Environmental Sustainability: A Benefit of Animal Productivity

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Cornell University

Washington State University
World Class. Face to Face.

Elanco

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There is a Human Tendency

to Romanticize the Past;

… to Vilify the Modern!

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Neither is a good representation…

… and those that remember, might argue about the past!

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Sustainability is Not a Passing Fad

Retailers Are Responding and Accelerating the Movement

THE WALL STREET JOURNAL.

Corporate Focus

Big Firms to Press Suppliers on Climate --- P&G, Others to Join In Pushing Plants For Emissions Data

By Jane Spencer

708 words

A group of multinational companies is embarking on a campaign to encourage their suppliers to report greenhouse-gas emissions, pressuring thousands of vendors and factories to show they are taking steps to battle climate change.

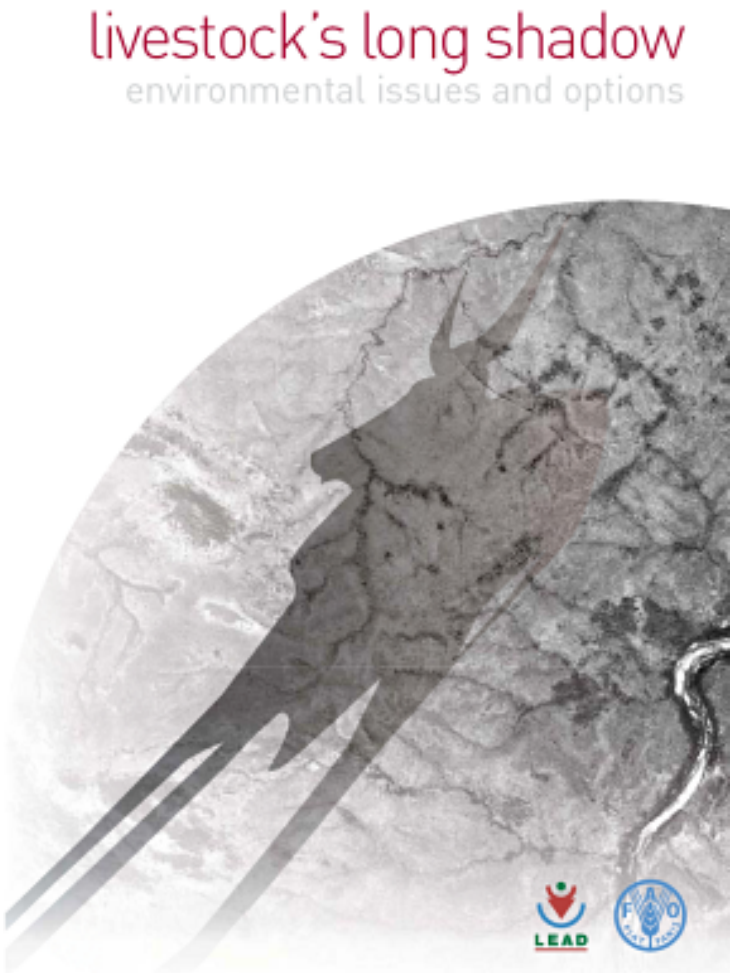
In the future, consumers may be able to shop for even small items with a carbon footprint in mind. Cadbury Schweppes is one of a number of European companies trying to label individual products with carbon-emissions data. Cadbury is trying to figure out how much carbon is released in the process of making a Dairy Milk chocolate bar, from the dairy farm through the factory. Eventually, the company plans to stamp the bars with a carbon footprint number, alongside the calorie count.

The announcement comes just two weeks after **Wal-Mart** Stores Inc. announced similar plans to begin asking suppliers for data on their energy efficiency, in partnership with the CDP. **Wal-Mart** has started monitoring emissions at 25 to 30 companies that collectively supply seven products: DVDs, toothpaste, soap, milk, beer, vacuum cleaners and soft drinks.

Oakhurst Dairy in Portland, Maine, one of **Wal-Mart**'s major milk suppliers in New England, was recently asked by the retailer to measure the carbon footprint of a case of milk. **Oakhurst** says it ultimately found the internal energy audit process useful.

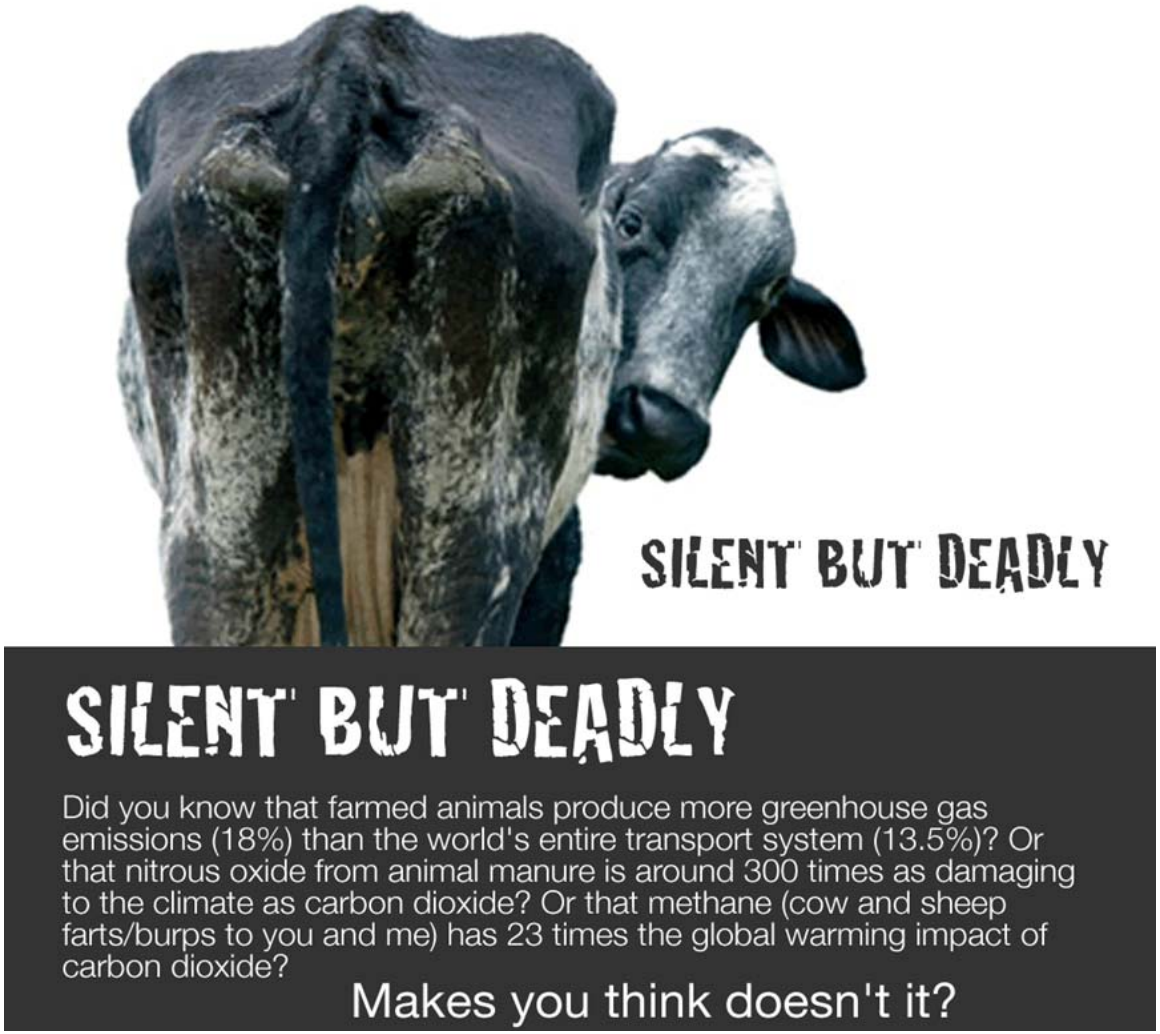
Excerpted from: Wall Street Journal, Oct. 9, 2007

Meat, Milk & Egg Production is Clearly Being Held Accountable



- Livestock production accounts for 18% of Greenhouse Gas emissions worldwide *(UN/FAO, 2006)*
- In the USA, contribution of Agriculture *(in total)* to GHG emissions is approximately 6% *(EPA Report on GHG Emissions, 2008)*
- Ability to discuss environmental benefits is critical for development of animal productivity products

In Fact – Animal Ag is Under Attack



Vegetarian Society (2008) http://www.vegsoc.org, Last accessed, July 26, 2009

Dairy Industry Response: Established an Industry-Wide Goal

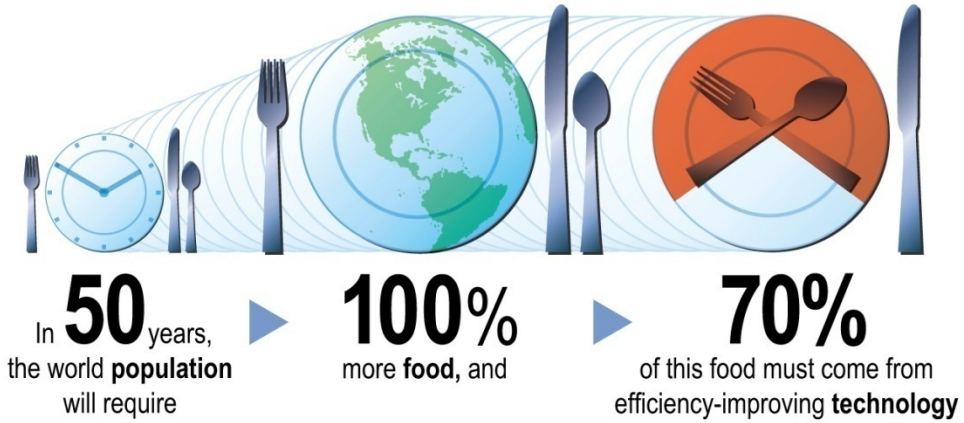
25% Reduction of Greenhouse Gas Emissions from Fluid Milk by 2020

- Equivalent to removing 1.25 million passenger cars from the road annually
- Committed to
  - Sound science
  - Establishing an industry benchmark
  - Life Cycle Assessment

INNOVATION CENTER FOR U.S. DAIRY
HEALTHY PEOPLE • HEALTHY PRODUCTS • HEALTHY PLANET

Source: http://www.environmentalleader.com/2009/04/14/dairy-industry-to-cut-milk-related-emissions-25-by-2020/, Last Accessed July 26, 2009

