

Consumer Food Waste - a Potential Animal Feed Resource

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Animal Agriculture

- “providing our dinner” or “taking our lunch” ?
- Competes for use of resources (land, water, .. .) for other activities.

Our Focus:

- What is the “appropriate role” of animal agriculture in a sustainable system?
- Can they play a synergistic role?

Historical approach to improving animal efficiency

- Increase yield/animal unit

Mechanism

- Dilution of animal maintenance cost
- More yield/animal, requires fewer animals, fewer replacement animals and fewer resources proportional to animal numbers.

[Link to Milk Intensity PDF](#)

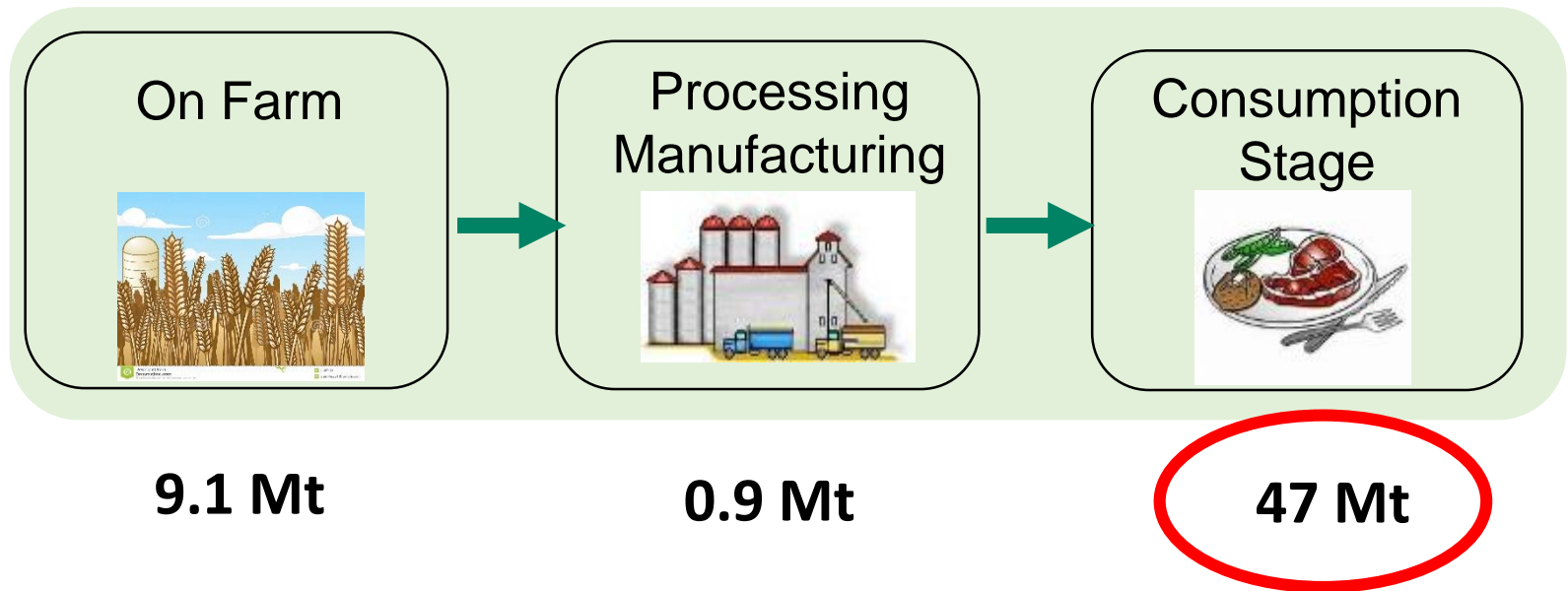
New dimensions of efficiency – use of human food waste as animal feed

- 30% of Human Food Production is used as by products in animal feeding systems
- However Food Waste in U.S. is very large



