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Food Sustainability: a global challenge

Next Generation Dairying for a Healthy Environment
Nov 22nd 2021

Charles Godfray

Oxford Martin School

University of Oxford

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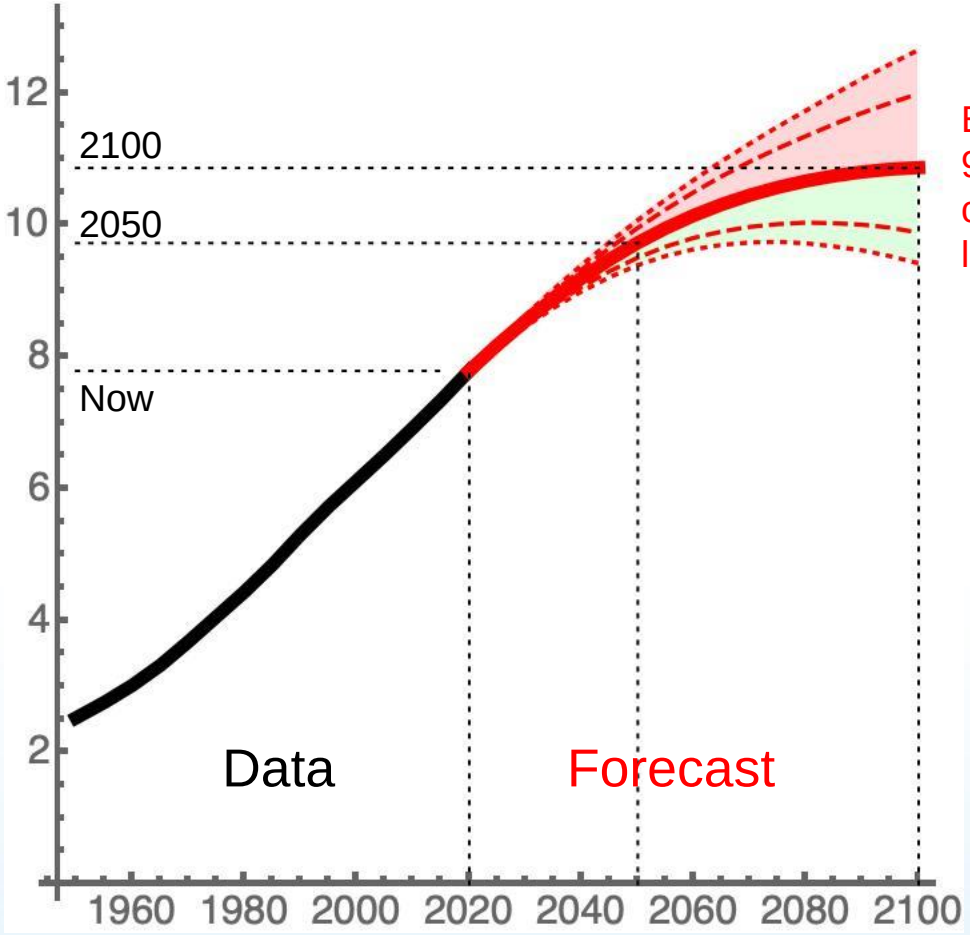
This talk:

- The challenges ahead
- What needs to be done
- Who needs to do it

[With a non-expert dairy slant!]

Future population growth



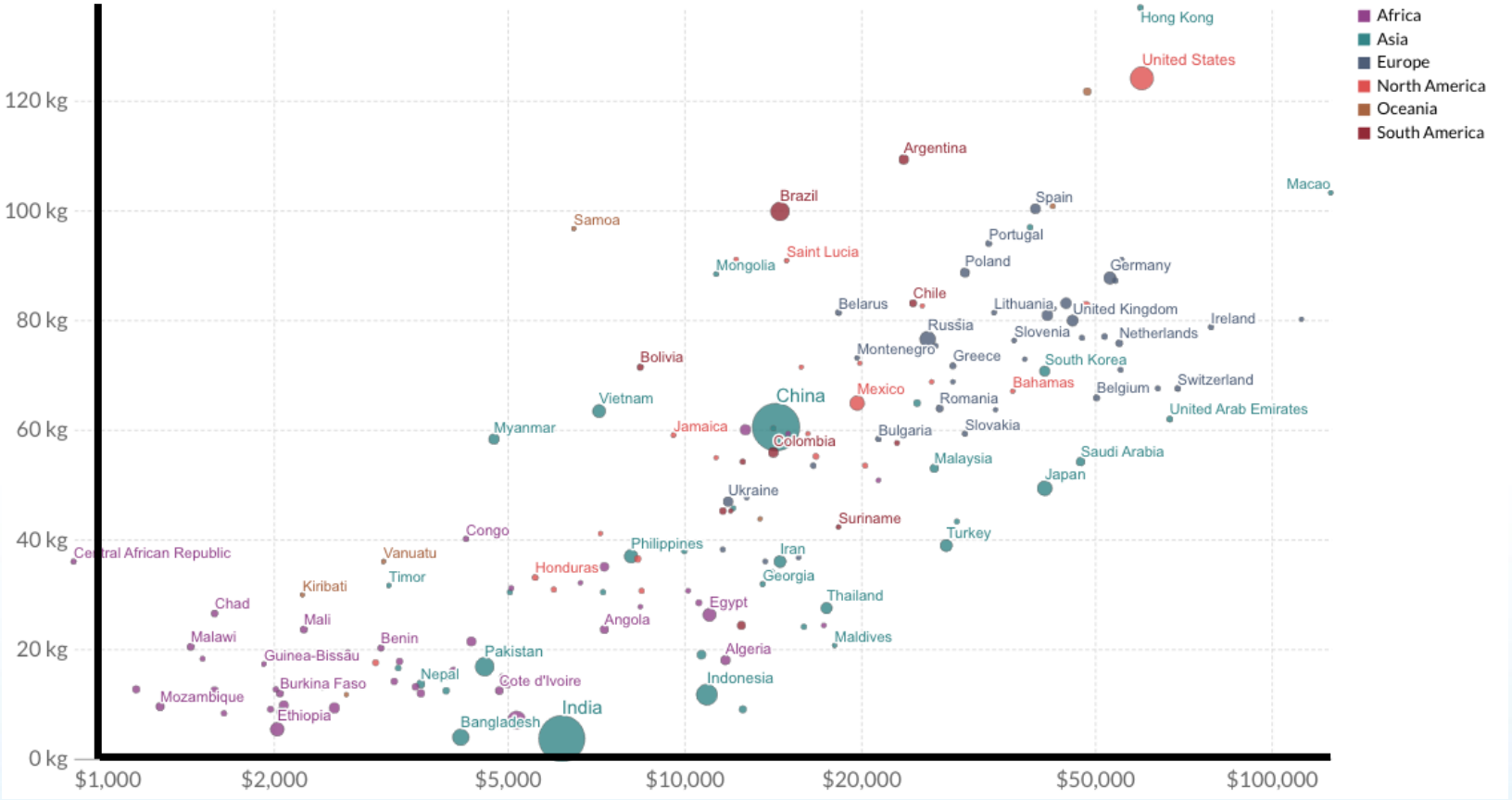
Estimate with 95 & 80% confidence limits