The Real Challenge: Global Demand Requires More Food



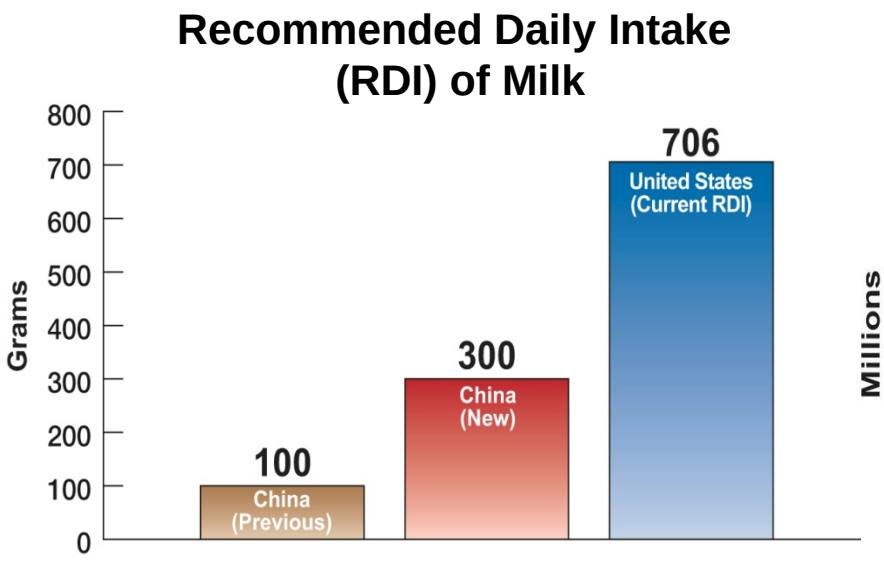
Technology's Role in the 21st Century: Food Economics and Consumer

- Challenge to meet 100% increase in global food demands in 50 next years
- The global food industry needs technology
- Consumers need choice
- The food production system can mitigate the food economics challenge and achieve an "ultimate win."
- Requires the continued use of safe and efficacious technology and close collaboration across the entire global food chain.

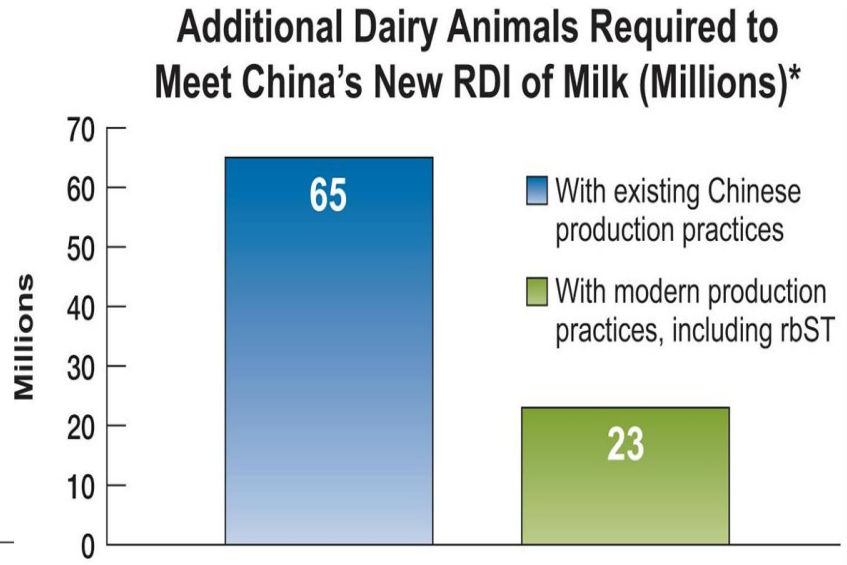
Sources: Green, R. et al. January 2005. "Farming and the Fate of Wild Nature." Science 307.5709: 550-555; and Tilman, D. et al. August 2002. "Agricultural sustainability and intensive production practices." Nature 418.6898: 671-677. "World Agriculture: toward 2015/2030." 2002. United Nations Food and Agriculture Organization, Rome. Accessed 12/8/08. <ftp://ftp.fao.org/docrep/fao/004/y3557e/y3557e.pdf

Real Life Challenge: Meeting China's New 2008 RDI for Milk

- Chinese Recommended Daily Intake (RDI) of milk raised to 300 g
- Represents a three-fold increase in the Chinese RDI
- 300 g is a modest requirement, only 44% of the US RDI

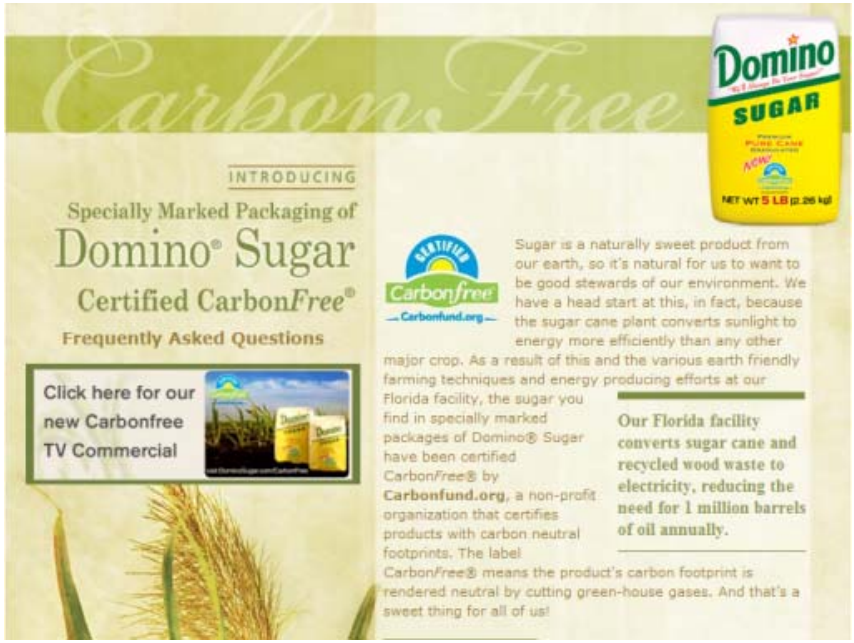


Source: - U.S. Dairy Export Council, July 2008



* Includes heifers and bulls

"Greenwashing" Undermines the Value of Responsible Efforts and Is Unacceptable



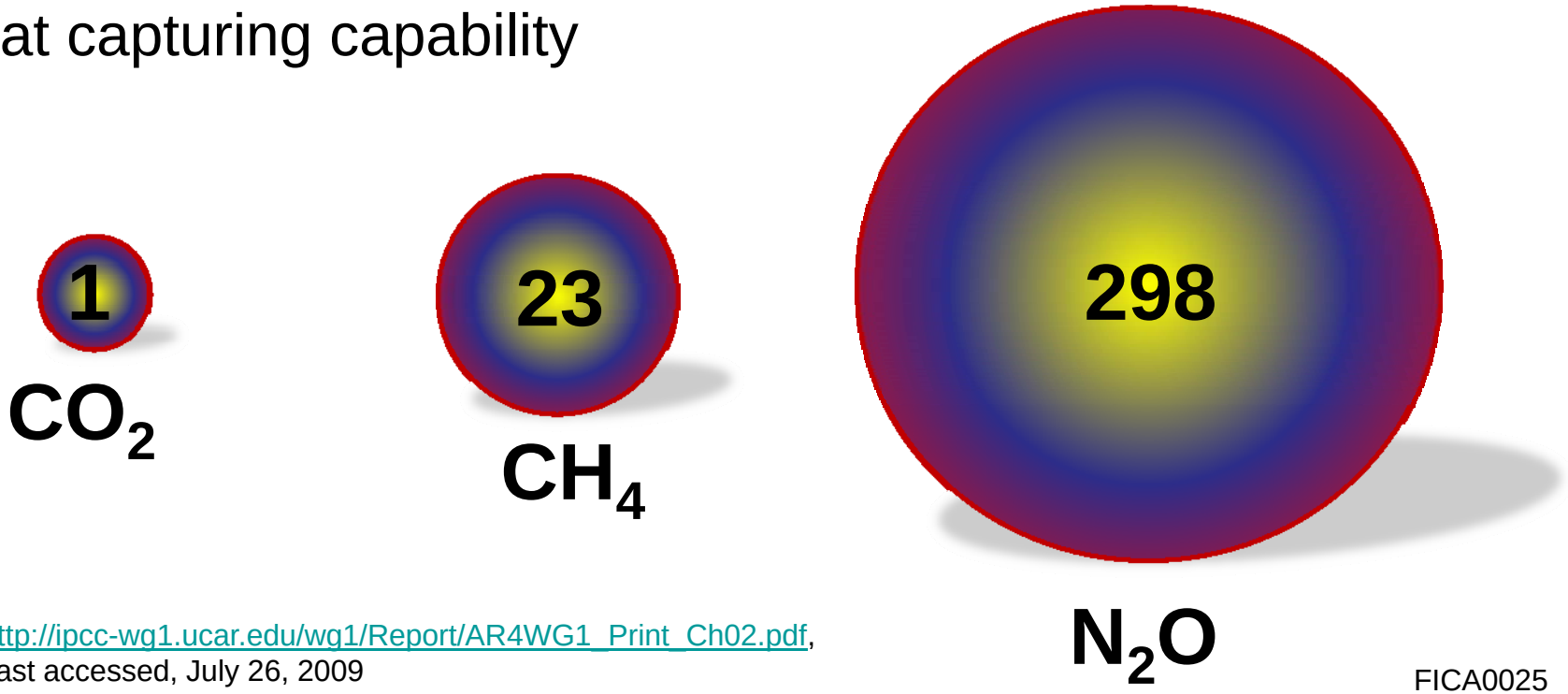
1. Carbon-free sugar
2. Organic rocks
3. Certified organic sea salt *(NaCl)*
4. Organic cigarettes
5. No-calorie energy drinks
6. Organic charcoal
7. Carbon-neutral insurance
8. Zero-carb alcoholic drinks
9. Carbon-free shipping
10. Carbon-free computing

Source: http://wattsupwiththat.com/2009/05/04/sugar-coated-consumerism-or-just-plain-crap/, Last accessed July 26, 2009

What is a Carbon Footprint?