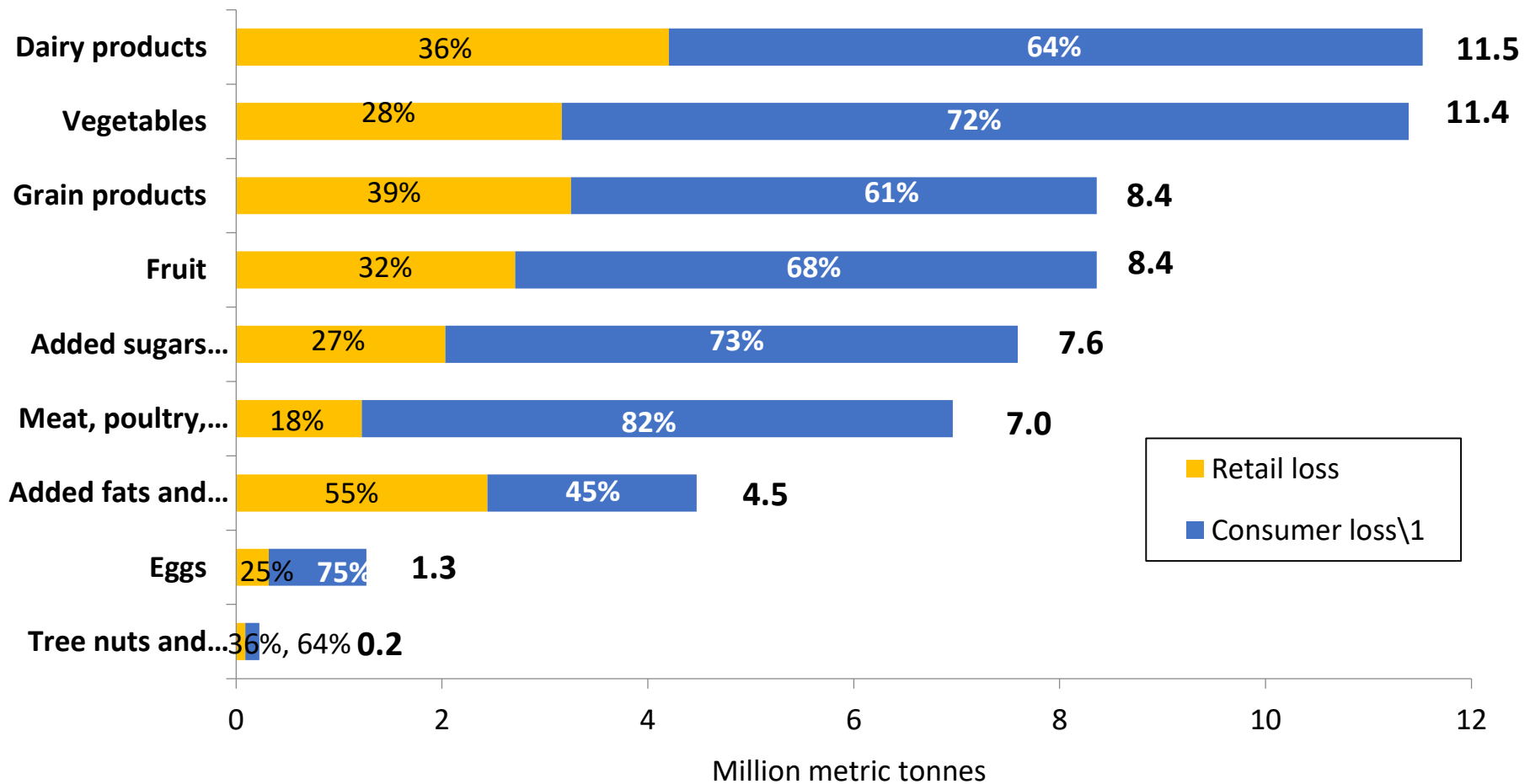
The Magnitude of the Problem

FLW along the food chain



The Magnitude of the Problem

Retail and consumer food loss by food group



Resources and Financial Drains with Retail and Consumer Level FLW

- 27% of cropland
- 25% of irrigation water
- 26% of fertilizer
- 25% of energy
- Retail value of \$161.6 billion
- Intangible impacts, e.g. water pollution, GHGs, biodiversity, and habitat loss