27% chance of peak before 2100

UN Population Division, World Population Prospects, 2019 Revision

Per capita meat consumption versus income

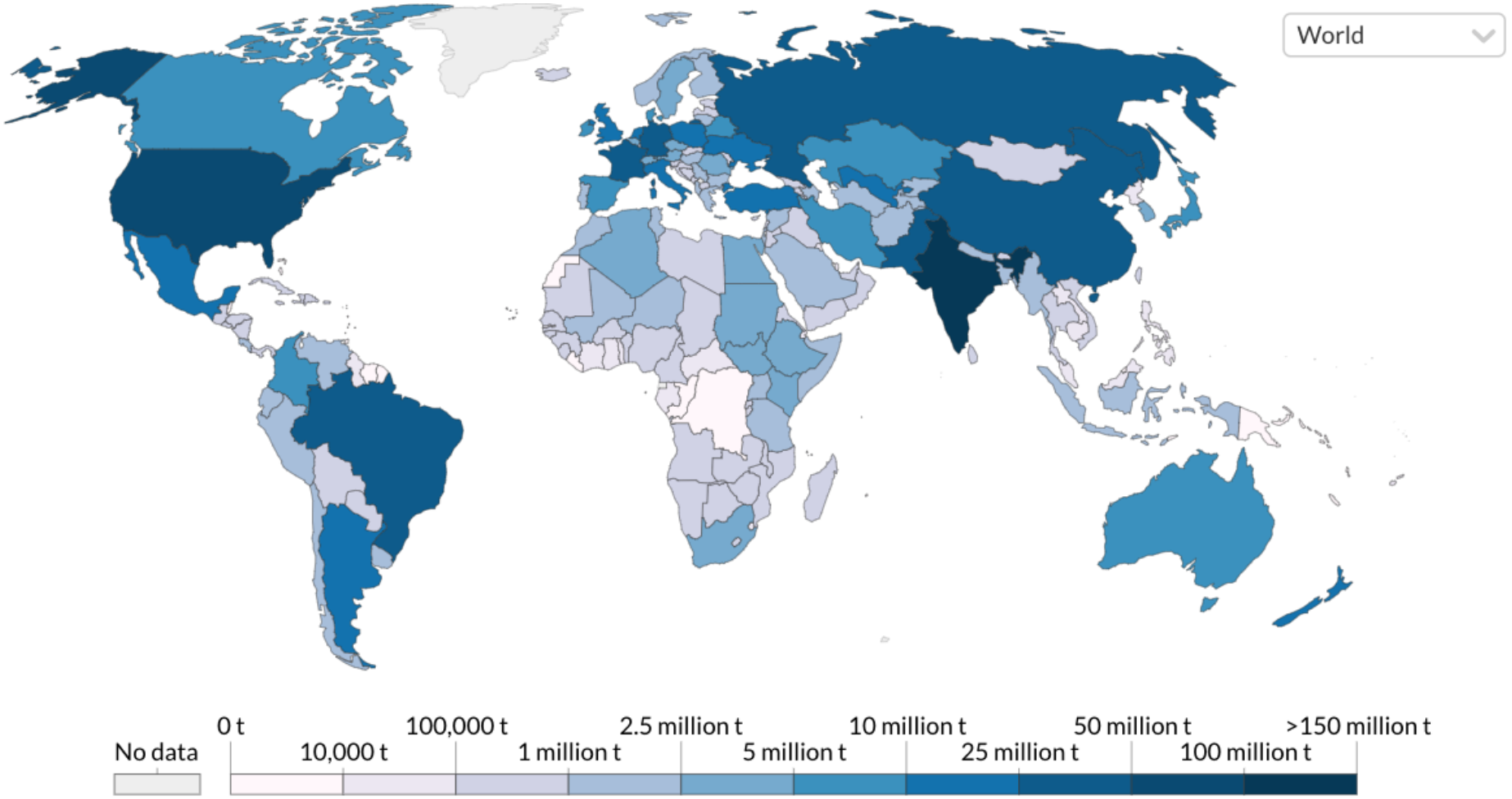
Meat consumed



GDP per person

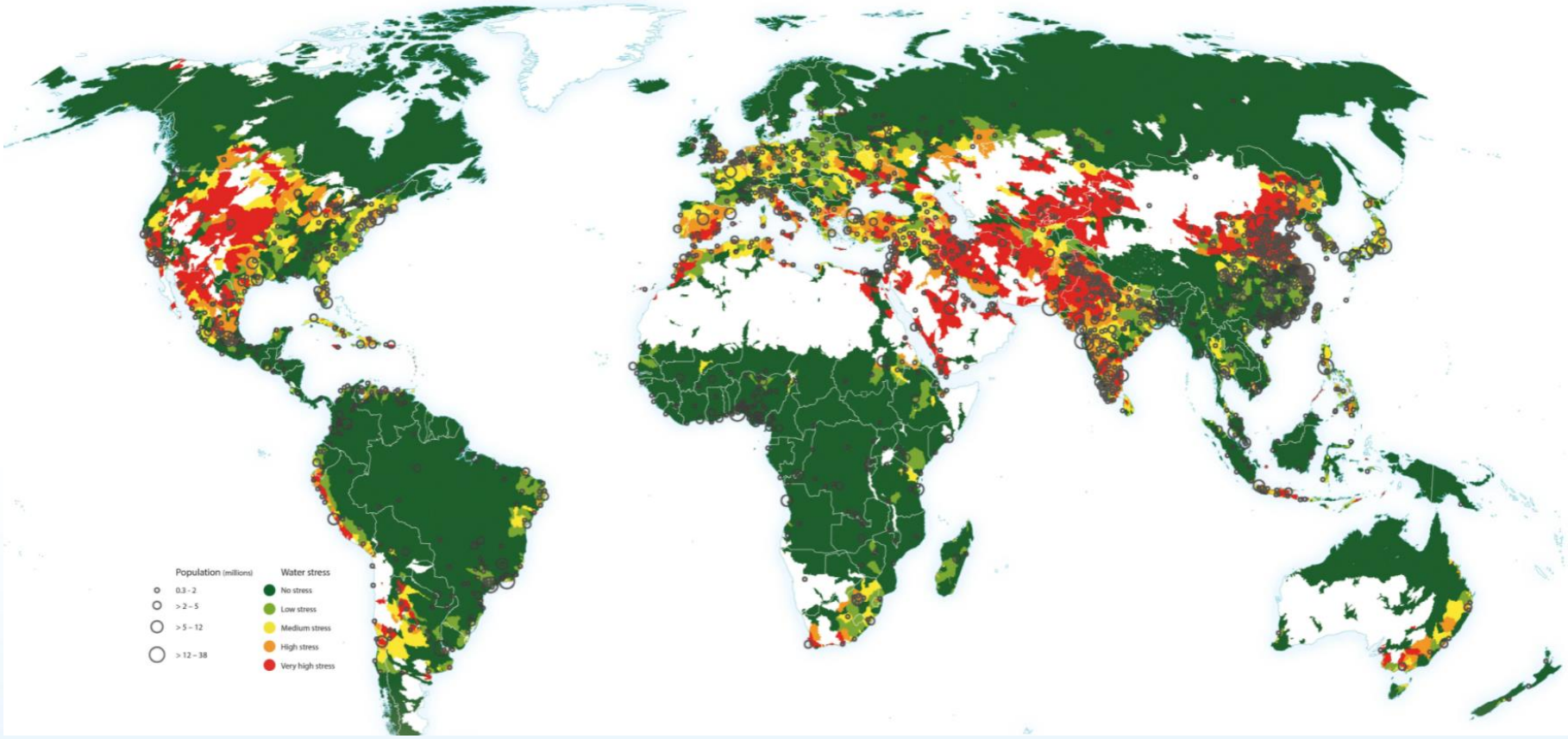
Our World in Data, Oxford University, ex FAO