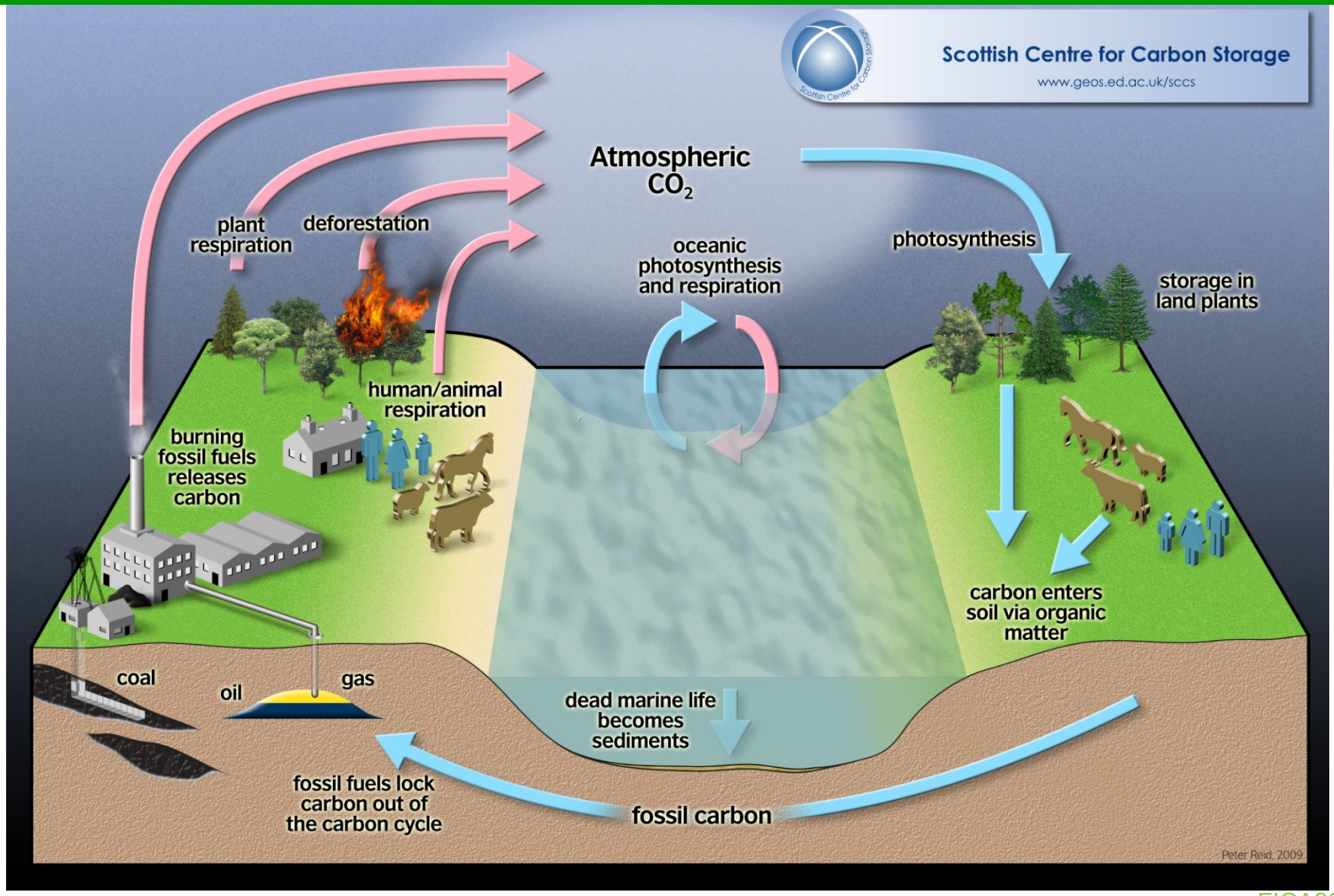
Total GHG (greenhouse gas) emissions caused directly and indirectly by an individual, organization or state in a given time

- Measured in CO_2-equivalents in terms of environmental heat capturing capability



Source: http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Print_Ch02.pdf, Last accessed, July 26, 2009

