Ruminants –
(2a) Breeding, physiology, feed &nutrition:

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Meeting outline

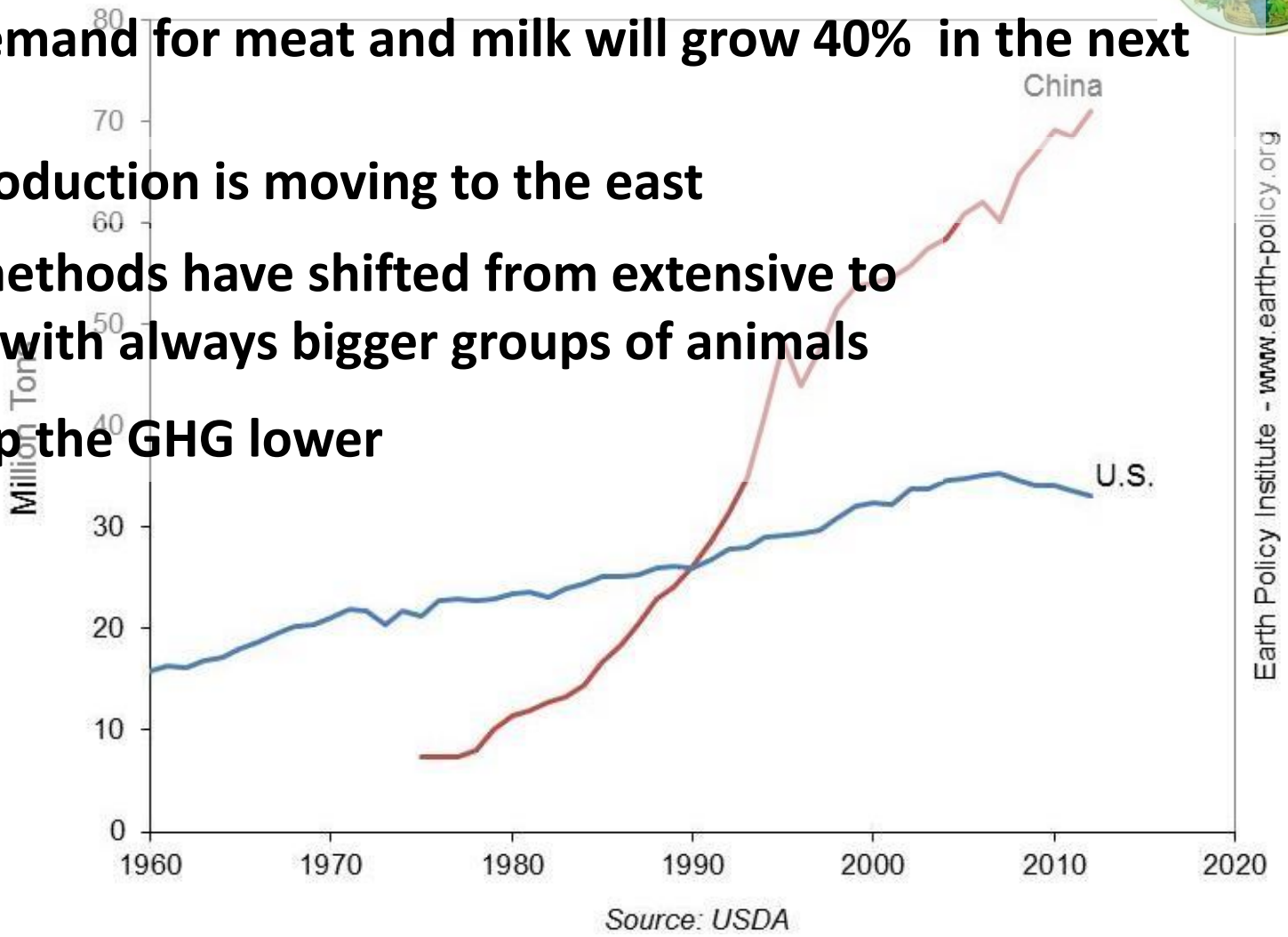
What are the challenges?