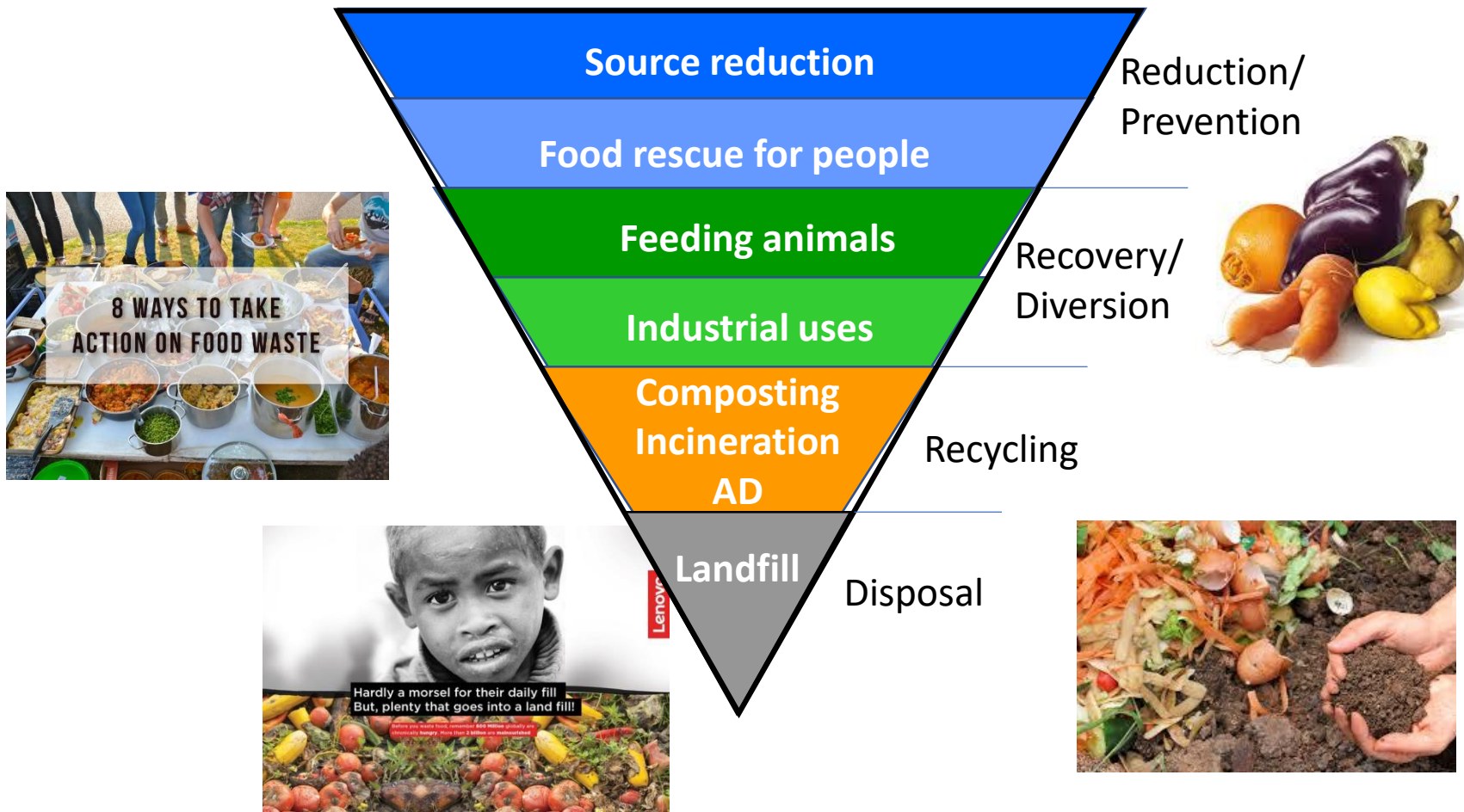
FLW Reduction, Recovery, and Recycling

U.S. 2030 FLW Reduction Goal: 50%



FLW Reduction, Recovery, and Recycling

The Hierarchy



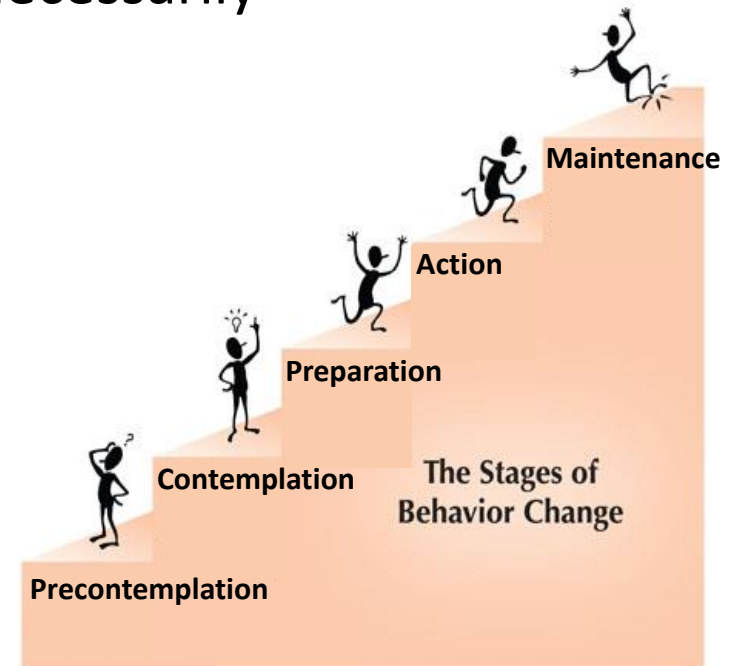
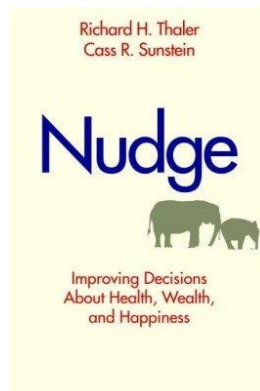
Major Data on Food Waste Prevention and Recycling

Hierarchy	Mt	Notes
Prevention (rescue/donation) to feed people 1-2 Mt	0.32	Manufacturer donation
	0.30	Retail/wholesale donation
	0.008	Farm gleaning
	0.19	Donation, Feeding America data
	0.56	Donation from consumer and retail
Diversion nonhuman beneficial use 15 Mt	13.9	Manufacturer diversion to feed animals
	0.1	Retail/wholesale diversion to feed animals
