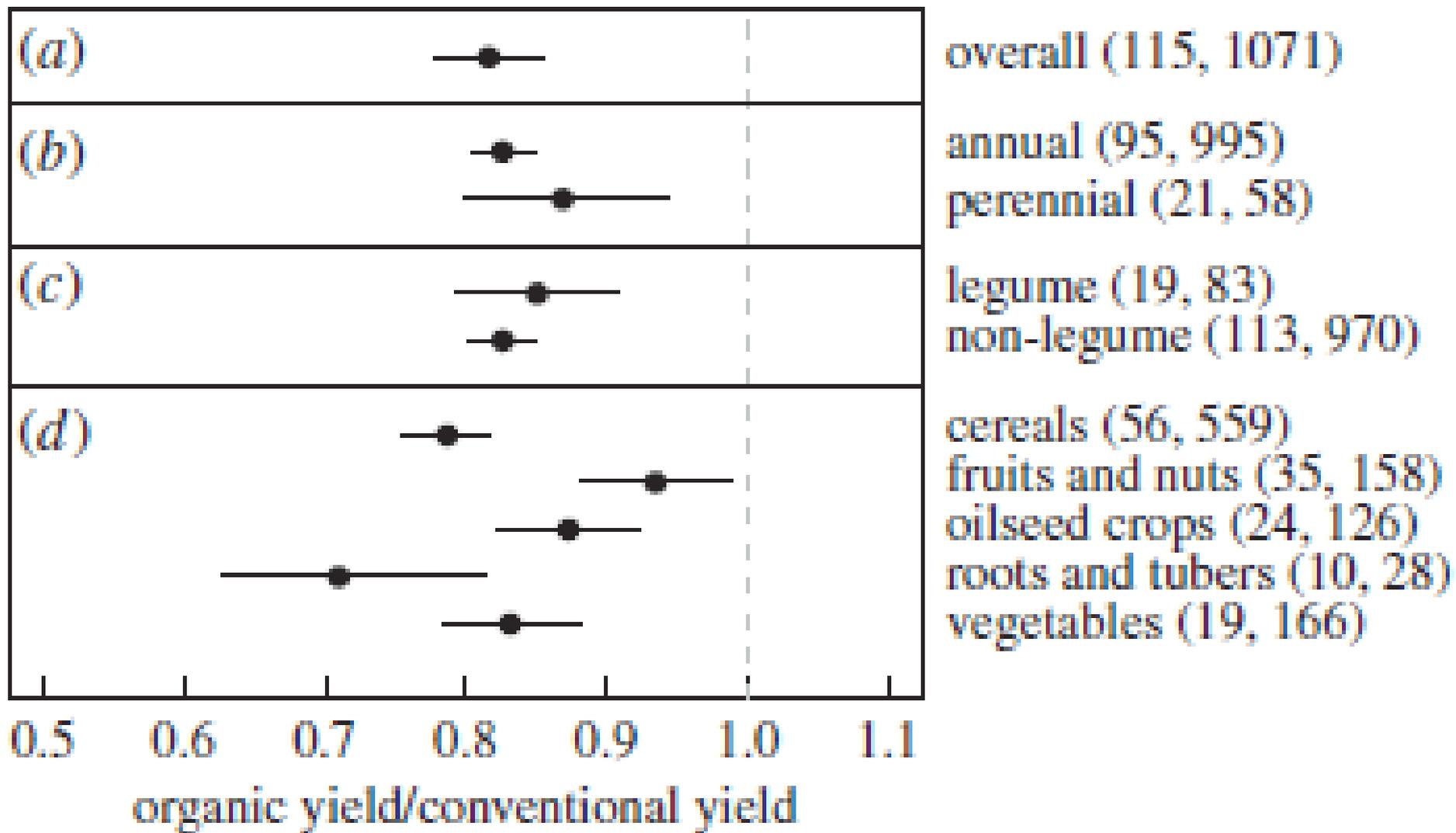
% Organic

0 20 40 60 80 100

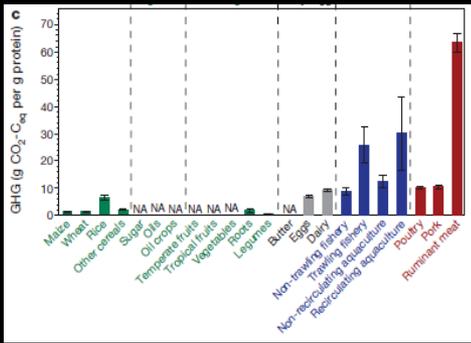
0 20 40 60 80 100

0 20 40 60 80 100

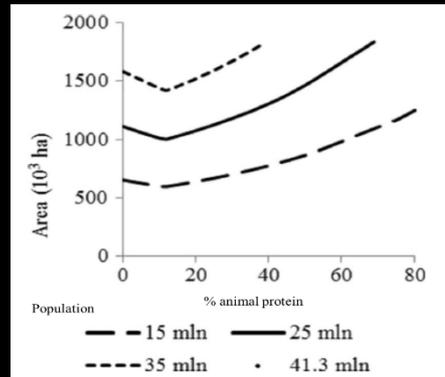




Efficiency



Consistency



Sufficiency

Climate change impact on yields

% Weight reduction % Reduction in food-competing land	Zero			Medium			High											
	% Organic			% Organic			% Organic											
	0	20	100	0	20	100	0	20	100									
0	8	5	10	17	25	33	21	26	33	40	47	57	46	50	54	58	64	71
50	-16	-12	-8	-4	2	8	2	7	10	16	22	27	25	26	29	32	35	40
100	-26	-24	-20	-16	-12	-8	-9	-6	-3	1	5	9	12	13	14	15	17	20
25	-6	-1	5	10	18	26	14	20	25	32	40	48	39	42	45	50	56	61
50	-22	-18	-13	-8	-4	-2	-4	0	5	9	14	21	18	20	22	25	27	32
100	-30	-27	-25	-21	-17	-13	-14	-11	-8	-5	-1	4	6	7	8	8	10	13
50	-11	-7	-1	5	11	20	8	13	18	25	32	40	30	34	38	42	47	53
75	-25	-23	-19	-14	-9	-4	-9	-6	-2	3	8	14	10	12	15	17	21	25
100	-35	-32	-29	-25	-22	-18	-19	-17	-13	-10	-7	-3	-1	0	1	3	4	7

**We have to reduce
the size of the food system
to gain room
for more extensive production systems.**

**We need systems
that perform reasonably well along all indicators
but need not be maximally performing
on any single one.**

What is a sustainable food system?

Less concentrate feed

Less animal products in diets

Less food loss and wastage

More organic production

N surplus (kg N/ha)