Milk production 2018



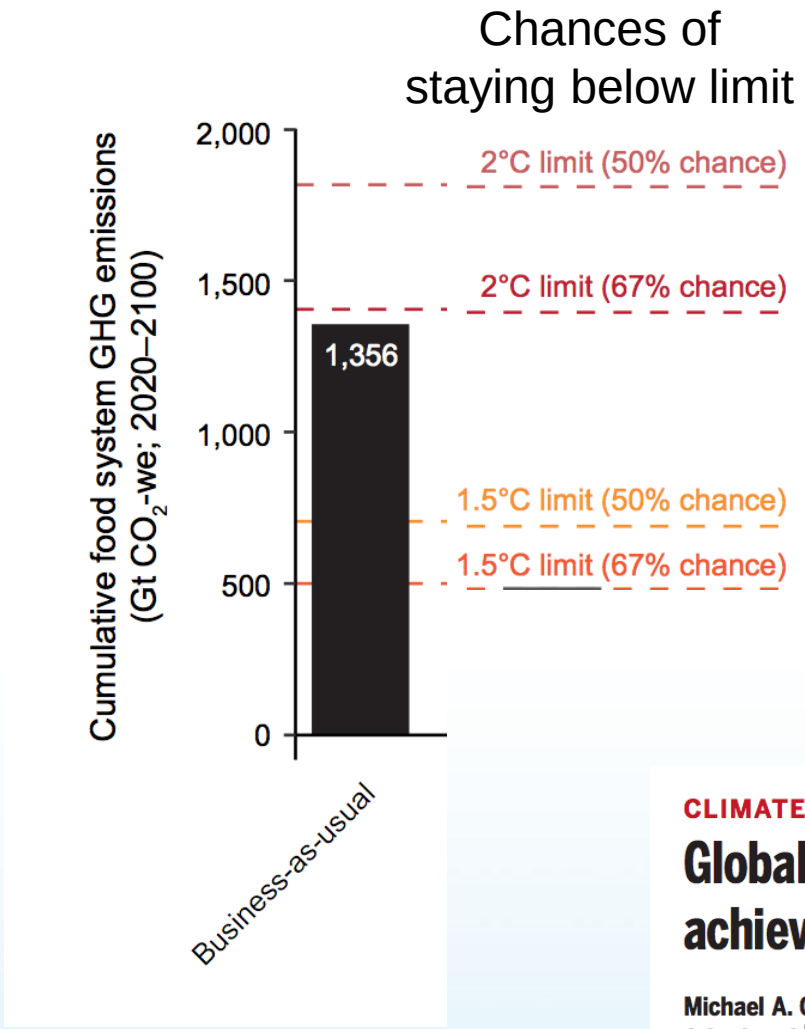
Our World in Data, Oxford University, ex FAO

Areas of water stress (hot colours)



EU, JRC

Food production could be severely affected by global heating



The food system alone could dangerously heat the world ….

