The Future of Animal Science Research

an NGO perspective

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The China phenomenon

	Population at start of growth period	Years to double GDP per capita[1]
Britain (1700-1855)	9M	155
US (1820-1873)	10M	53
China (1983-1995)	**1,023M**	**12**
India (1989-2006)	822M	17

China doubling of GDP was 12x the speed of Britain during the Industrial Revolution at 100x the scale

400 million

lifted out of poverty

1 Time to increase GDP per capita (in PPP terms) from 1,300 to 2,600 USD **Source:** Angus Maddison, University of Groningen

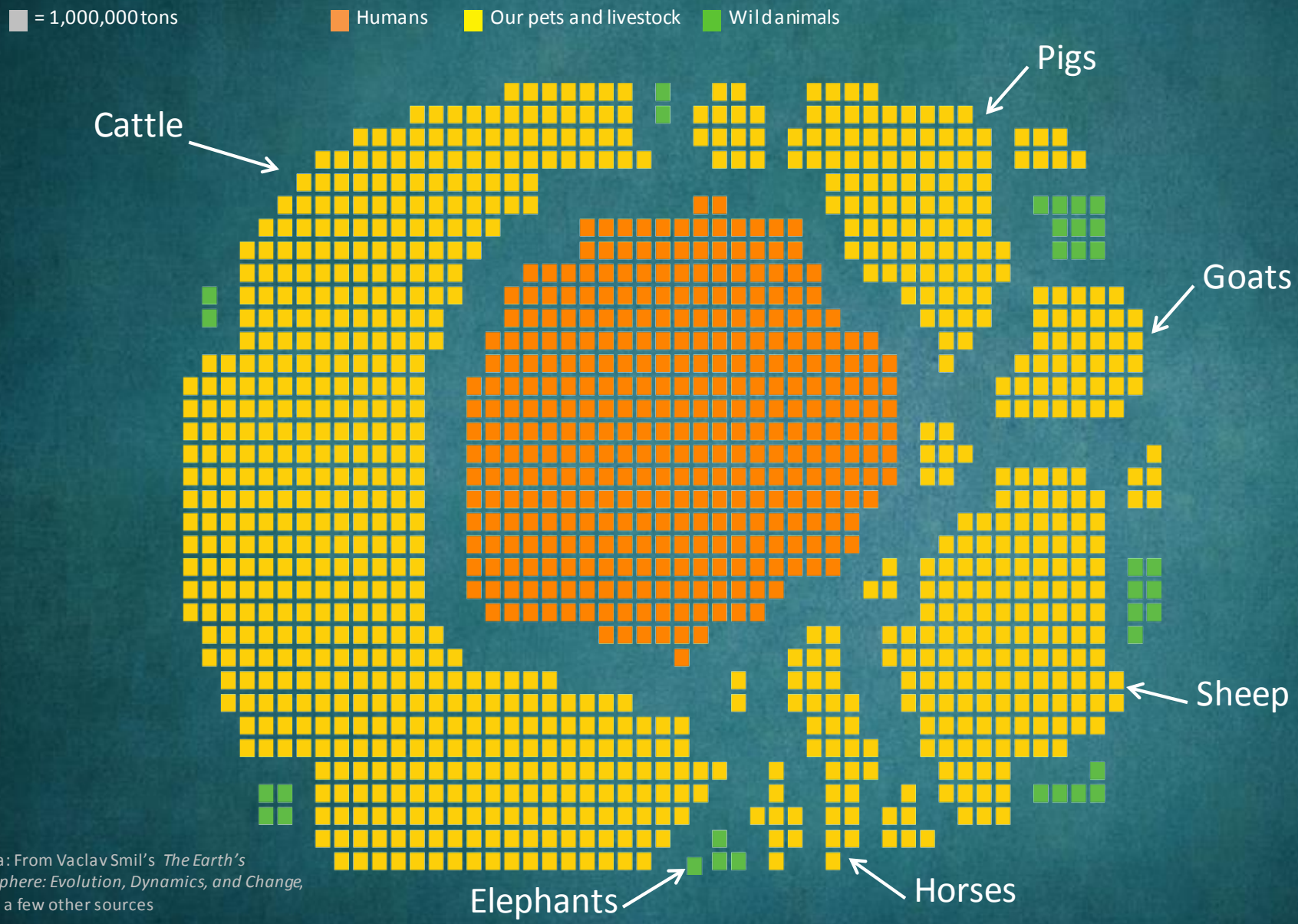

we must make
production more
efficient
sustainable
intensification is key

to prevent
agricultural **sprawl**

we need **more** from less

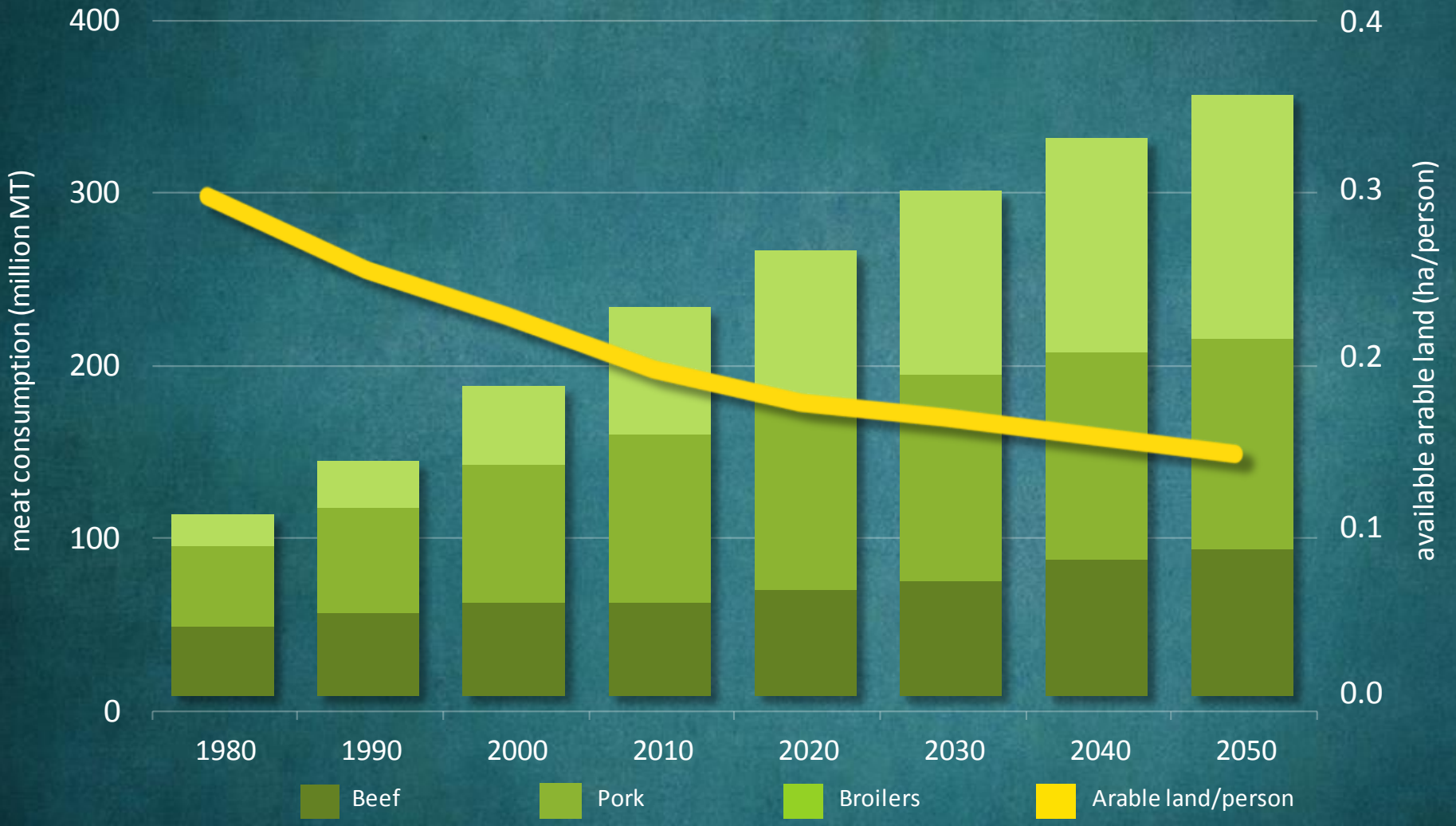
Source: WWF PADDDtracker.org

Earth's land mammals by weight



Data: From Vaclav Smil's *The Earth's Biosphere: Evolution, Dynamics, and Change*, plus a few other sources