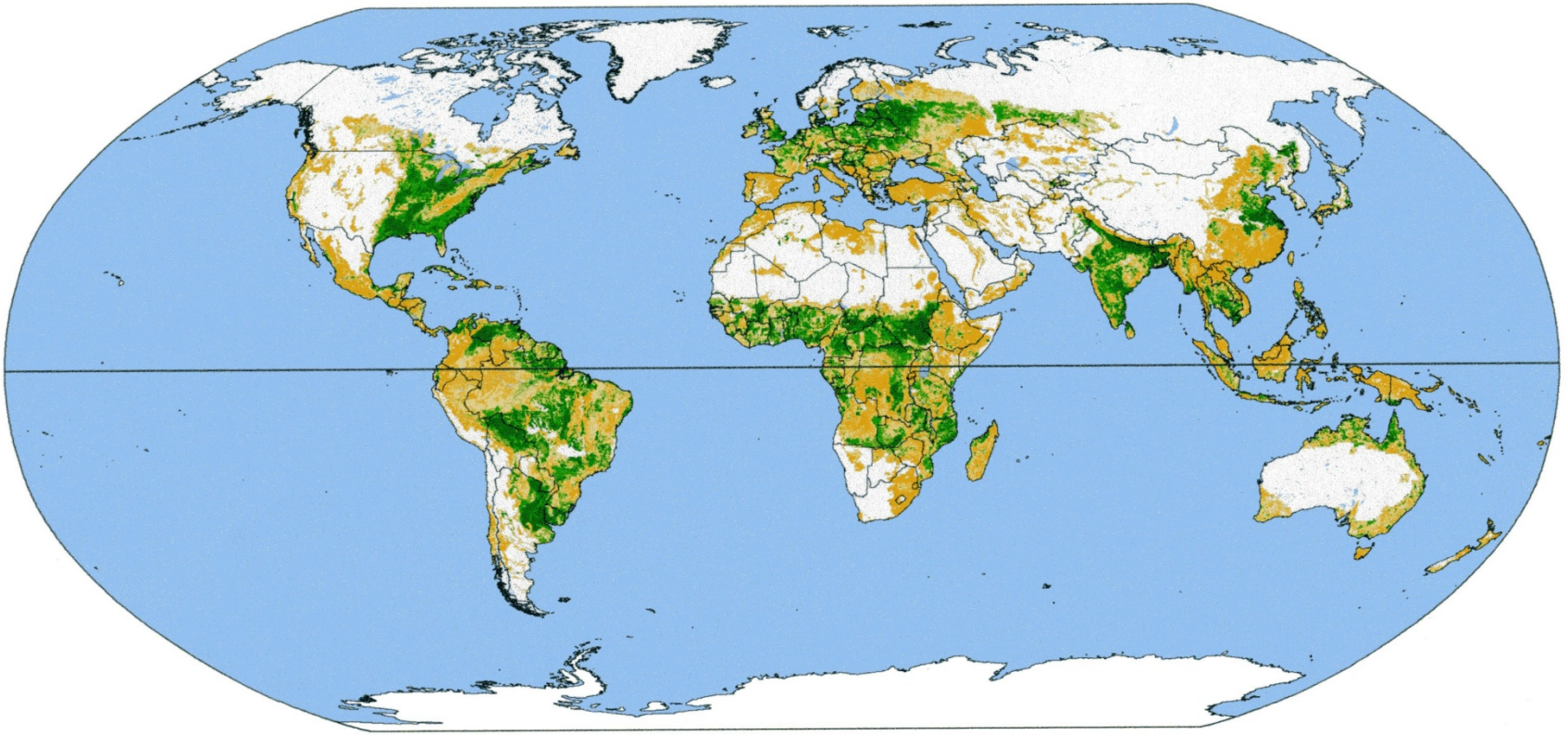
The Carbon Checkbook Must Balance



http://www.geos.ed.ac.uk/sccs/public/teachers/

Little Unexploited Arable Land Available

Potential Maximum Cropland



Source: FAO, 2000b. as published in UN-FAO Report, 2006, Livestock's Long Shadow

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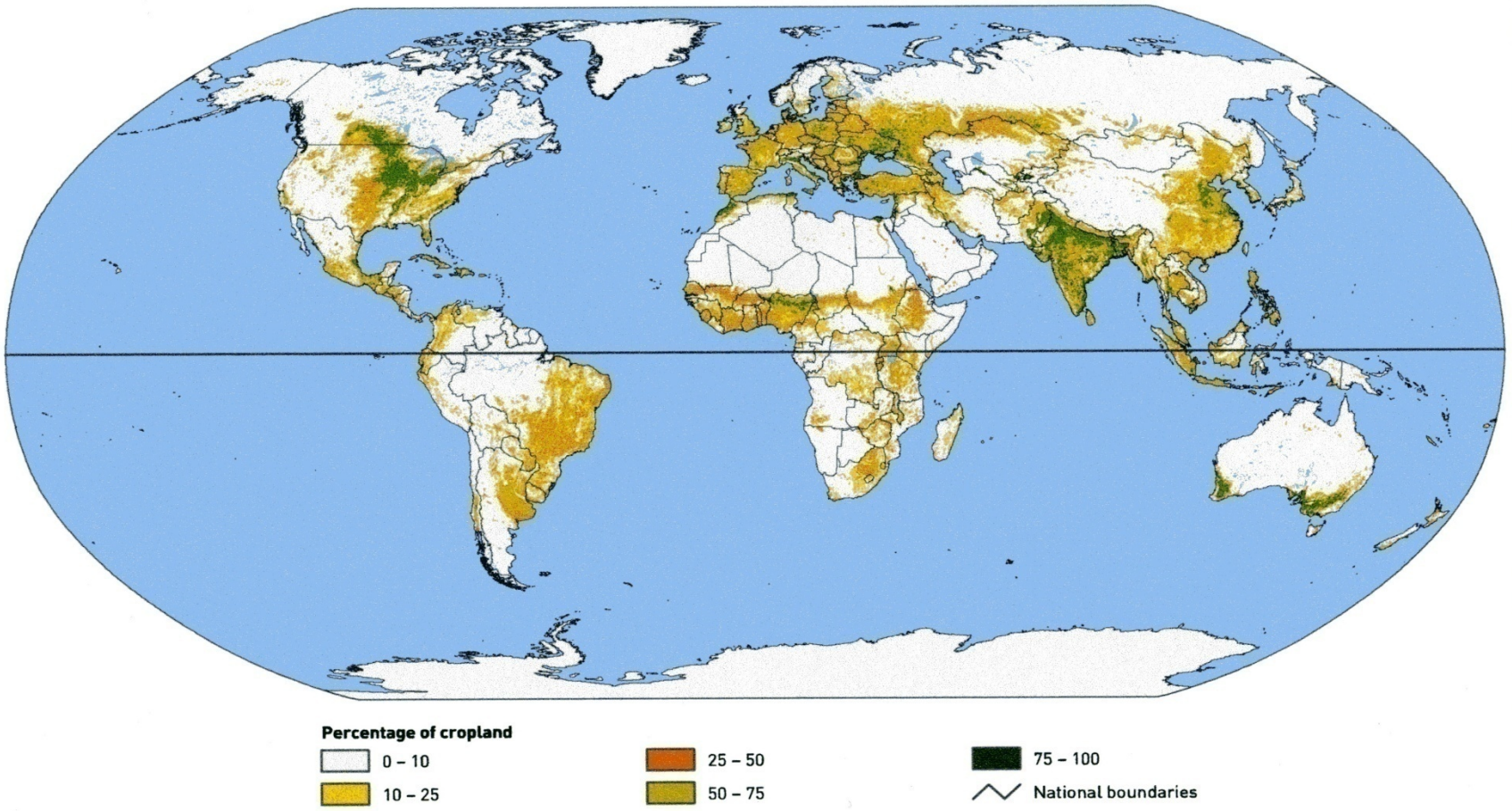
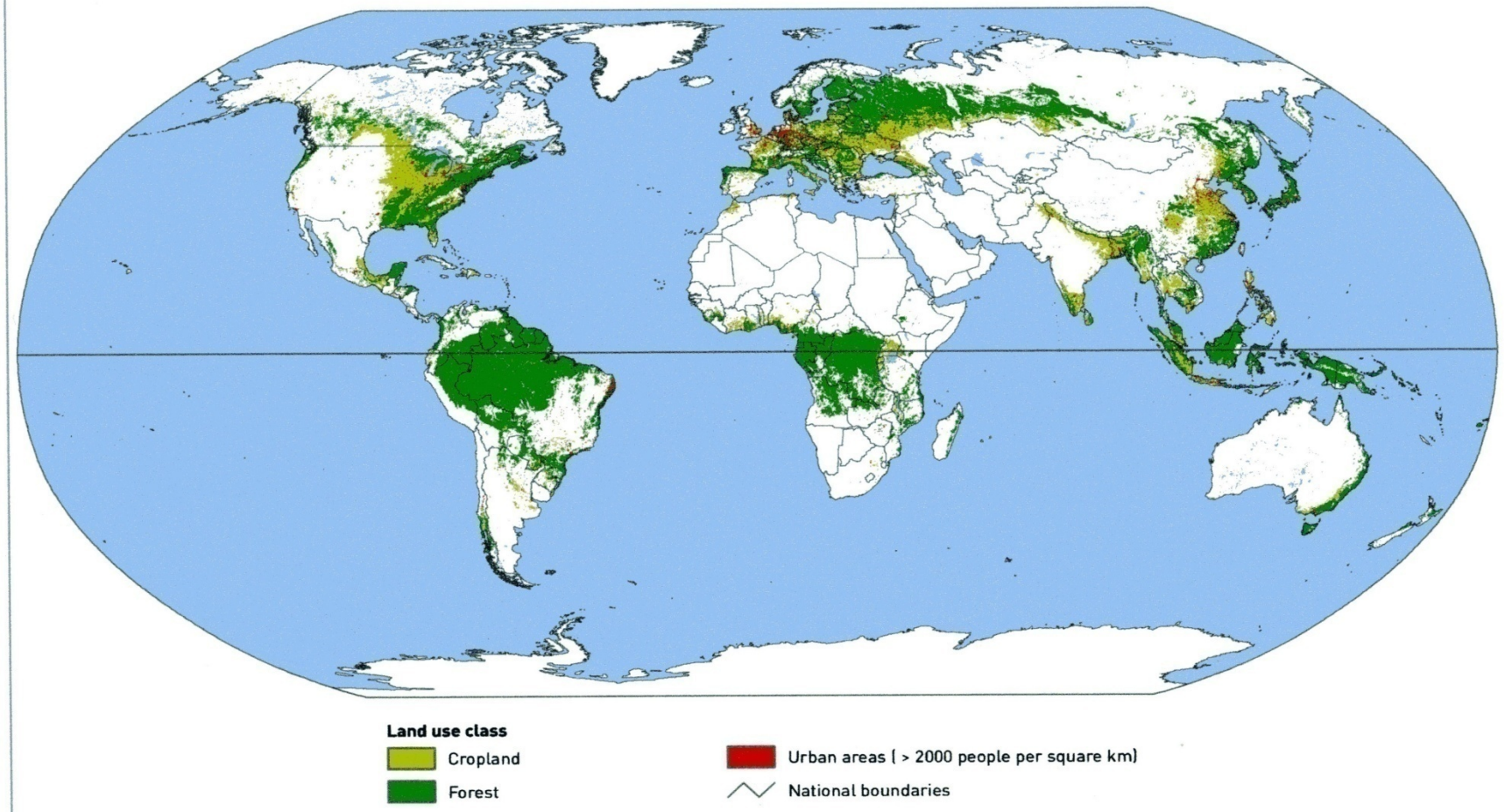
Little Unexploited Arable Land Available
Currently Utilized Cropland



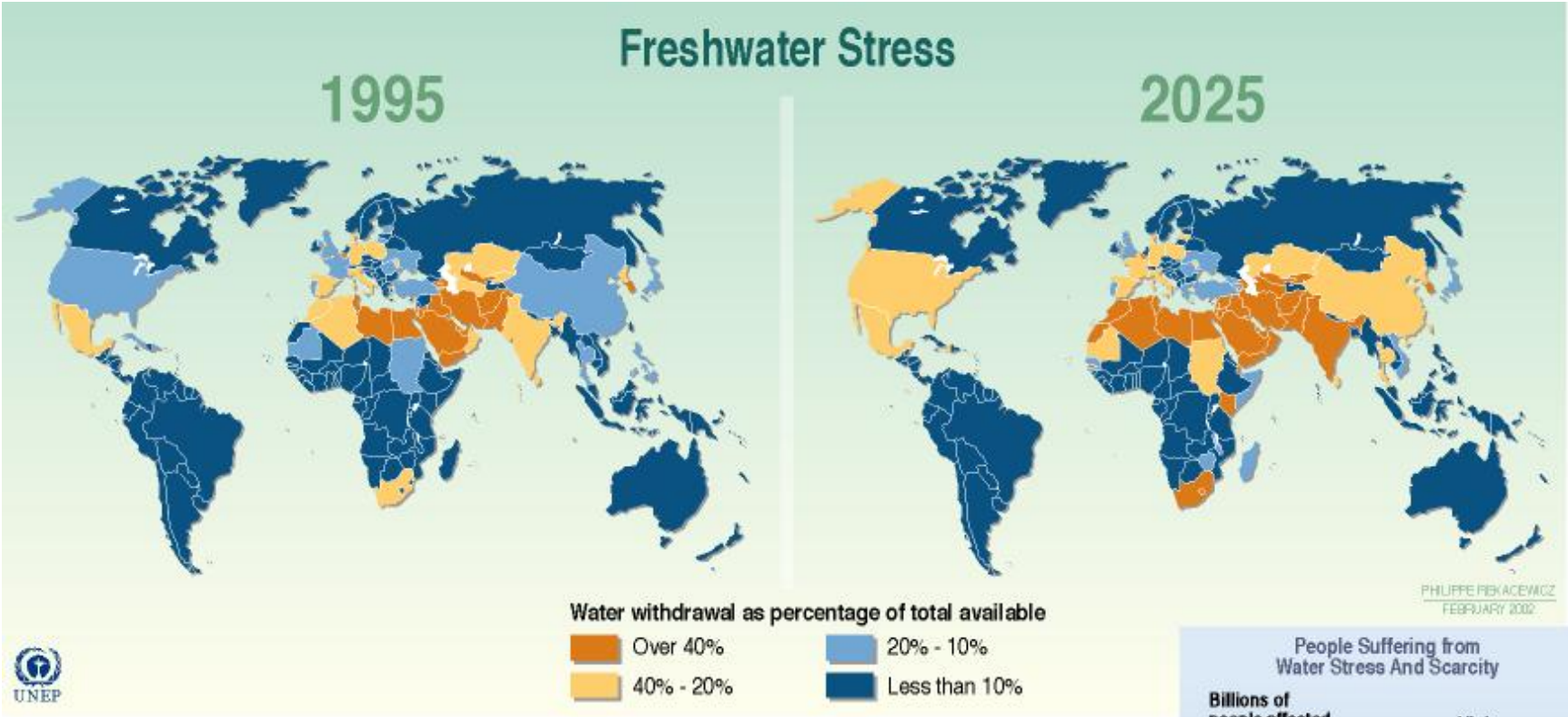
Source: FAO, 2006f. as published in UN-FAO Report, 2006, Livestock's Long Shadow

Little Unexploited Arable Land Available
Additional Cropland Requires Deforestation

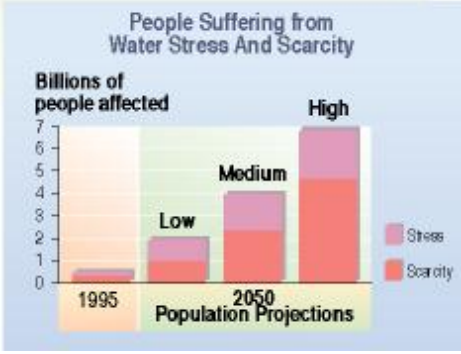


Source: LEAD. Current dominant land-use is displayed for cells with estimated high suitability for pasture (FAO, 2006f) and less than one-third of the area dedicated to pasture (FAO, 2006f). as published in UN-FAO Report, 2006, Livestock's Long Shadow