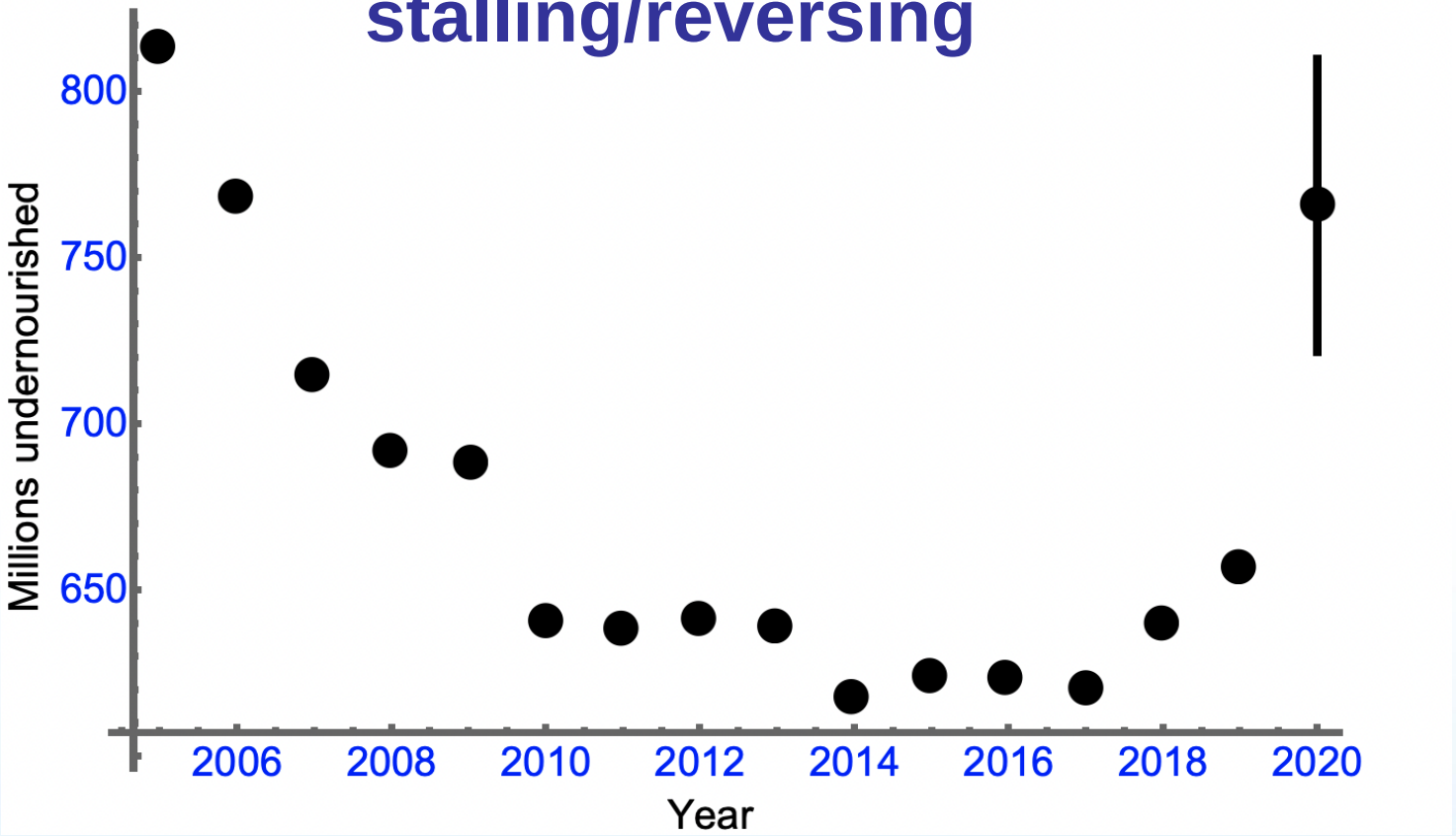
CLIMATE CHANGE

Global food system emissions could preclude achieving the 1.5° and 2°C climate change targets

Michael A. Clark[1]*, Nina G. G. Domingo[2], Kimberly Colgan[2], Sumil K. Thakrar[2], David Tilman[3,4], John Lynch[5], Inês L. Azevedo[6,7], Jason D. Hill[2]

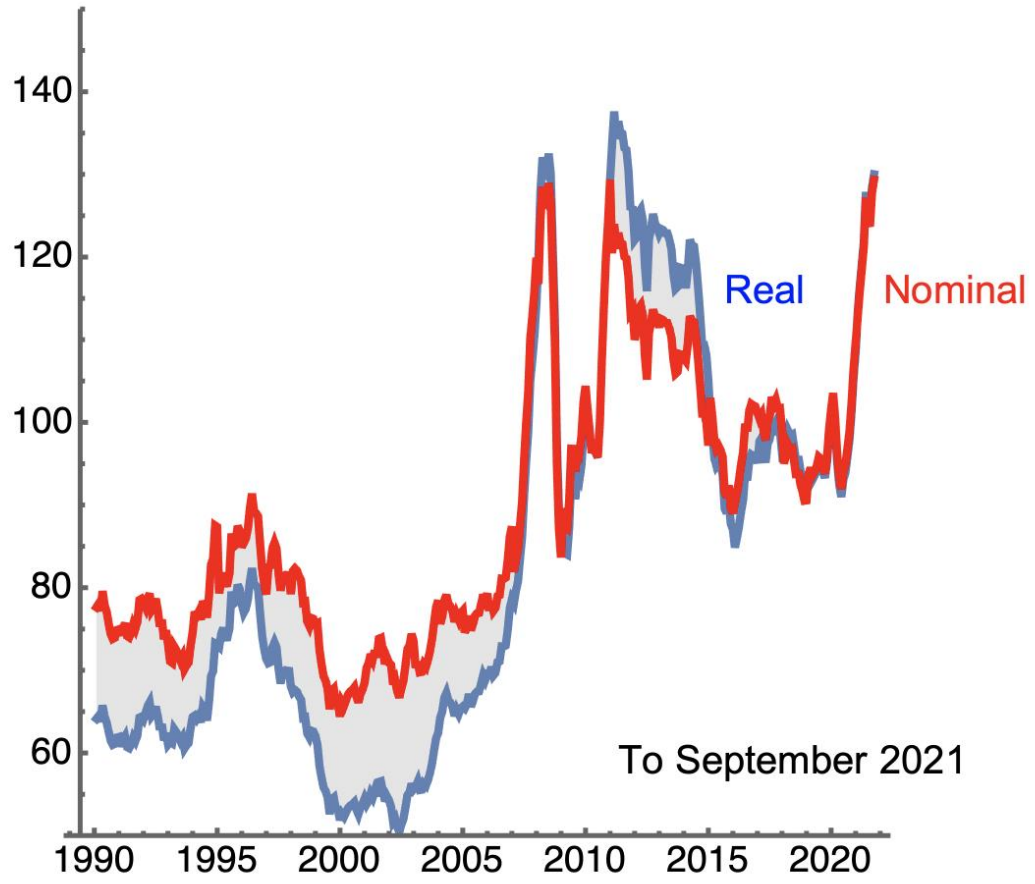
Science (2020): **370**, 705

Progress on hunger stalling/reversing



FAO/WHO/IFAD State of Food Security 2021

FAO Food Price Index



To September 2021 (3% up in Oct 21)