	1.1	Restaurant grease recovery
Recycling 7-8 Mt	5.0	Manufacturer-reported composting
	0.53	Retail/wholesale reported composting
	1.42	EPA data on composting
	1.66	Survey response of 24 states

Interpretive Analysis

Changing food-wasting behavior

- No one buys food to throw it away but...
- Our decisions and actions are not necessarily rational or straightforward...
- Nudging for behavioral change...



Sources: Grimley 1997 (75) and Prochaska 1992 (148)

Interpretive Analysis

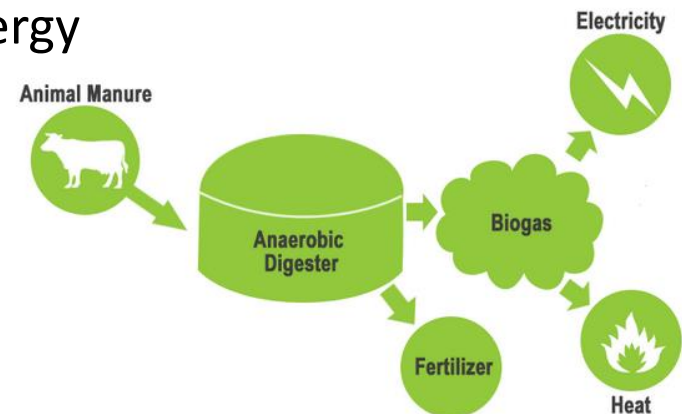
Technologies and the 50% reduction goal

- Composting
 - Reduced volume, moisture, and pathogens
 - Compost as soil amendment