World beef, pork and poultry consumption: 1980-2050

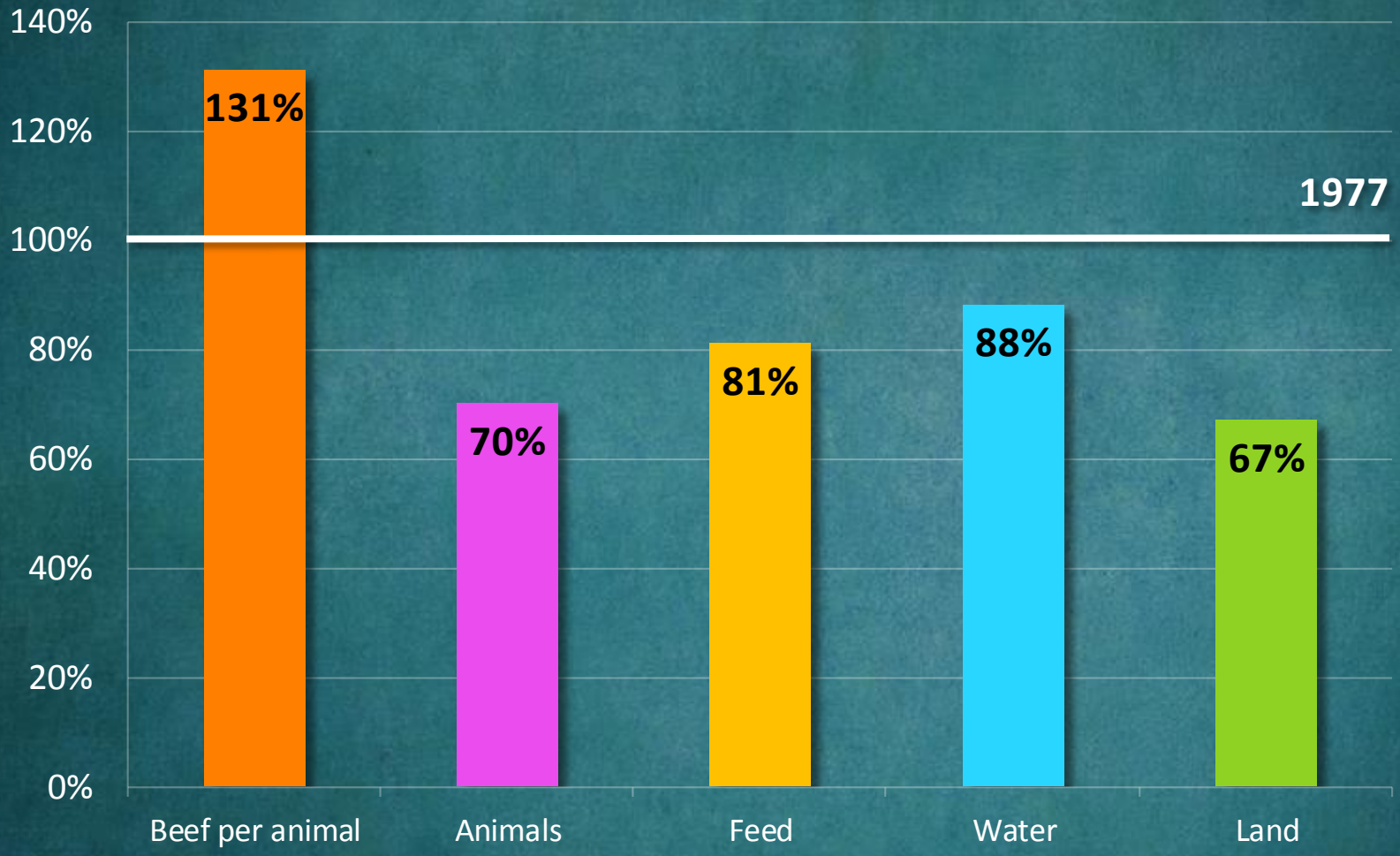


Sources: Global Insight Demand Analysis to 2050; Bauman and Capper (2011) Southwest Nutrition and Management Conference, Tempe, AZ


beef takes 60%
of land,
produces 1.3%
of calories

we can’t afford to focus on everything or just one thing

Environmental impact of U.S. beef production reduced by improved productivity



*all values expressed per lb of beef produced

Source: Capper, J.L. (2011). The environmental impact of U.S. beef production: 1977 compared with 2007. *J Anim Sci*

Key sustainability indicators for animal protein production systems

	Feed conversion (kg feed/kg edible weight)	Protein efficiency (%)	N emissions (kg/ton protein produced)	P emissions (kg/ton protein produced)	Land (tons edible product/ ha)	Consumptive freshwater use (m^3/ton)
Beef	31.7	5	1200	180	0.24 - 0.37	15497
Chicken	4.2	25	300	40	1.0 – 1.2	3918
Pork	10.7	13	800	120	0.83 – 1.10	4856
Finfish (avg)	2.3	30	360	148	0.15 – 3.70	5000
Bivalves	not fed	not fed	-27	-29	0.28 – 20.0	0

Source: World Bank. Adapted from Phillips et al. 1991, FAO 2003, Hall et al. 2011