UN Food and Agriculture Organisation

Coming challenges

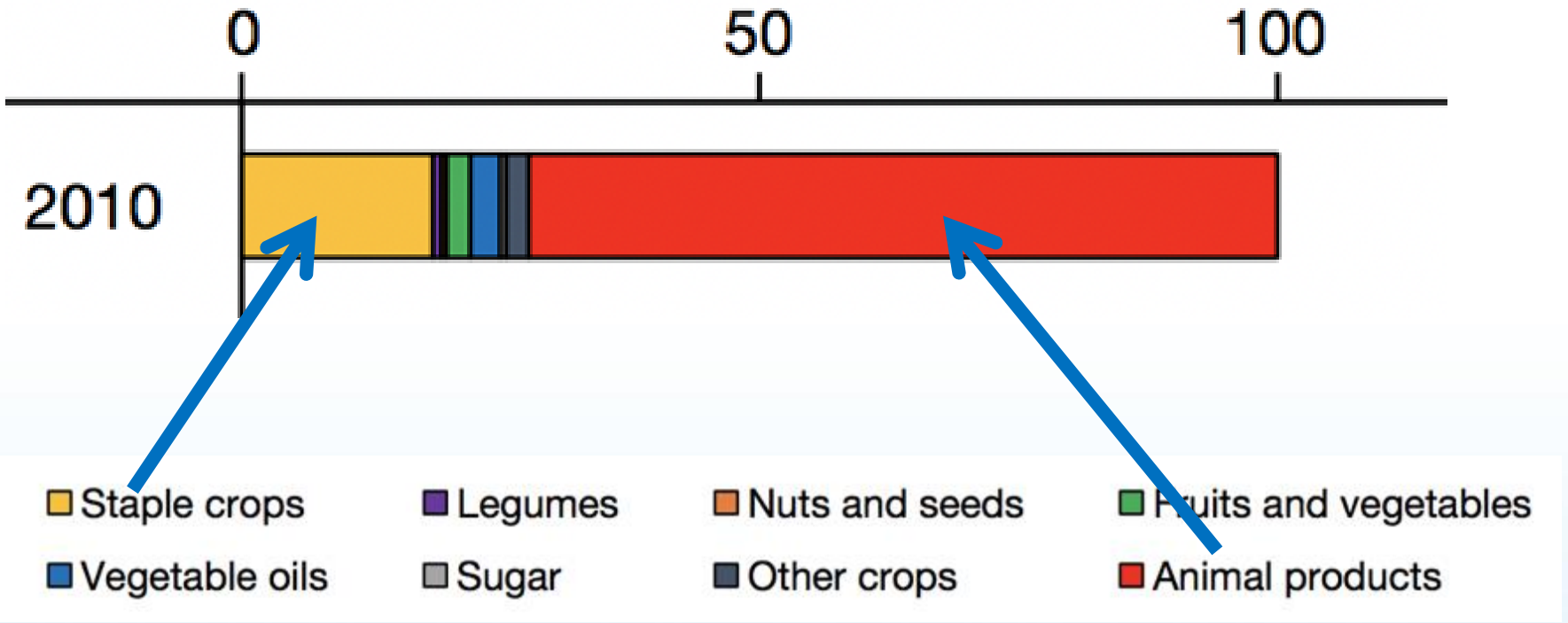
- Continuing demand growth
- Hunger & under-nutrition +
  Obesity & over-nutrition
- Pressures on agriculture
  - Water scarcity
  - Competition for land and soil degradation
- More frequent shocks
  - Climate change
  - Geopolitical

What needs to be done

- Modify diets
- Sustainably increase production
- Reduce waste
- Improve food governance

Diets

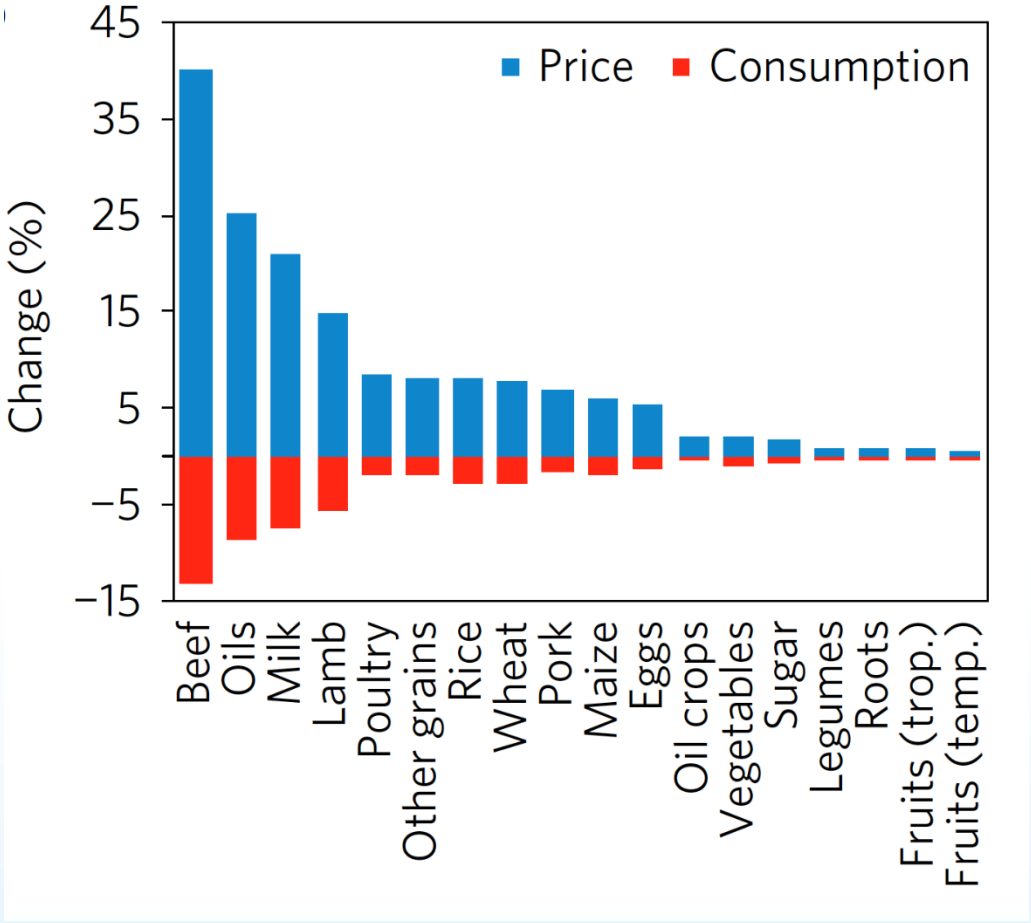
Percentage contributions of different sectors to total agricultural greenhouse emissions



Springmann et al. 2018, Nature

Diets

SINGLE BYPASS BURGER®
DOUBLE BYPASS BURGER®
TRIPLE BYPASS BURGER®
QUADRUPLE BYPASS BURGER®



Net ~500K avoided deaths and ~1 Gt CO_2 emission reduction yr^{-1} (~10% of reduction required for $\Delta T < 2°$)

Springmann et al. 2016 Nature Climate Change

Sustainably increase production

- Decrease CO_2 emissions (and other externalities) per unit of food
- Increase food per unit of land so that released land can be used for
  - Carbon capture
  - Biodiversity

Sustainably increase production

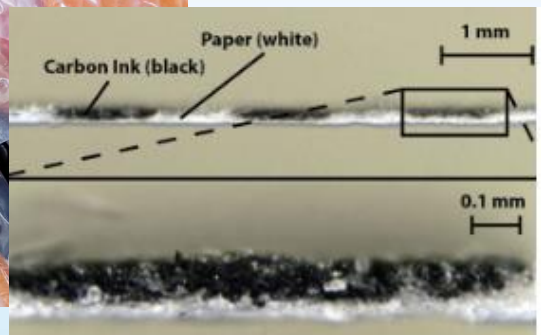
- Grand challenges
  - Improving feed conversion (gaps and ceilings)
  - Precision agriculture (data and analytics).
  - Reducing enteric methane (feed additives etc.)
  - Nitrogen fertiliser management (inhibitors etc.)
  - Manure management (farm practices, additives etc.)
  - Carbon sequestration in pastures