Global Water Availability Projection

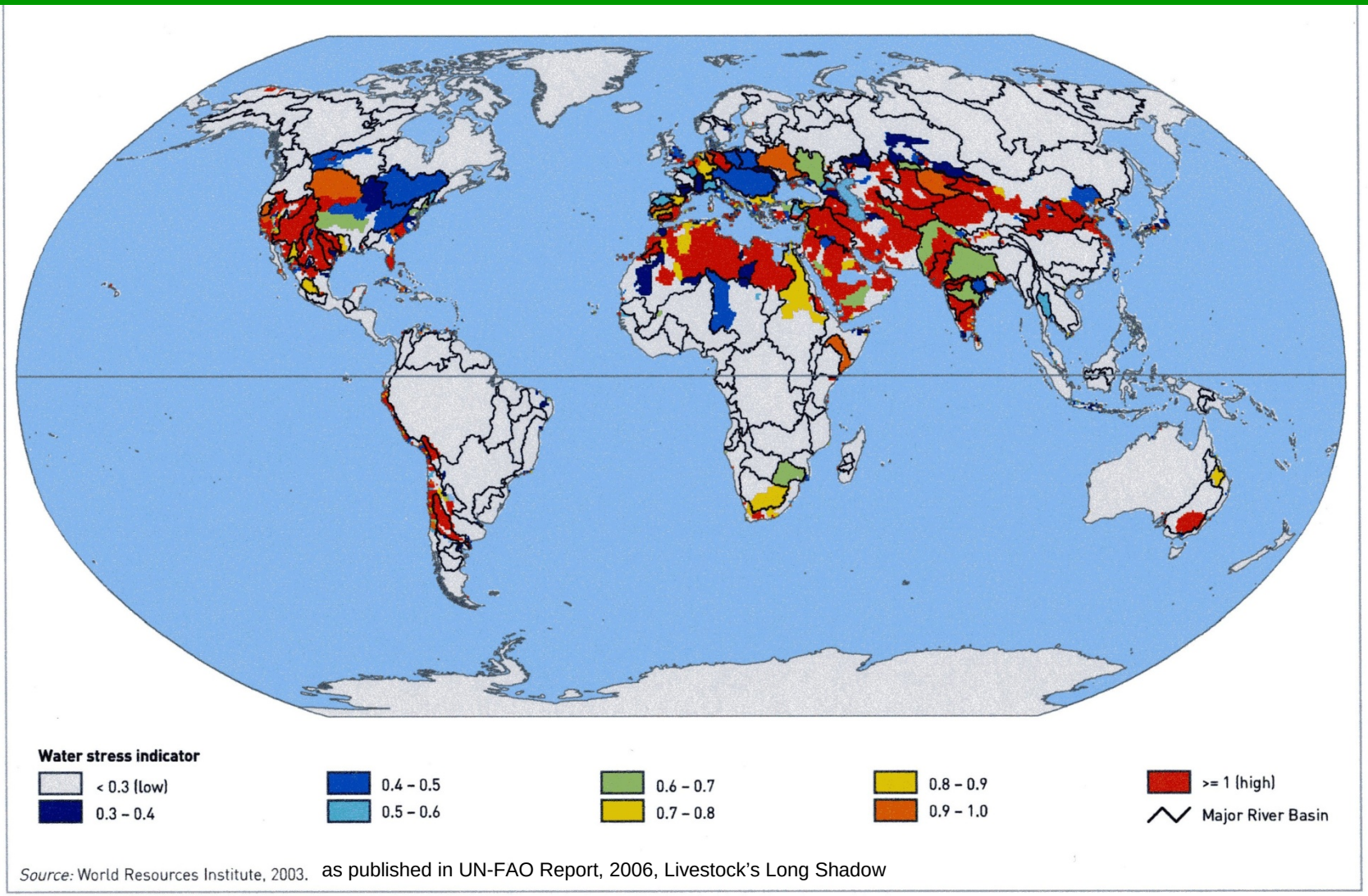


Source: World Meteorological Organisation (WMO), Geneva, 1996; Global Environment Outlook 2000 (GEO), UNEP, Earthscan, London, 1999.



Source: As published by United Nations Environmental Program (UNEP). Accessed http://maps.grida.no/go/graphic/freshwater-stress-1995-and-2025, 27JUL10

Water Scarcity – Human Water Draw as Compared to Availability



Source: World Resources Institute, 2003. as published in UN-FAO Report, 2006, Livestock's Long Shadow

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LCA is a Whole-System, Multi-Currency Accounting System

PRIMARY INPUTS
Animals
Feed
Water
Transport Fuel

SECONDARY INPUTS
Cropland
Fertilizer
Pesticides
Water
Fossil Fuels

PRODUCTION SYSTEM

WASTE
Manure
Greenhouse Gases

OUTPUT
Animal Protein

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Source: Jude Capper, Washington State University

Essential to Assess Impact per Unit of Output Rather Than per Unit of the Production Process

	Vehicle 1	Vehicle 2	
Fuel Burned in 5 hrs:	70 gal	10 gal	Production Process
Distance Traveled:	350 mi (5 mpg)	350 mi (35 mpg)	Production Process
Passengers:	50	4	Output
People Miles:	17,500	1,400	Output
People MPG:	**250**	**140**	Output

Winner

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Three States of Activity to Account for in an LCA

Physical Plant ***(Machine)***
Off
Idle
Performing

Three States of Activity to Account for in an LCA

Physical Plant ***(Machine)***	**Animal Corollary**
Off	Deceased
Idle	At Rest *(Maintenance)*
Performing	Production *(Growth, Lactation, Reproduction)*

Three States of Activity to Account for in an LCA

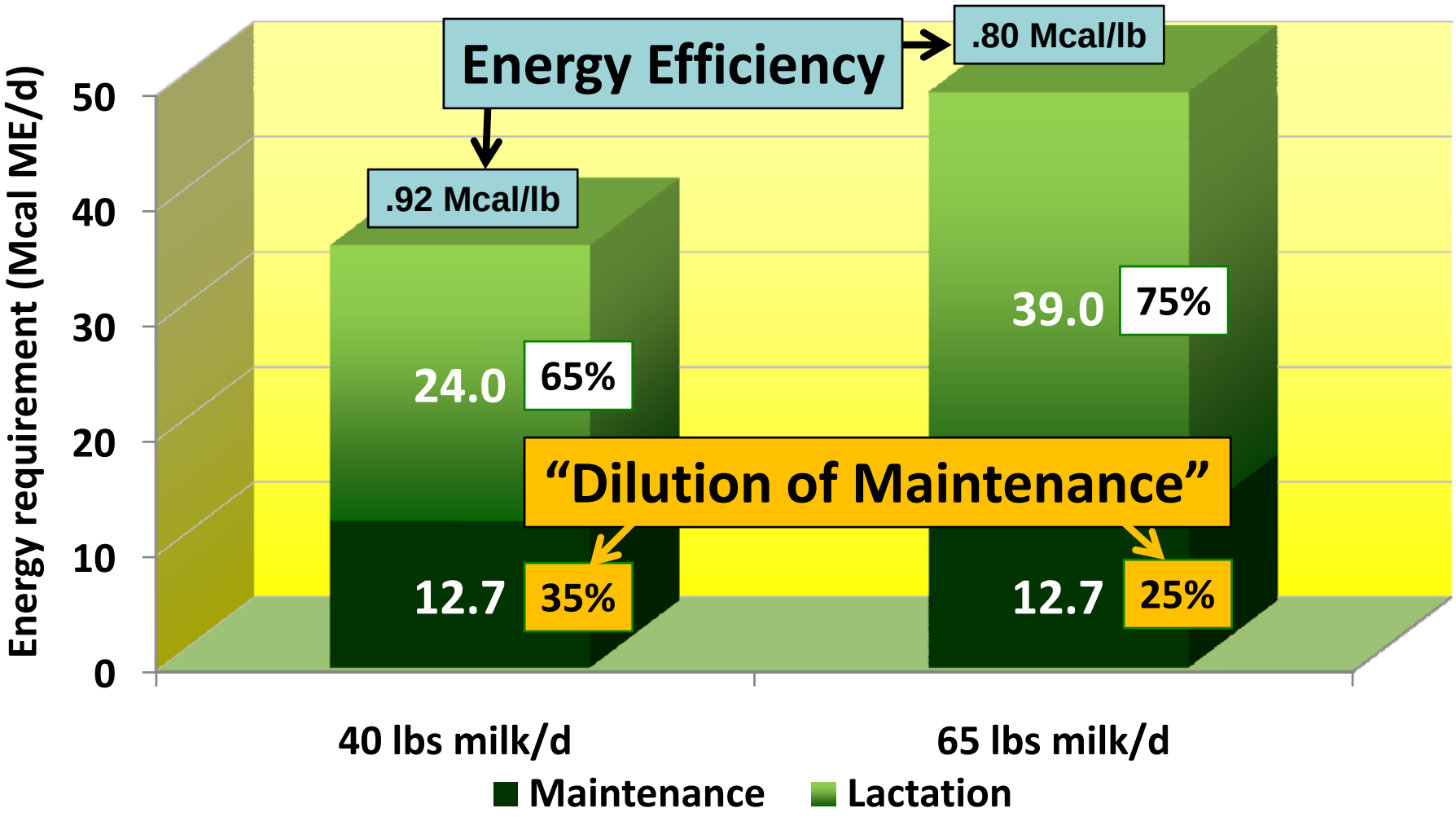
Physical Plant ***(Machine)***	**A**
Off	
	aintenance)
P	Production *(Growth, Lactation, Reproduction)*

Unlike machines, animals have an overhead maintenance energy requirement that must be paid <u>first</u>!

Key is to spread that fixed cost over more units of production.

"Dilution of Maintenance"

Defining Efficiency & "Dilution of Maintenance" for a Lactating Dairy Cow



Source: Created as an example by Jude Capper, WSU & Roger Cady, Elanco, 2010
based on AMTS dietary needs for a 1,500 lb Holstein Dairy Cow, 3.8%F, 3.1%P

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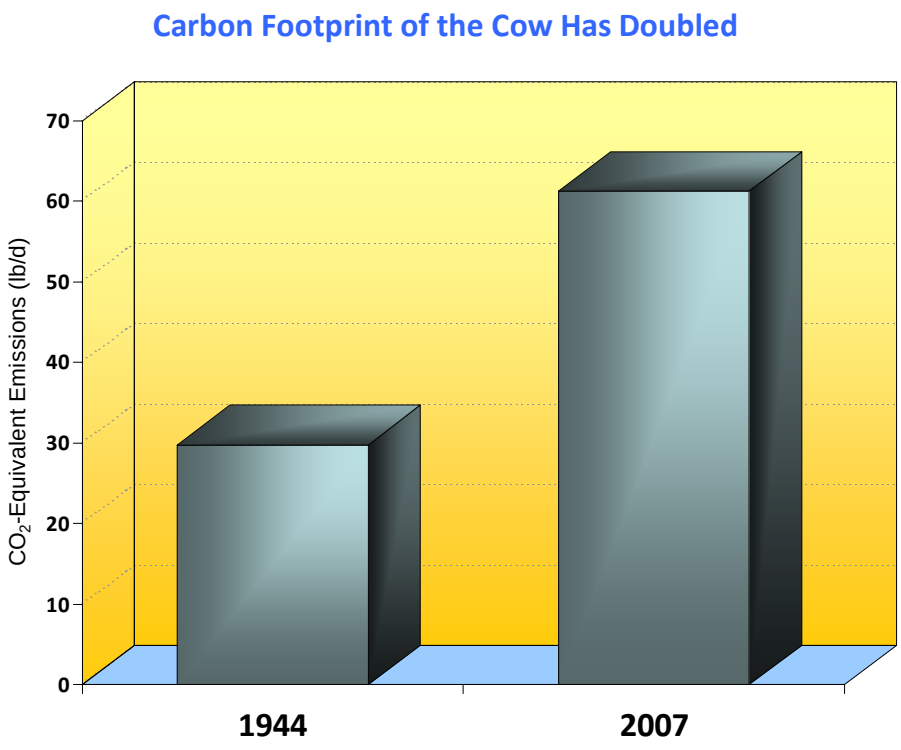
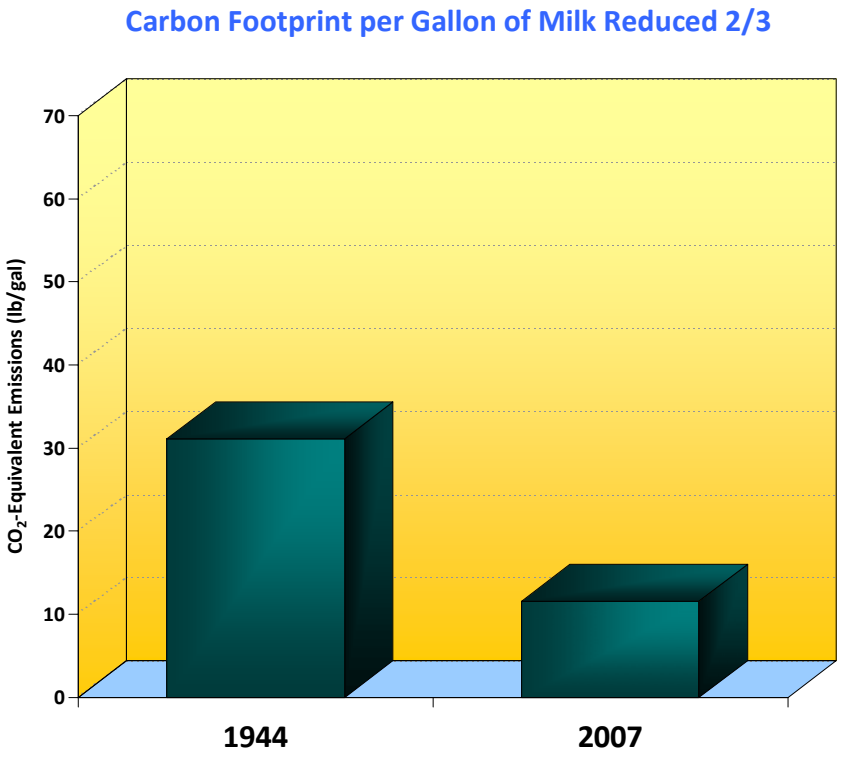
Production Process Footprint Not Necessarily Indicative of Industry Capacity to Reduce Impact