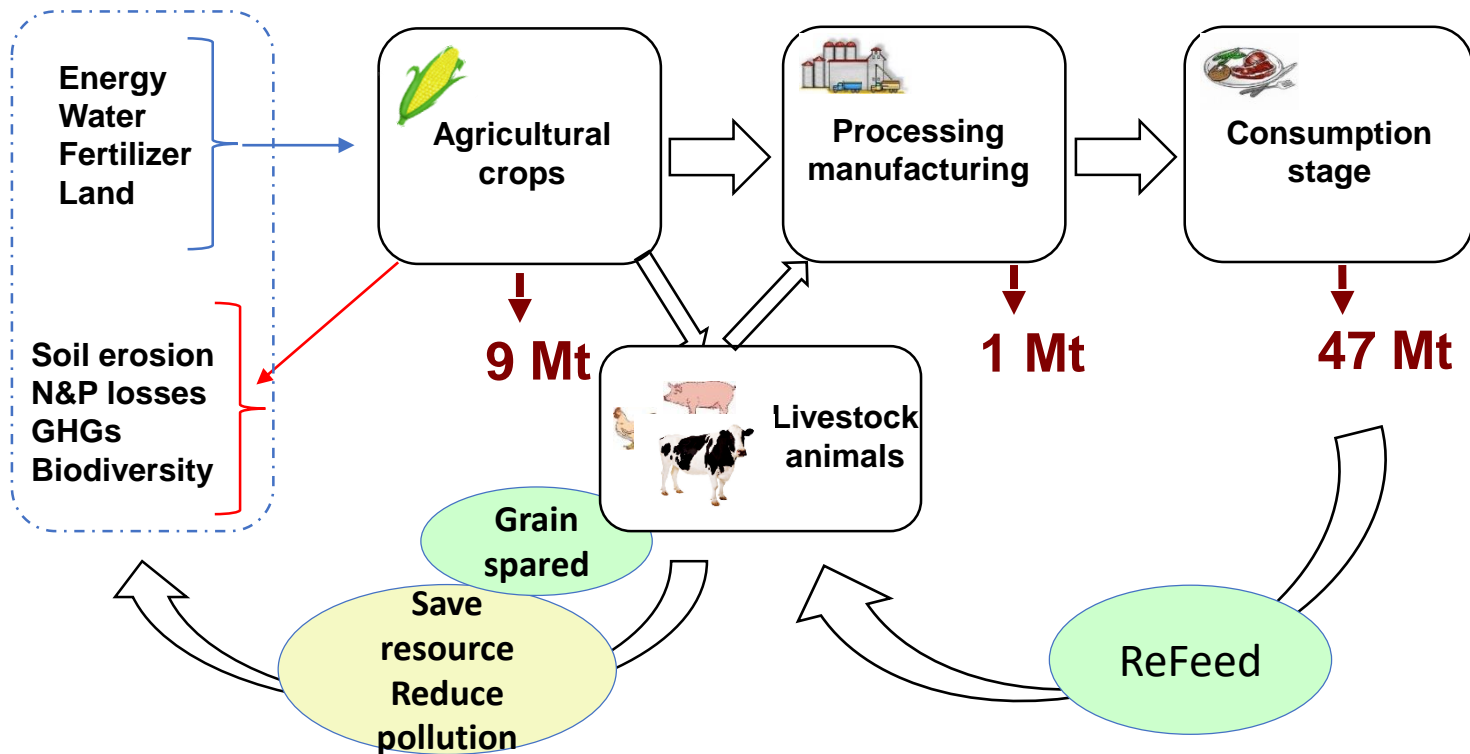
- Anaerobic digestion (AD)
 - Biogas as a source of renewable energy
 - Digestate as soil amendment

- Efficacy, costs-benefits, scale-up?
- Tradeoffs?



Interpretive Analysis

A game changer?



Conclusions

- Sustainable food consumption must be taken into account of the food security and sustainability agenda.
- Food waste prevention is a top priority; changing consumer wasteful behavior is essential. Still, need all workable solutions.
- Technologies have a critical role to play. Research must evaluate the overall impacts of different technologies on food, energy, water, other resources, economic viability, and environmental-climate outcomes.

Questions/Discussion

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Food Loss and Waste

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Sustainably Feed the World by 2050*



Substantially decreasing food waste is attainable as long as people are willing to take actions to change wasteful lifestyles and society enables such change with necessary support. (Photo from SpeedKingz/Shutterstock.)

ABSTRACT

Reducing food loss and waste (FLW) is one of the key strategies to combat hunger and sustainably feed the world. In the United States, four major sources of data help describe the magnitude of the problem and illustrate potential opportunities for food waste reduction, recovery, and recycling: (1) at the retail and consumer levels, 60 million tonnes of food go uneaten annually (Buzby,

Wells, and Hyman 2014 [2010 data]); (2) at landfills, estimated food waste totals 26.6 million tonnes, representing three-quarters of food waste generated (USEPA 2016a [2014 data]); (3) estimates based on human physiology and metabolism models coupled with obesity and food availability data put consumer food waste at roughly 78 million tonnes (NRDC 2012); (4) farm-to-fork system analysis indicates food waste totaling 56.7 million tonnes, which is partitioned

into 9.1, 0.9, 22.7, and 24.5 million tonnes for wastage occurring at farms, in manufacturing, in consumer-facing businesses, and in homes, respectively (ReFED 2017a [2015 data]). Embedded in FLW are large amounts of resources, including 16 million hectares of land, 3.9 million tonnes of fertilizer nutrients, and 17 billion cubic meters of irrigation water for retail- and consumer-level food loss alone, plus other environmental and economic costs.

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