What are the Strategies?

What are the burning research questions?

What are the challenges / Opportunity) ?

- Global demand for meat and milk will grow 40% in the next 15 years
- Animal production is moving to the east
- Farming methods have shifted from extensive to intensive, with always bigger groups of animals
- While keep the GHG lower



Meat Consumption in China and the US, 1960-2012

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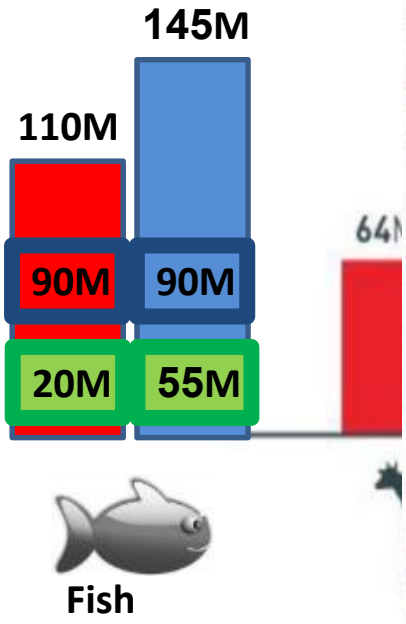
What are the challenges / Opportunity) ?

Global demand for meat and milk:

- will grow 40% in the next 15 years
- Absolute growth of 126 million tons

While arable area will decline -6.5% and lower GHG



Source: Food and Agriculture Organization of the United Nations, ESA Working Paper No. 12-03, p. 131

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Brain storming !

Each one has a strong opinion

Vote I

Ruminants – Breeding, physiology, feed & nutrition (2a):

What are the challenges / Opportunity) ?

1. Accurate measurements and measurement techniques (sensing) also for CH4 and N2O (9)
2. Rumen process knowledge and difficulty in modification of the rumen microbiome (7)
3. Demand grow 40% while arable land will decline -6.5% and keeping the GHG lower --- > intensive and sustainable farming systems
4. Try to be more ambitious in finding new mitigation techniques
5. More research on fermentation pathways in order to find more potent inhibitors and combine with some potent hydrogen sinks
6. Widen rumen knowledge and research/immunology (2)

Ruminants – Breeding, physiology, feed & nutrition (2a):

What are the challenges / Opportunity) 2?

a. More efficient utilization of non-conventional forages and natural flora, as way to decrease gas production and increase the energy efficiency, in cows.

b. Communicate these important topics with farmers more in details

c. Measurement techniques for CH4 and N2O (2)

d. Raising awareness of farmers and society for the need to decrease GHG's

e. Holistic approach with mapping GHG's within specie systems; to compare systems. Including land use etc. Between species not important.

f. Breeding should always be involved ibn thinking about solutions and

Ruminants – Breeding, physiology, feed & nutrition (2a):

What are the strategy / technology?

A range of animal sensing technologies and strategy such as:

1. Early life intervention to program the rumen microbiome (7)
2. Breeding and nutrition strategies should be combined (5)
3. sensors (machine vision, accelerometers, real-time location…), machine learning, big data, signal processing (9)
4. Data collection and real-time interpretation (3)
5. caring and manage the smallest production unit
6. Early-life intervention to modify rumen microbiome (3)
7. Feeding strategies per specie. Diet manipulation (Reducing carbohydrate ingredients of diet (alternatives) (
8. Holistic approach/combations strategies (look further than CH4) considering trade offs (2)
9. Modular approach (see combination), tailor made to

What are the burning research questions?

- Efficient animal production: (1)
  a. Accurate measurements, data analysis
  b. Rumen microbiome
  c. individual feed efficiency and GHG (1)
  d. new mitigation techniques
  e. Strong need of long term studies (in several different fields)

  f. (1)