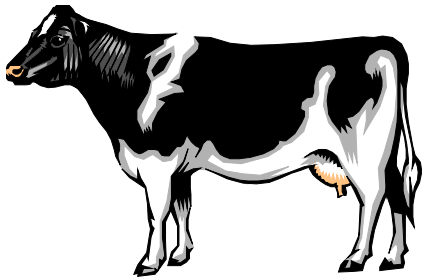


Net Result: U.S. Dairy Farm Industry has Reduced its Total Carbon Footprint by 41% Since 1944

Source: Capper et., al., JAS, 2009

Infrastructure Maintenance Must Also Be Assessed

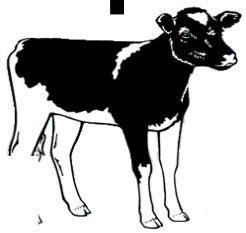
It Takes a Herd to Make Milk



+

$^1/_8$ of a Dry Cow

+



97% of a Heifer

Increases

- Maintenance Feed
- Water
  - Intake
  - Sanitation
- Greenhouse Gases *(Carbon Footprint)*
  - CO_2 - Carbon Dioxide
  - CH_4 - Methane
  - N_2O - Nitrous Oxide
- Land
- Manure
- Fuel
- Electricity
- Herbicides & Pesticides

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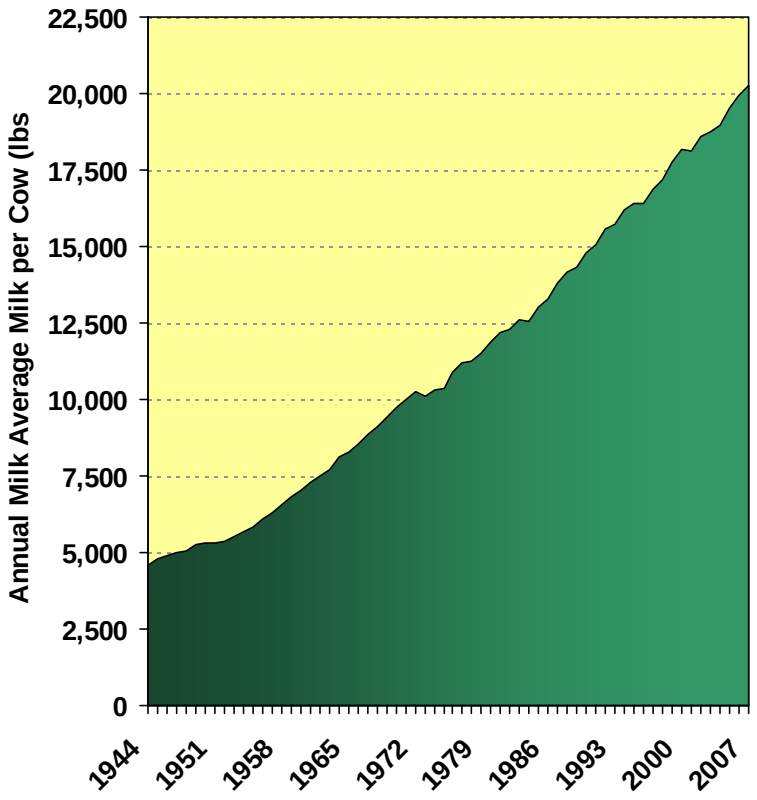
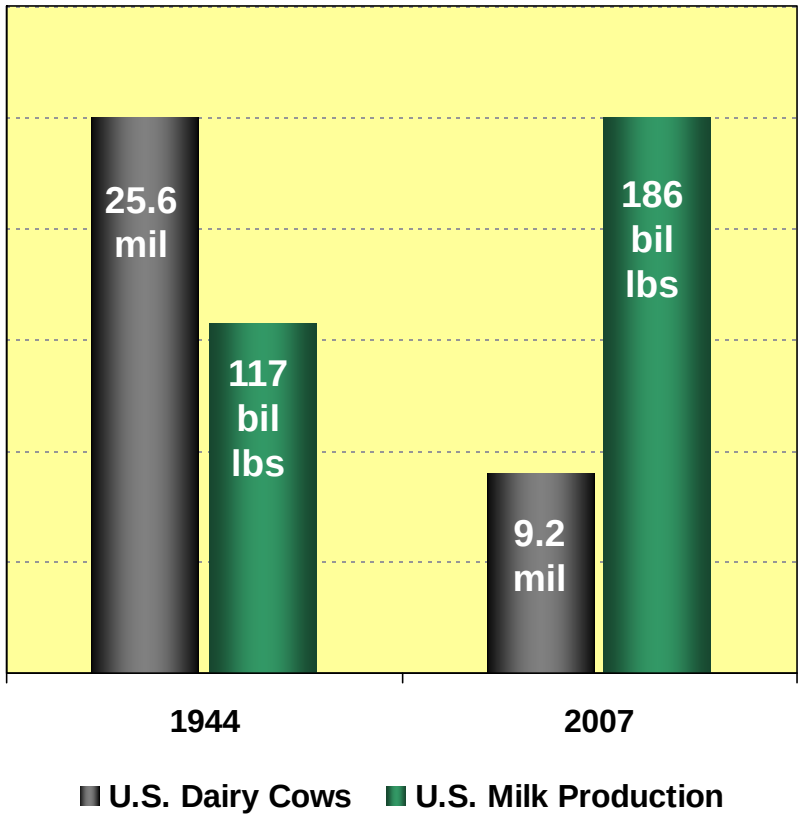
Productivity is the Reason

U.S. Productivity has Quadrupled Since 1944



59% More Milk with 64% Fewer Cows



Source: USDA-NASS, http://www.nass.usda.gov (May, 2009)