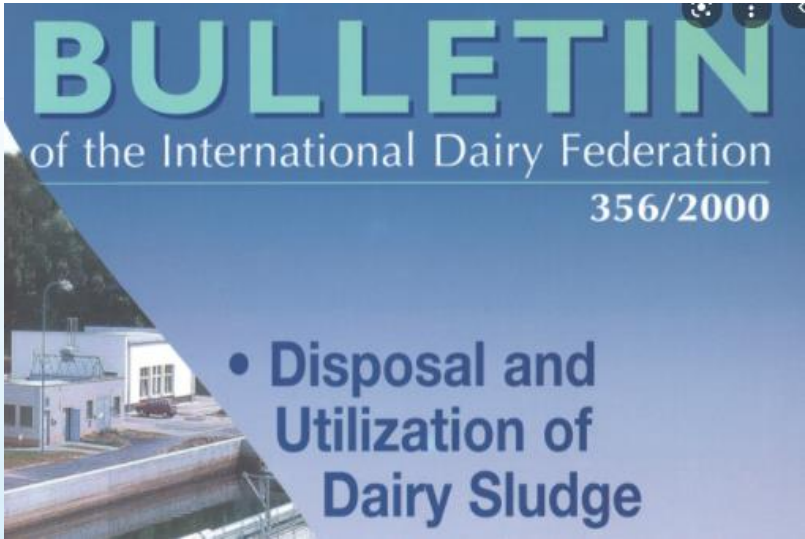
Reduce waste

Sustainability

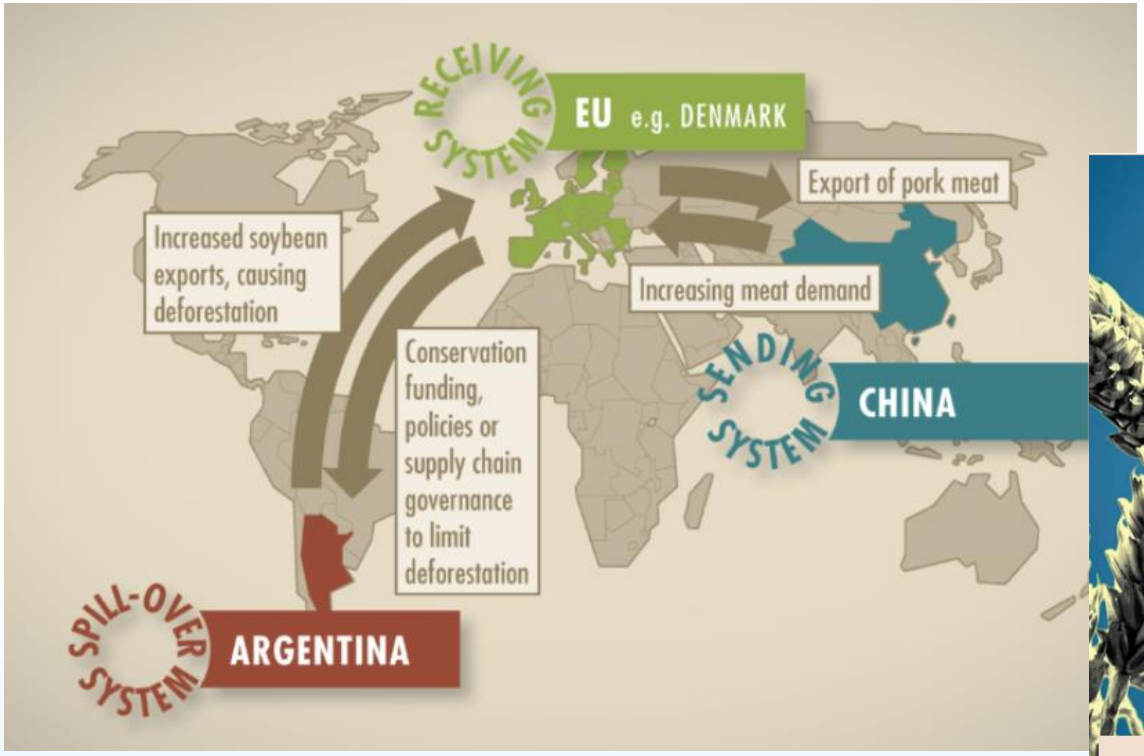
New Processes Turn Dairy Waste Into Bioplastics And Fertilizers