double **net**
food availability

productivity & efficiency

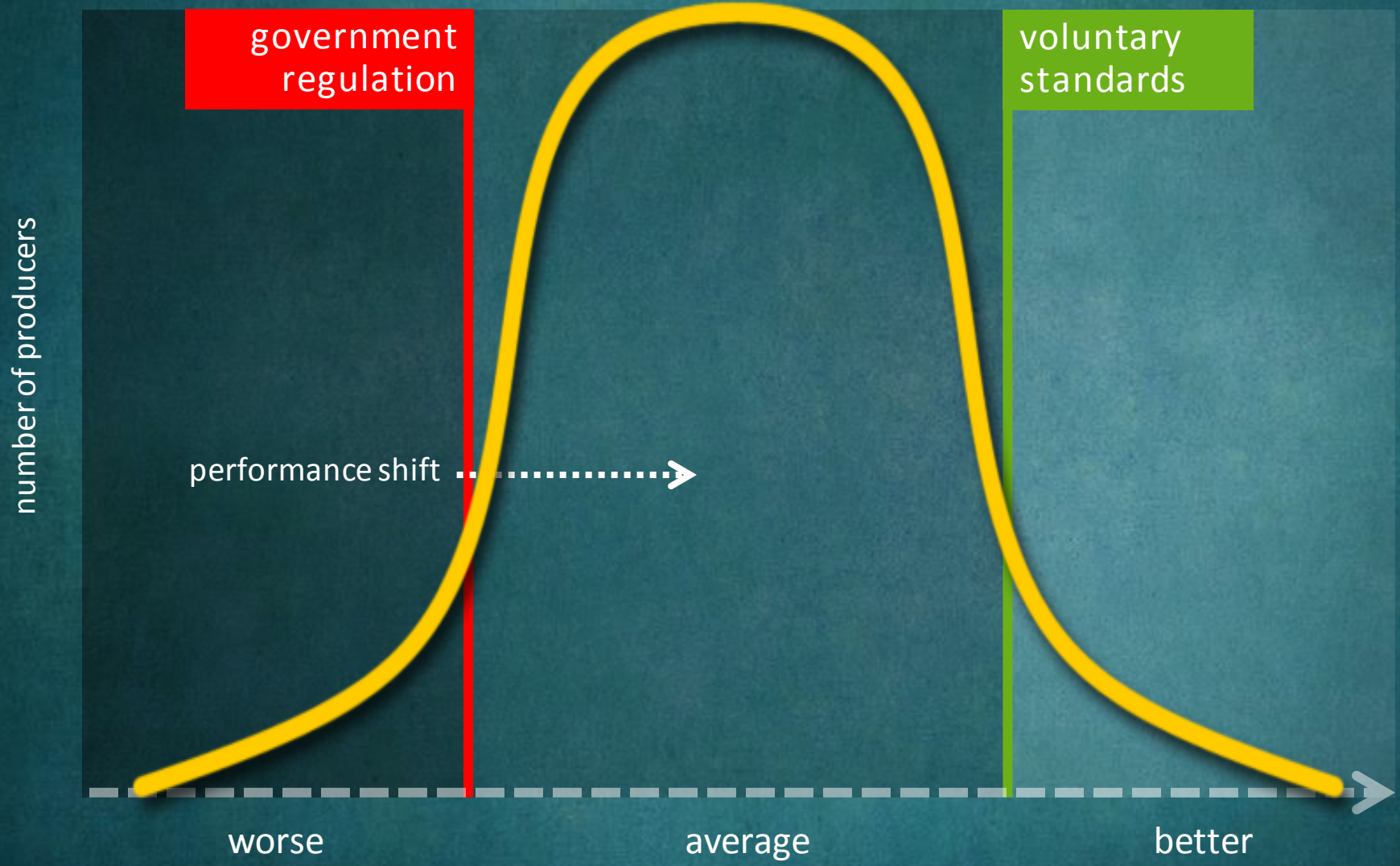
and

waste & consumption

waste

1 out of 3 calories

Reward the best, or move the rest?



Sustainability by a thousand cuts—Inefficiency increases impacts

- Nutrition
- Morbidity and mortality
- Parasites
- Poor reproduction
- Antibiotic residues
- Carcass defects
- Feed shrink

Source: Created by Dr. Jude L. Capper, 2013

What to measure?
Animal protein metrics

- Protein in/protein out
- Land use per gram of protein
- Water use/gram of protein
- GHG emissions/gram of protein
- FCR/gram of protein
- Time to produce a gram of protein