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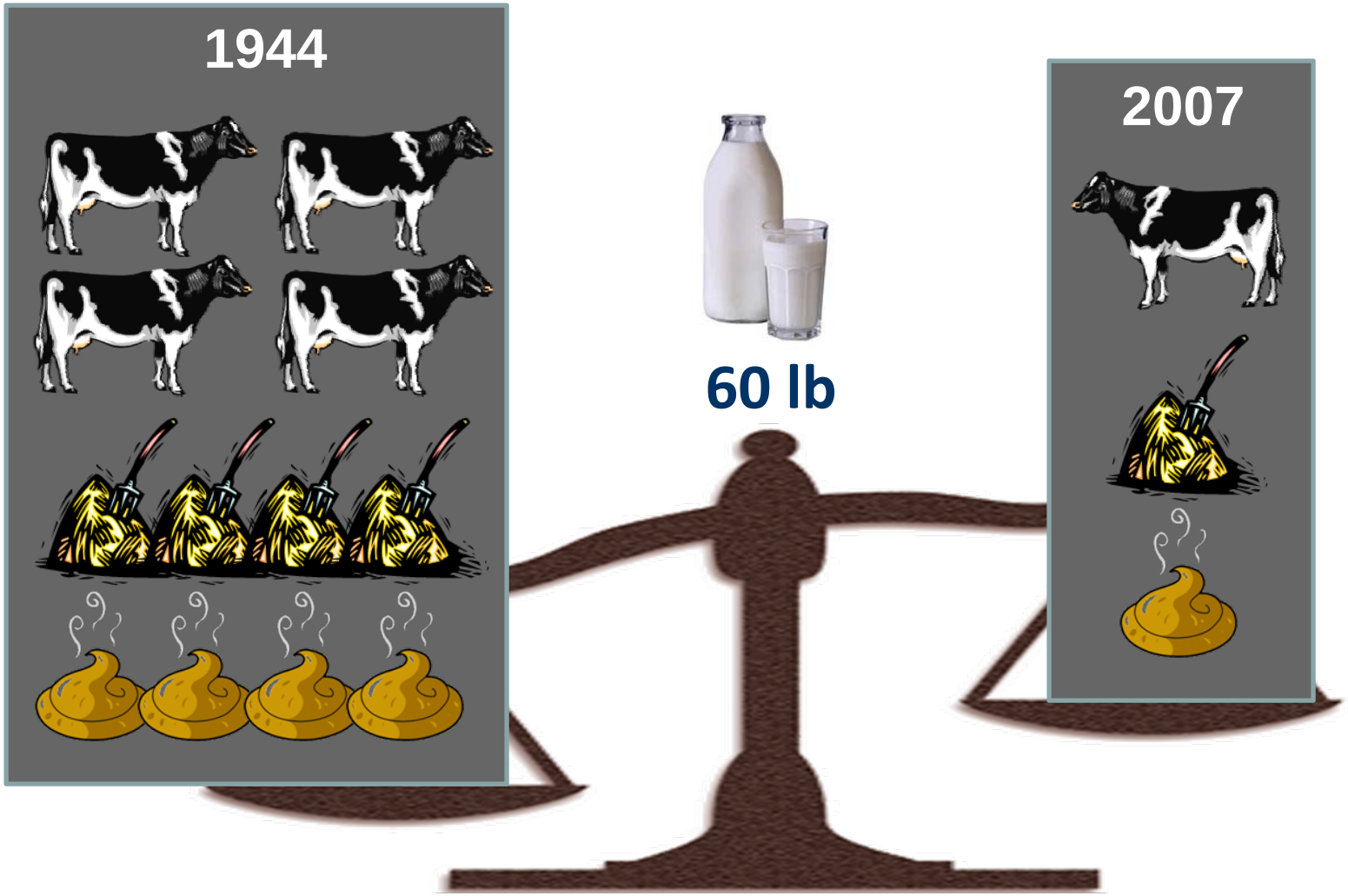
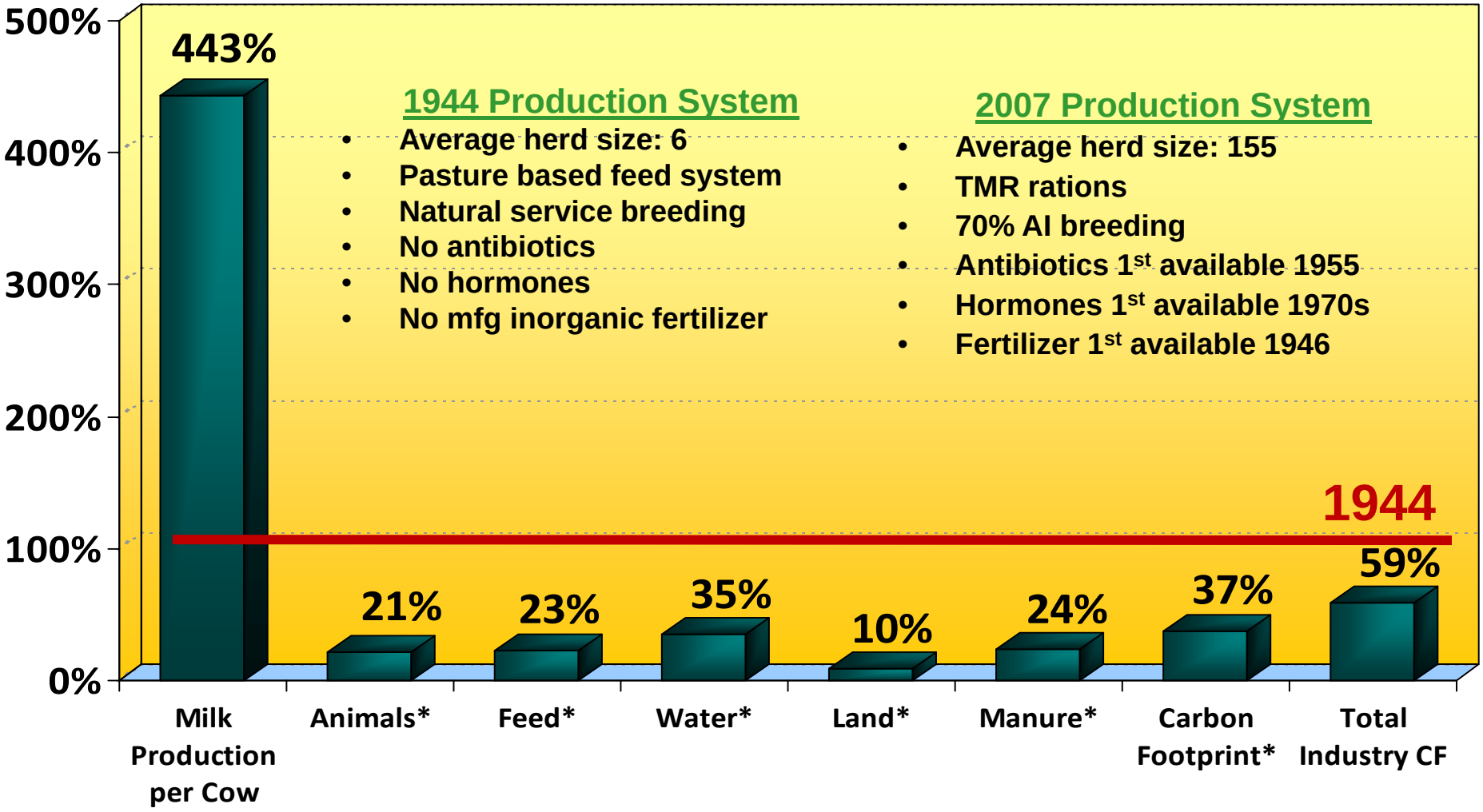
Practical Application of Dilution of Maintenance: Increasing Productivity Reduces Environmental Impact



Source: Capper, et. al., 2009, JAS

Environmental Impact of Milk Production Has Been Considerably Reduced Since 1944



*** Note:** per unit of milk

Source: Capper *et al.*, 2009, JAS

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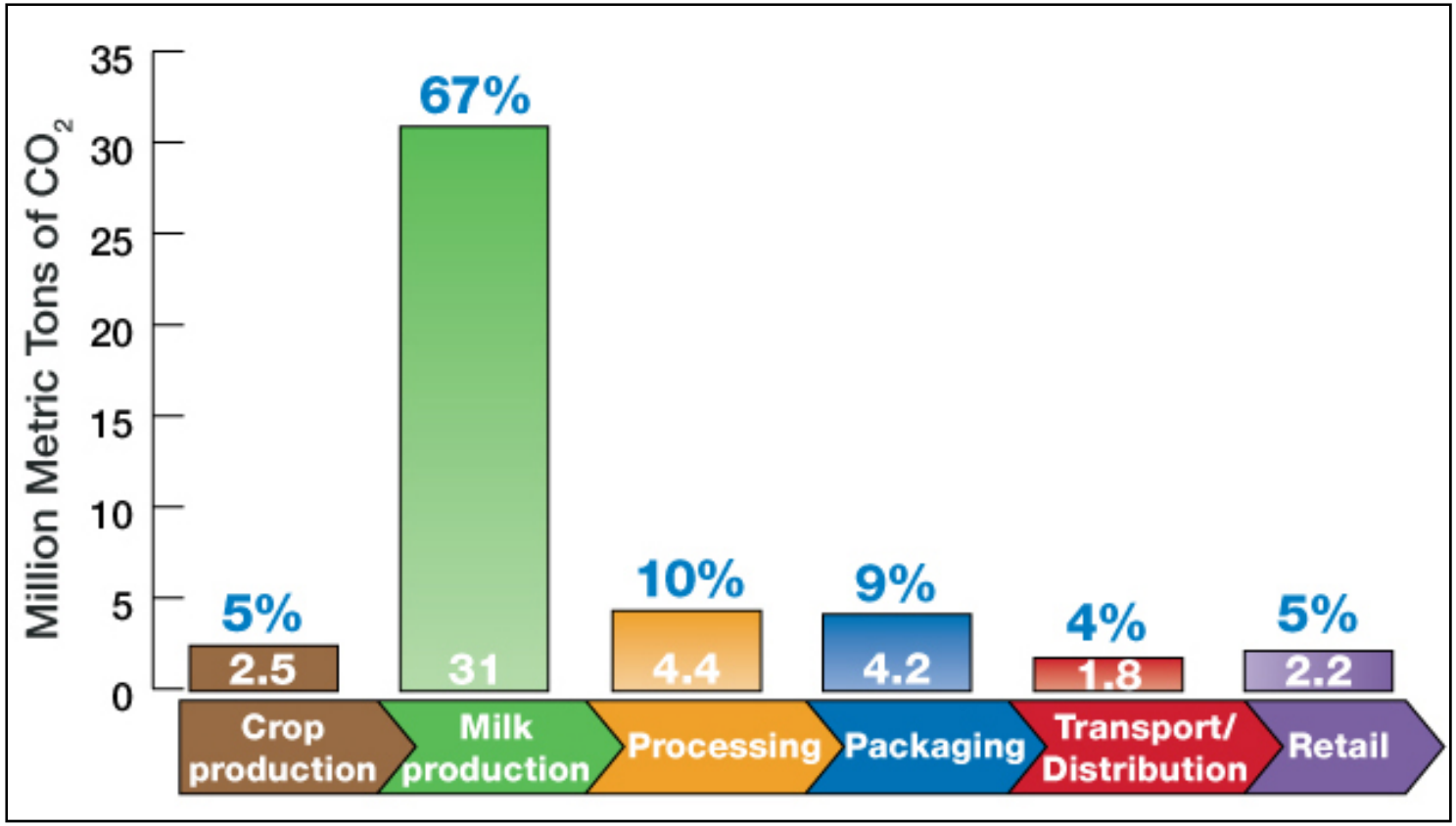
Dairy Industry is the Most Well Defined Animal System to Date

2007 Carbon Footprint Summary for U.S. Milk



Source: 2009, Capper et. al, JAS, & Blue Skye Sustainability Consulting

Food Miles: 3 Scenarios for a Consumer Buying One Dozen Eggs

1. Local chain grocery store supplied by a production facility some distance away
2. Farmer's market supplied by a source much closer than the grocery store source
3. Directly from a local poultry farm

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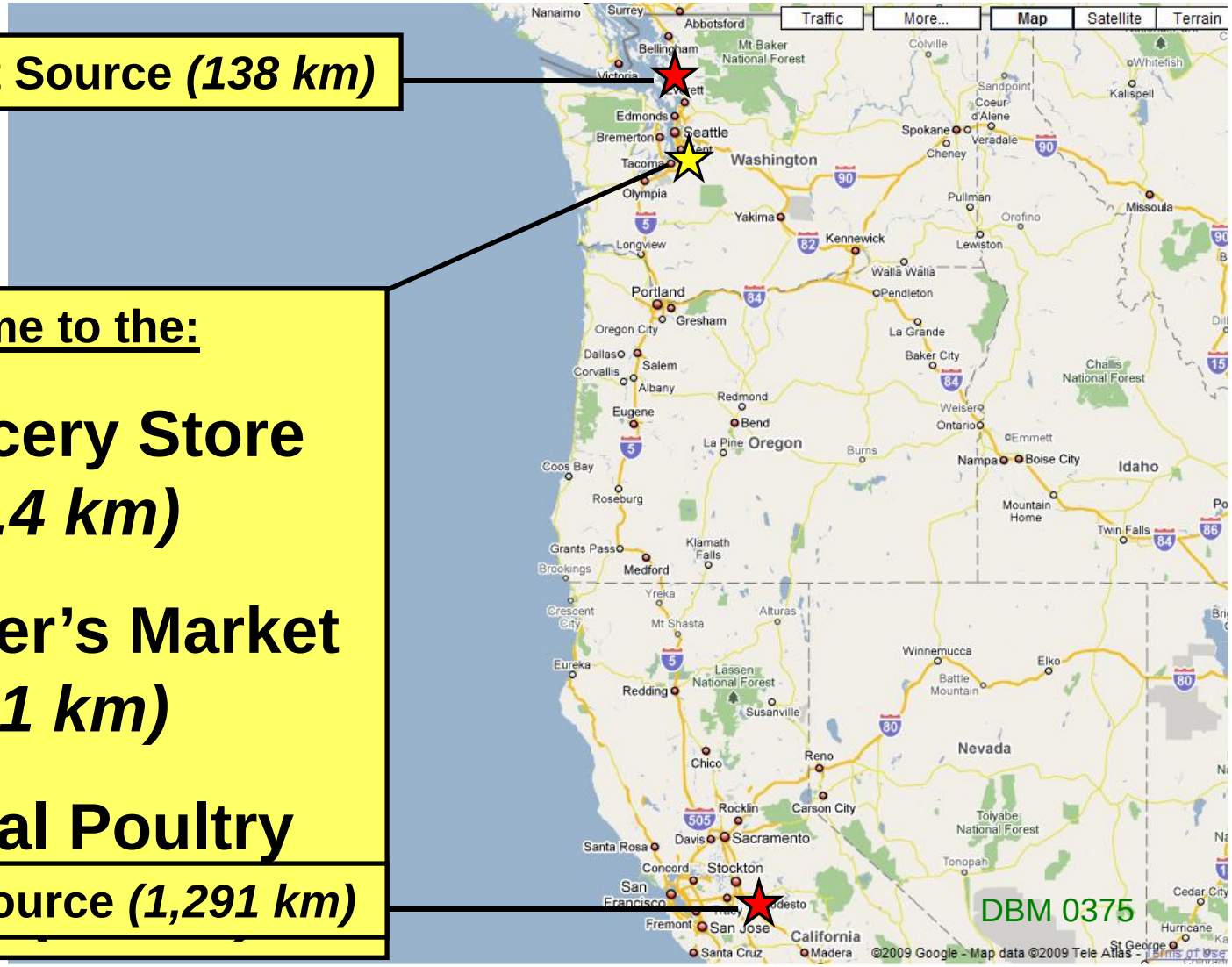
Relative Locations of Home/Store/Farmer's Market and Egg Sources