by Andrea D. Steffen July 23, 2020





Improve governance



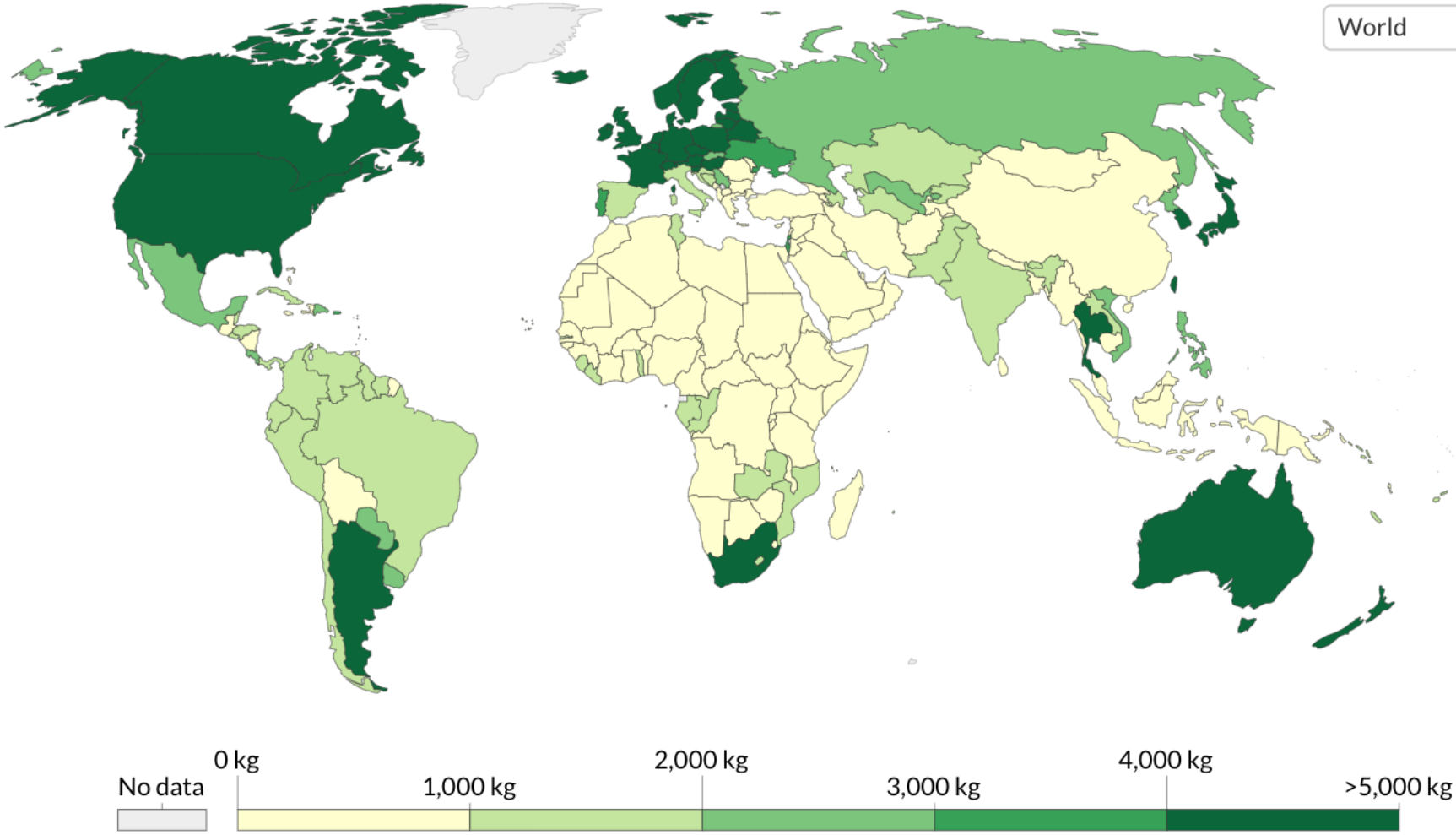
The Big Read Russia + Add to myFT

Russia starts to sow seeds of 'wheat diplomacy'

Food exports bring in welcome dollars to the sanctions-hit economy but could also extend Moscow's global reach

Coupled Project (Humboldt University); Financial Times (July 2021)

Milk per animal 2018



Our World in Data, Oxford University, ex FAO

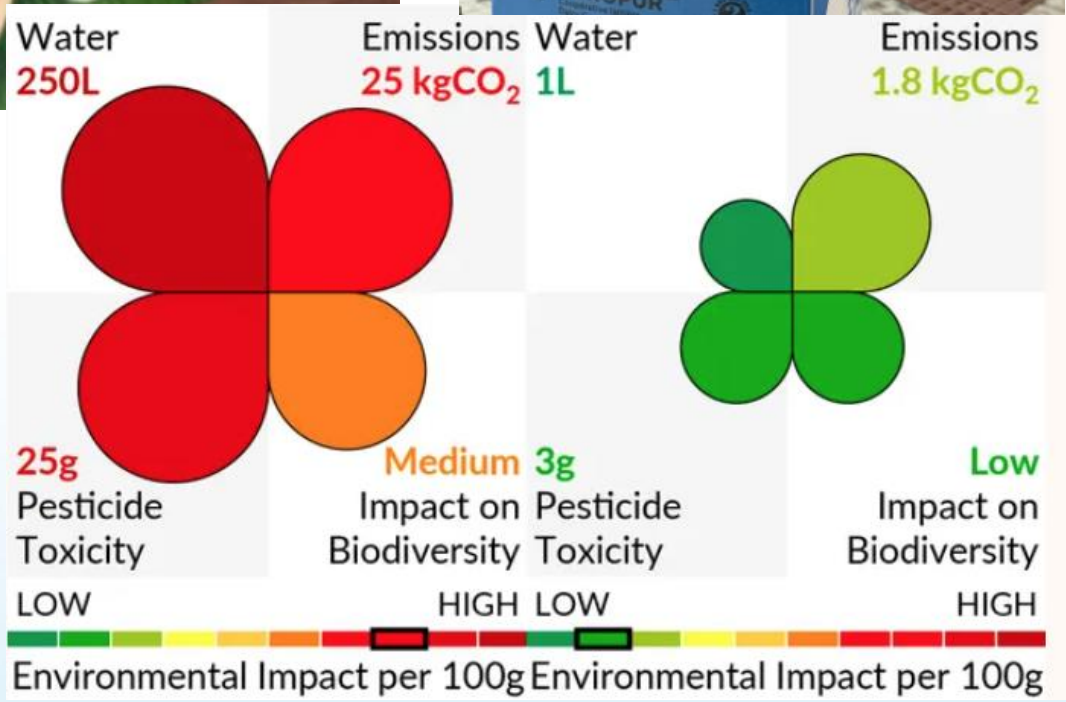
Who needs to do it

- Consumers
- Civil society
- Private sector
- Governments

Consumers

Civil society

"ideas that change food"