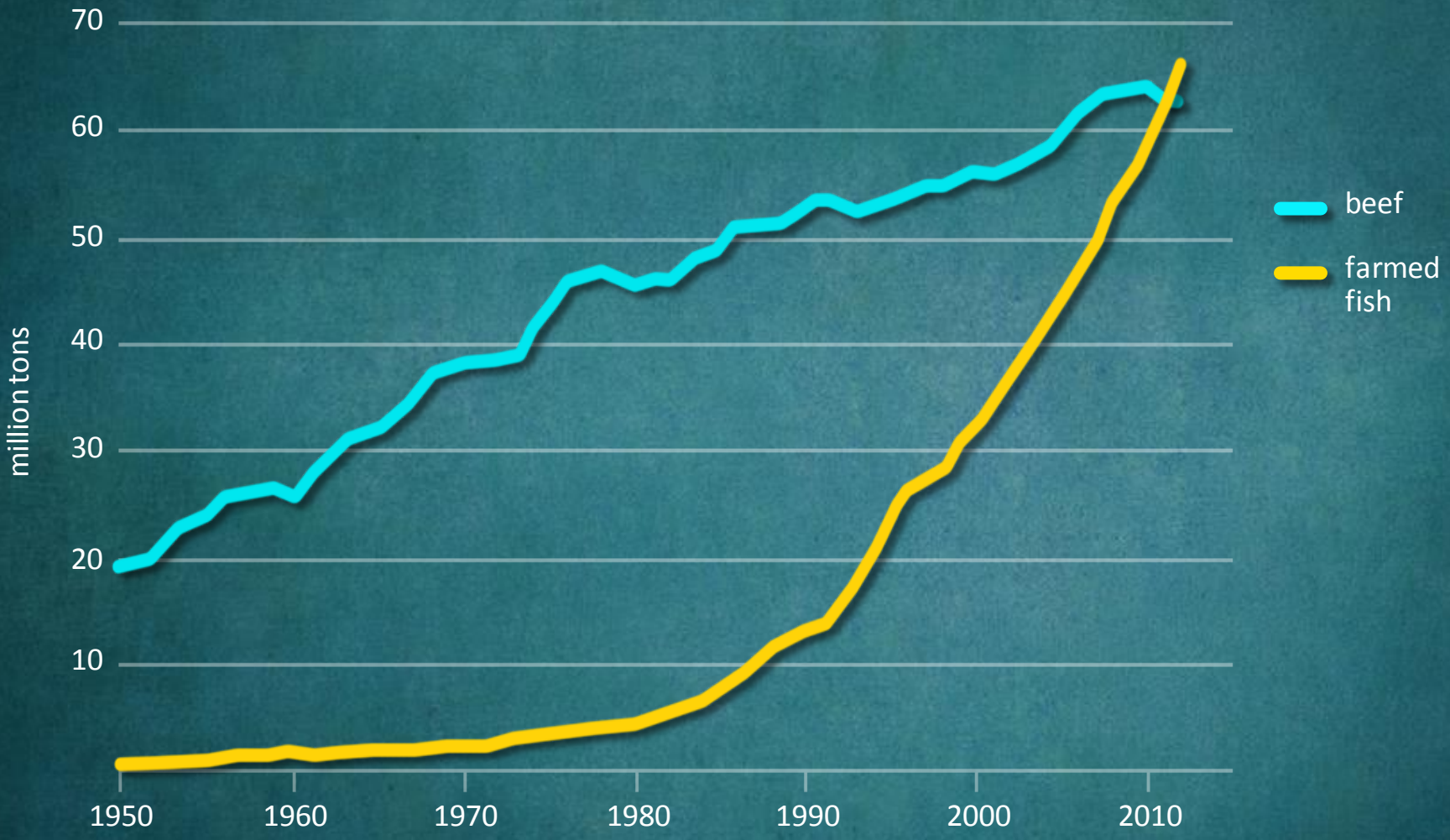
Does stocking density = animal welfare?

Indicators from aquaculture suggest:

- Feed conversion ratios (FCRs)
- Time to market
- Survival rates
- Disease outbreaks
- Medicine used per MT of product
- Medical interventions per MT of product
- Air quality


salmon
aquaculture

World farmed fish and beef production, 1950-2012



Source: EPI based on FAO, USDA

Earth Policy Institute – www.earth-policy.org

Global Salmon Initiative

- 2004 – salmon dialogue launched
- 2012 – salmon standards finished
- 2013 – GSI commitment
  - 15 CEOs/producer companies
  - 70% of global production
  - 100% ASC certified by 2020
  - Share performance data