Farmer's Market Source *(138 km)*

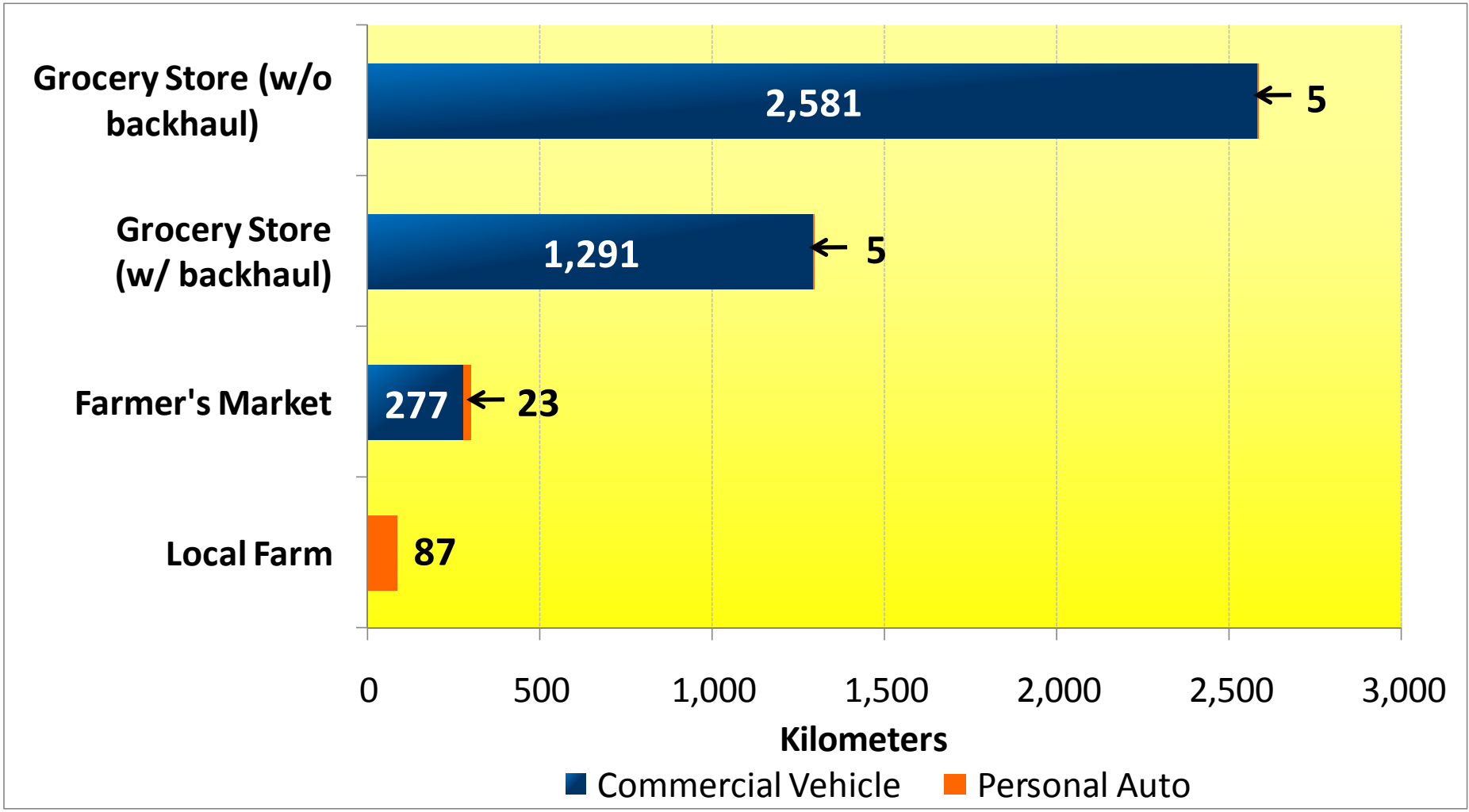
Home to the:

- **Grocery Store *(2.4 km)***
- **Farmer's Market *(11 km)***
- **Local Poultry**

Grocery Store Source *(1,291 km)*



Vehicle Distance Traveled to Move Eggs from Source to Home



Source: Capper et al. (2009) "Demystifying the environmental sustainability of food production" *Cornell Nutrition Conference*

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Vehicle Fuel Efficiency and Cargo Capacity

	Fuel Efficiency (km/liter)	Egg Capacity (dozens)
Automobile	9.5	1
Pick-up Truck	7.7	1,740
Refrigerated Tractor Trailer	2.3	23,400
Refrigeration Unit	1.9 (l/hr)	N/A

Source: Capper et al. (2009) "Demystifying the environmental sustainability of food production" *Cornell Nutrition Conference*

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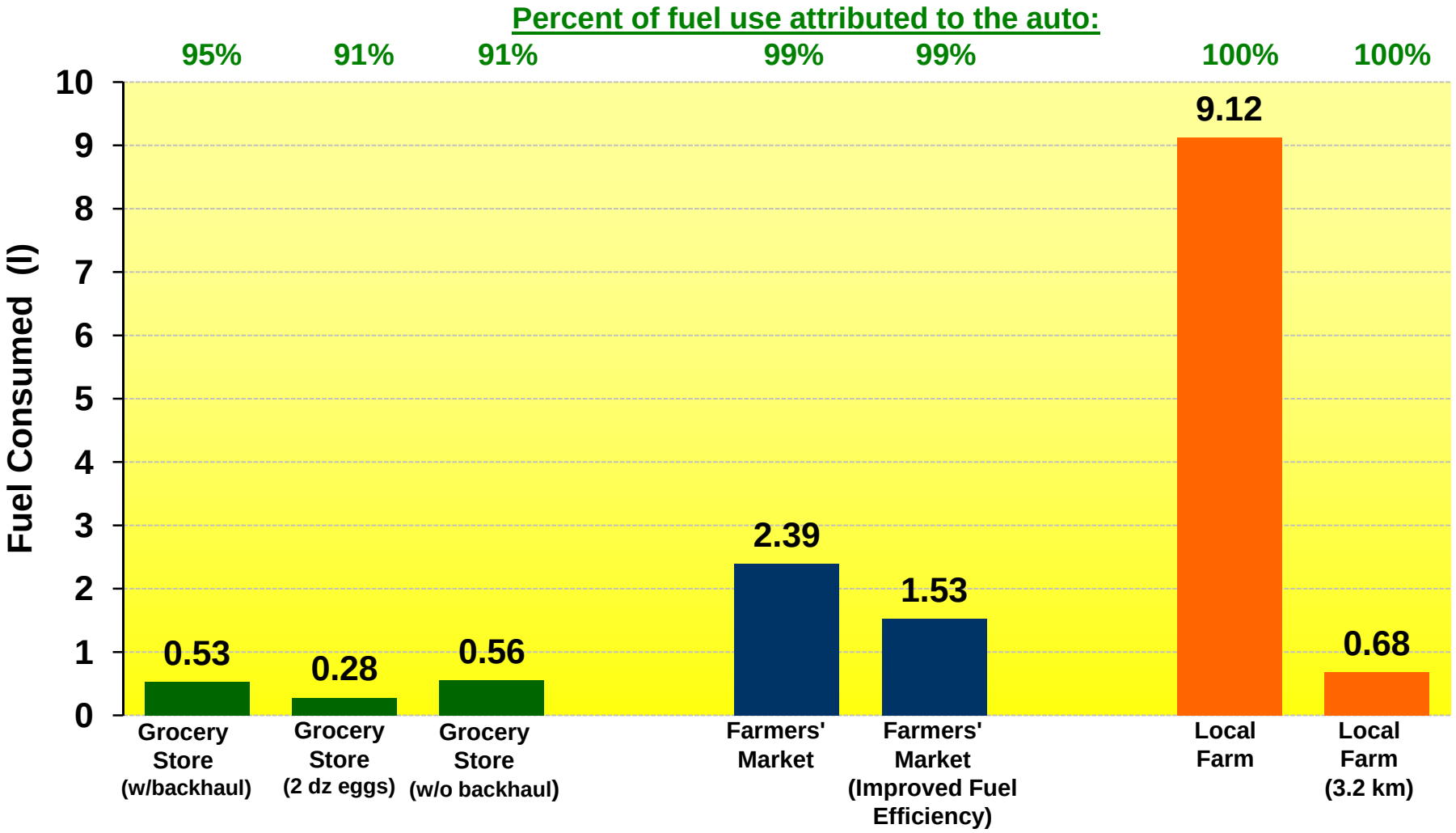
Fuel Consumed per Dozen Eggs to Move Eggs from Source to Home



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Source: Capper et al. (2009) "Demystifying the environmental sustainability of food production" *Cornell Nutrition Conference*

Summary

- ✓ Environmental stewardship is a critical responsibility of food animal agriculture
- ✓ Science-based standards are in place for assessing environmental impacts
- ✓ Essential to evaluate environmental impact per unit of output rather than simply by unit of production
- ✓ “Dilution of Maintenance” is an important contributing factor in reducing the food animal industry’s environmental impact – Productivity dilutes maintenance
- ✓ Essential need exists to understand and discuss the role and environmental consequences of technology

Thank you!

Questions?