Private sector

World Business Council for Sustainable Development

WORLD ECONOMIC FORUM

Sustainable Palm Oil Dialogue

EUROPE
European Palm Oil Alliance

RSPO

idh the sustainable trade initiative

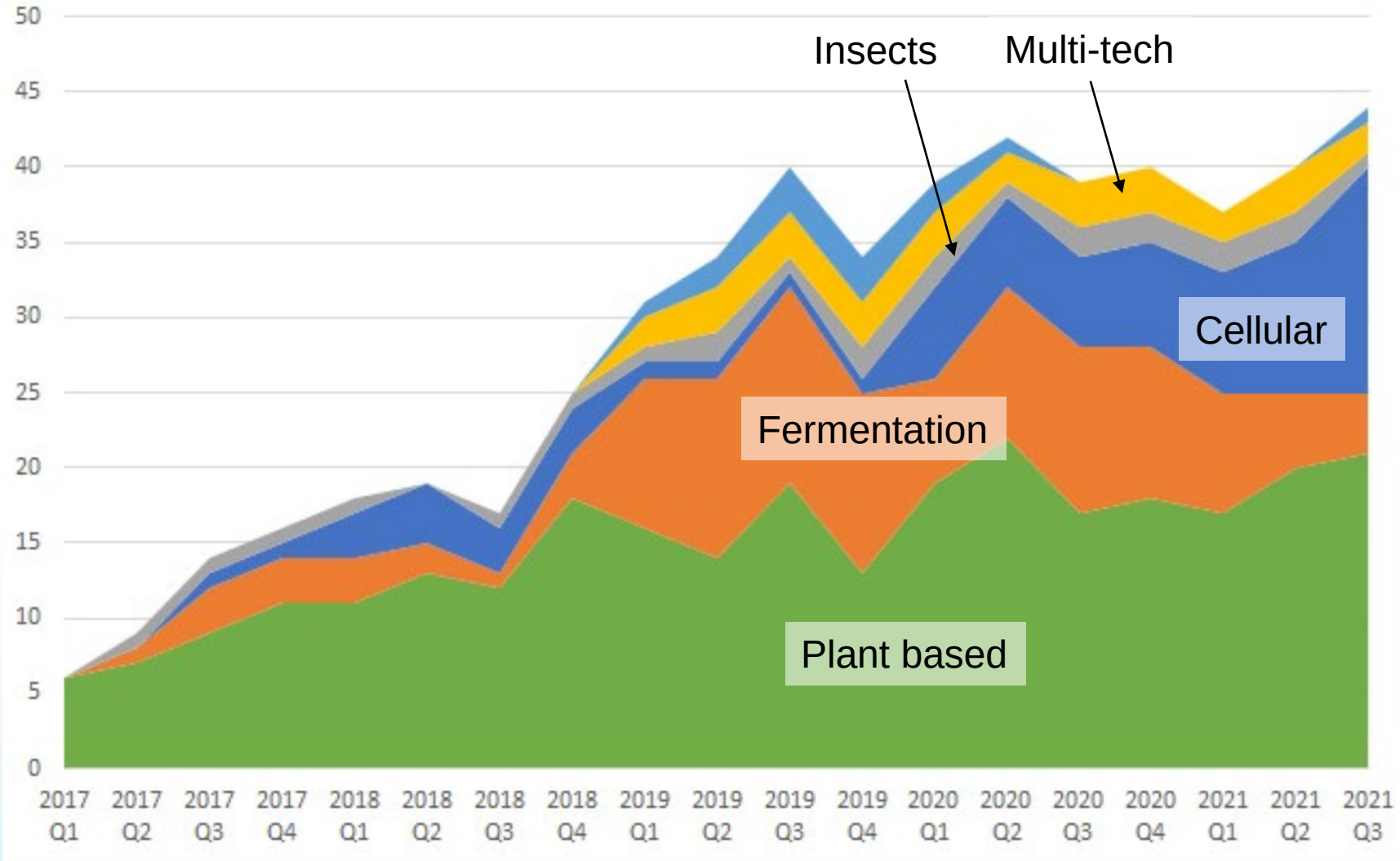
IMPOSSIBLE

Quorn
healthy
protein
MEAT FREE
Mince
Low in
Sat Fat
Serving Suggestion

JUST
Meat
2 Kobe A5 Beef Patties
100% Japanese Wagyu fresh from our farm.
No hormones or steroids ever.
NET WT 20 OZ (567g)

Grasshopper
cooked and dehydrated
ready to eat grasshoppers
entomo
Weaver Ants
cooked and dehydrated
ready to eat weaver ants
entomo

Alt-protein investment transactions



Alex Money, SSEE, Oxford University

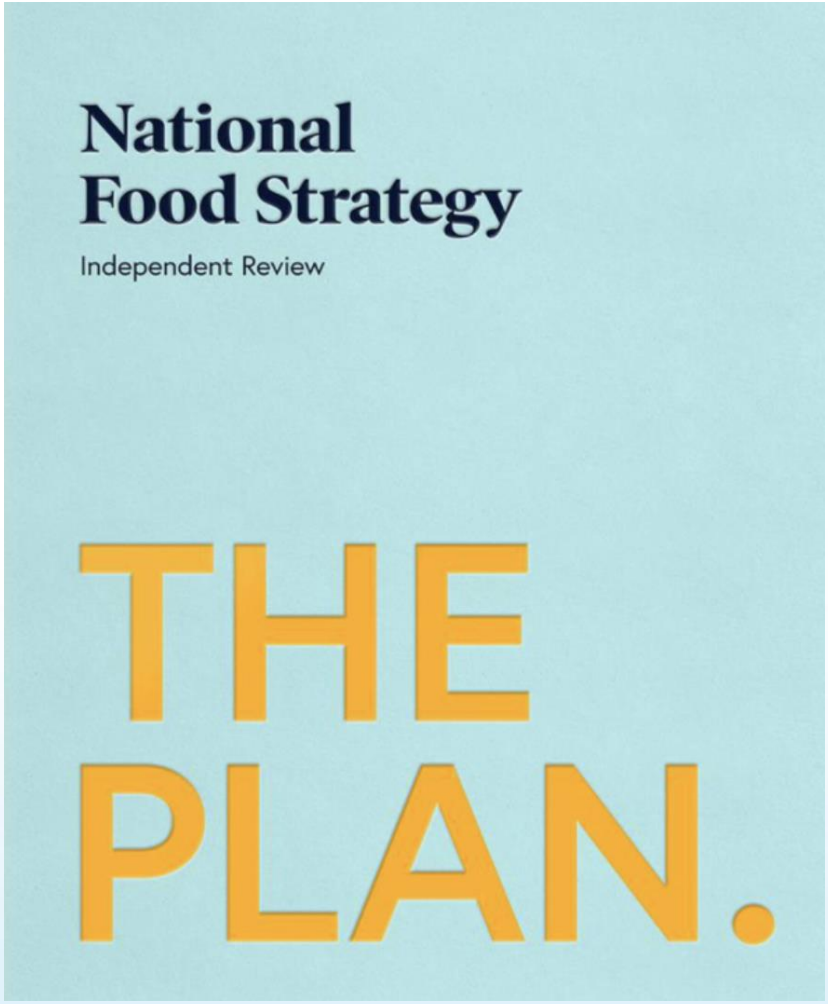
innocent
OAT
Unsweetened
Almond Breeze
COCONUT MILK
ALMOND
alpro
HAZELNUT
ORIGINAL
VALSOIA
Soya
Delicate
BARISTA BLEND
ALMOND
DAIRY FREE
PLENISH
ORGANIC ALMOND
UNSWEETENED
3 NATURAL
CALIFIA
Chocolate
COCONUT ALMOND
BLEND
750 mL
DREAM
OAT
ORGANIC
VEGAN
VALSOIA
Almond
REBEL
Vegan
CALIFIA
ALMOND
750 ml
THE ORIGINAL
OAT-LY!
OAT DRINK
innocent
ALMOND
Provamel
ORGANIC-BIO
ALMOND MANDEL
essential Waitrose
unsweetened soya
essential Waitrose
soya drink original
CALIFIA
ALMOND
750 ml
innocent
HAZELNUT
DREAM
RICE
ORGANIC
VEGAN
nestandglow.com
Hemp
Nature

Governments

Department
for Environment
Food & Rural Affairs

Health and Harmony: the future for food, farming and the environment in a Green Brexit

February 2018



Conclusion

- Major food systems challenges ahead
- But they can be met; iff…
  - We act now
  - We act on all fronts
- … but, if we fail on food we fail on everything

Thank you