Origin Green
IRELAND

Working with nature

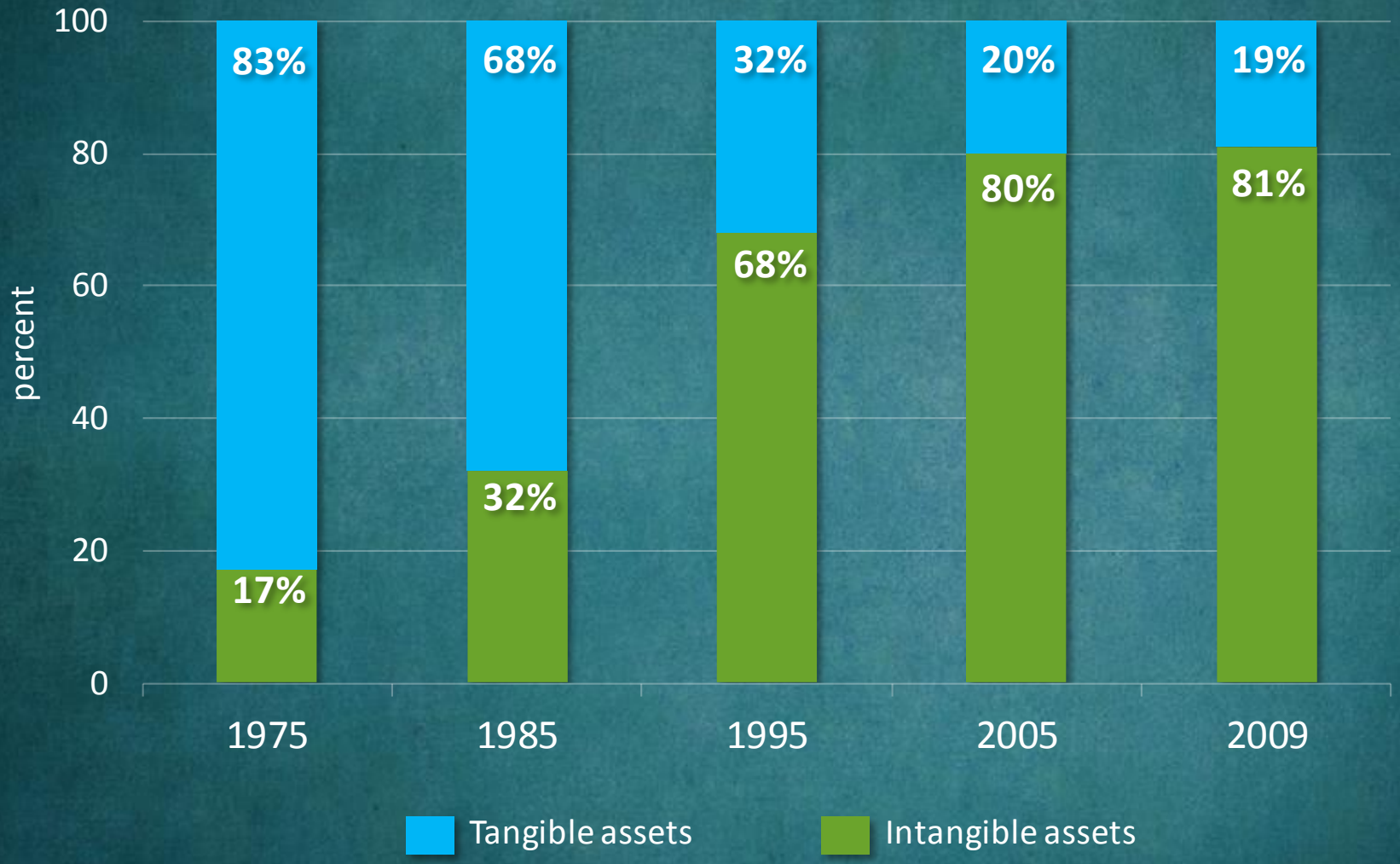
Bord Bia
Irish Food Board

Growing the success of Irish food & horticulture

Ireland's Commitment

- All food exports
- 100% certified by 2016
- Reputation is key, not premiums
- Government, private sector and producers working together
- Share performance data

Components of S&P 500 market value



Source: Ocean Tomo

illegal

illegal

SPECIES	MINERALS	FISH	FOREST	PLANTATION
 tigers	 gold	 bluefin tuna	 pulp	 palm oil
 elephants	 coltan	 demersal fishes	 timber	 soy
 rhinos	 diamonds	 shrimp and prawns	 mangroves	 beef