Climate change impact on yields

Zero

Medium

High

% Organic

% Organic

% Organic

0 20 40 60 80 100

0 20 40 60 80 100

0 20 40 60 80 100

% Wastage reduction
% Reduction in food-competing feed
0
25
50

0	25	21	15	10	4	-3
50	20	16	12	7	2	-4
100	15	11	7	3	-1	-5

0	23	19	14	8	3	-3
50	18	14	10	6	1	-4
100	13	10	7	3	-1	-5

0	21	16	12	7	1	-4
50	17	13	9	4	0	-5
100	12	9	5	2	-2	-6

0	23	19	14	8	2	-4
50	18	14	10	6	1	-5
100	13	10	6	2	-2	-6

0	21	17	12	7	1	-4
50	17	13	9	5	0	-5
100	12	9	5	2	-2	-6

0	19	15	10	5	0	-5
50	15	11	7	3	-1	-5
100	11	8	4	1	-3	-6

0	21	17	12	7	1	-5
50	16	12	8	4	0	-6
100	11	8	5	1	-3	-7

0	19	15	10	5	0	-6
50	15	11	7	3	-1	-6
100	10	7	4	1	-3	-7

0	17	13	9	4	-1	-6
50	14	10	6	2	-2	-6
100	10	7	3	0	-3	-7

**A main challenge for organic production:
adequate nutrient supply**

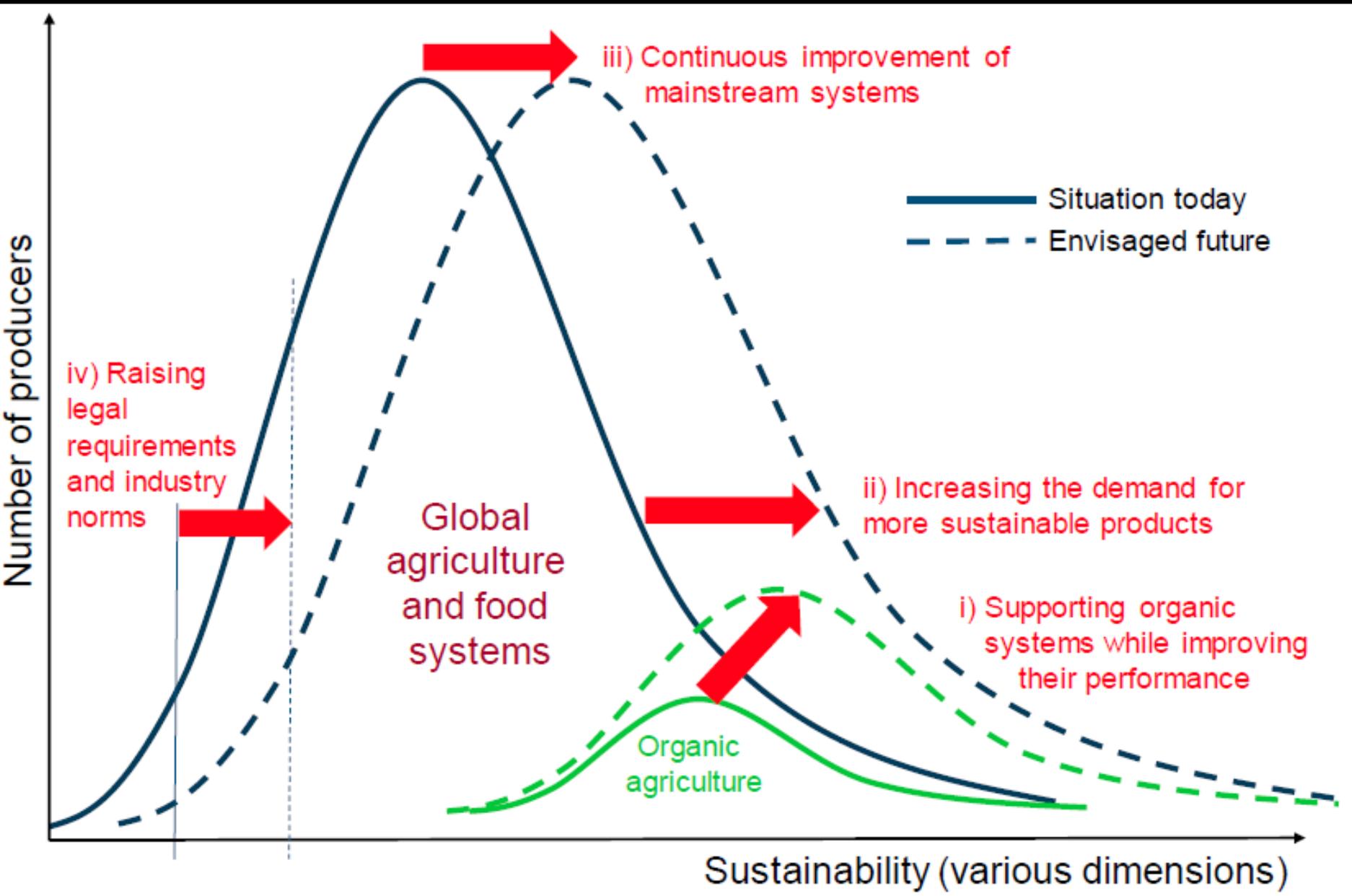
Crop rotations – fodder legumes

Fodder legumes – land use

Off-season legume lays – water use

Grass-based production – manure quantities

Closed nutrient cycles



Conclusions

- I. «Efficiency» is important, but «sufficiency» is central as well and «consistency» also contributes to viable solutions.**

Therefore, the yield gap is not that important.

We need systems that perform reasonably well along all indicators but need not be maximally performing on any single one.

Conclusions

- 2. We need to adopt the food systems view; to look at sustainability in production only is not enough, the consumption side is central as well.**

Otherwise, central options for taking action are neglected and the danger of «leakage» is big.

Therefore, a central focus has to be on the consumption side.

We have to reduce the size of the food system to gain room for more extensive production systems.

Conclusions

- 3. The Central question is not whether organic may feed the world or not, but which role organic may play in the transition towards sustainable food systems.**

We have to overcome the polarized and ideological debates – conventional systems can learn from organic ones and vice-versa.

The big question, the big gap

**How to take action on
the consumption side?**