Lessons learned

- Metrics/performance are better than practice-based approaches
- Can't measure everything—be strategic
- Good metrics shed light on several things
  - FCR, time to market, survival rates
- The best metrics are ones where the data is already collected

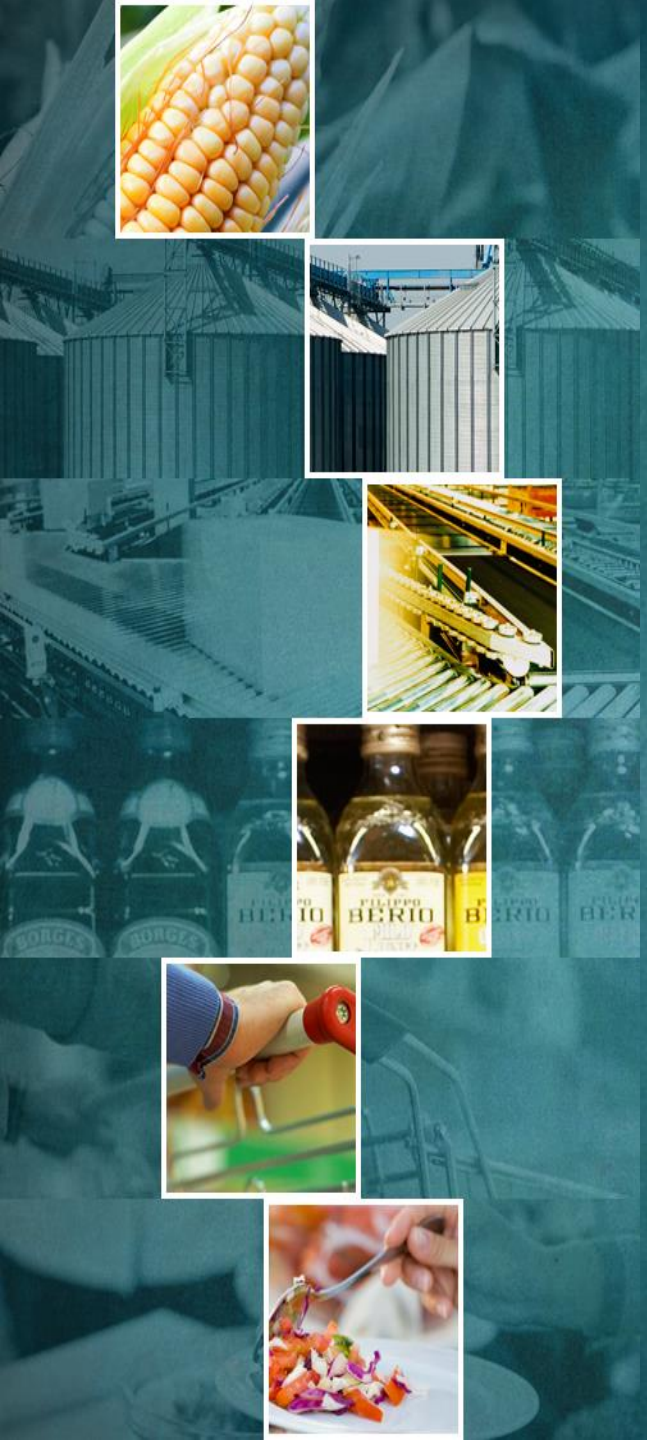
Recommendations

- More on-farm research
- ID key impacts & desired results
- Cumulative impacts
- Watch out for trade & market shifts
- Business case for BMPs
- Less on what to think, more on how to think

Focus on the consumer, too

We are winning the science battle, but losing the public opinion war

- Lessons from anthropology (1:1)
- Consumers don't believe the science or scientists
- Don't think tradeoffs are necessary
- We need to:
  - Shape awareness, build consensus
  - Agree strategies, accelerate change



The new realities

- A finite planet
- Increased income & consumption
- Importance of South/South trade
- Comparative advantage
- Sustainability is pre-competitive

think about it

WWF