Cumulative Impacts of an Industrialized Food System

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food matters
Health Care Without Harm
PSR
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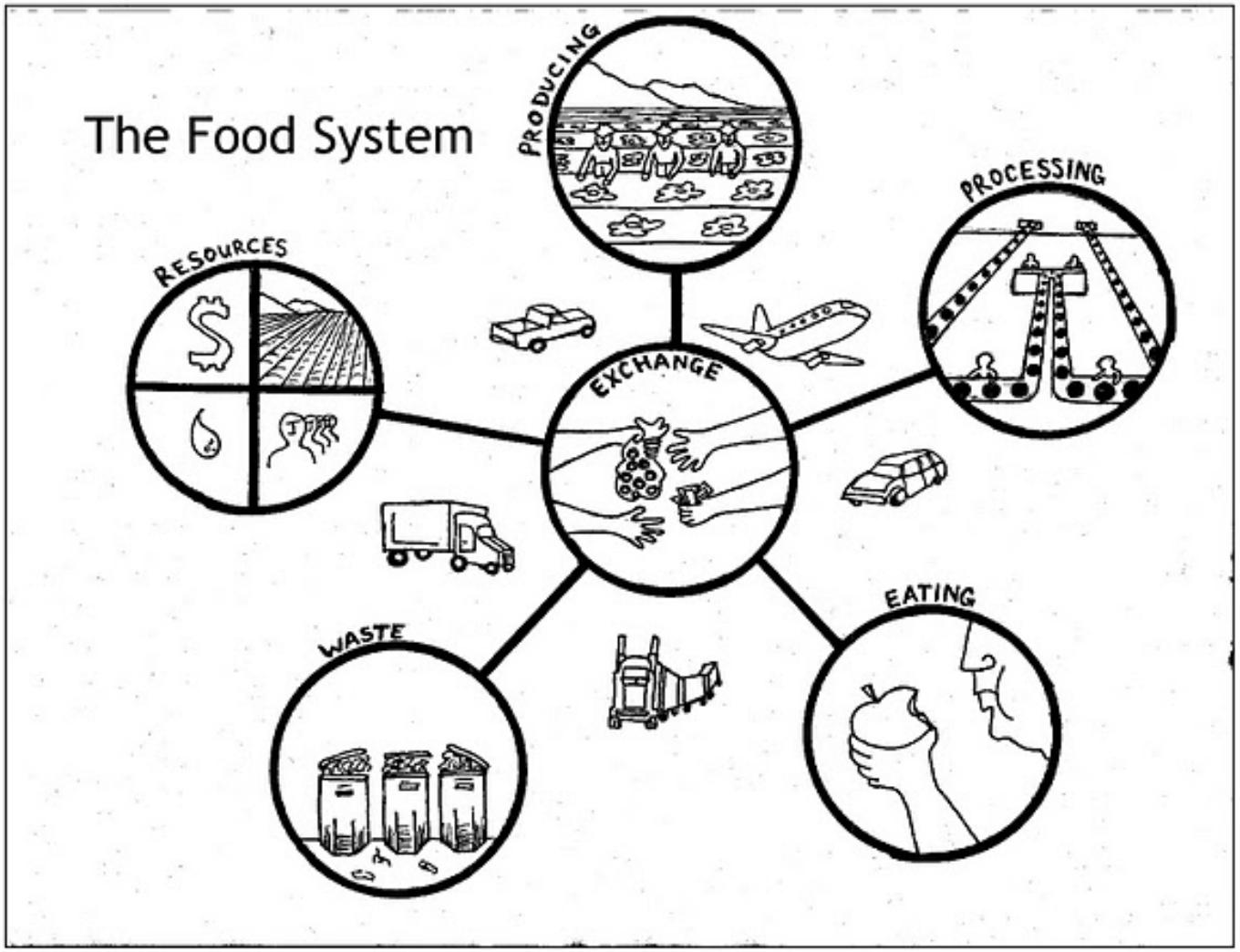
SAN FRANCISCO BAY AREA

The Food System



Dominant Model of Modern Agricultural Production

- An industrial model: maximizes production while minimizing labor inputs
- Features few crops grown in simple rotations
- Large scale
- Assumptions and premises:
  - Cheap energy and other inputs (fertilizer, pesticides)
  - Abundant water
  - Stable climate
- Externalizes many costs
- Abundant, relatively inexpensive calories

Adverse Impacts of Industrial Agriculture

- Direct adverse health effects
- Change in nutritional composition of food
- Air, water, soil contamination with pesticides, hormones, growth promoters, antibiotics, nitrates, manure effluents
- Social disruption of rural communities
- Indirect health effects

Externalities of the Industrialized Food System: Production, processing, packaging, transport, consumption

HEALTH

- Chronic diseases (cancer, diabetes, obesity, cardiovascular)
- Antibiotic resistance & food-borne pathogens
- Pesticide exposure (cancer, reproductive, neuro-developmental, and endocrine impacts)
- Asthma and respiratory illness
- Food injustice (hunger, food deserts)

SOCIETY

- Local economic decline
- Labor issues

ENVIRONMENT

- Water depletion, water and air quality
- Energy use and GHG emissions
- Loss of crop and biological diversity
- Soil erosion

Diet-related Health Effects

- Adverse birth outcomes
- Neurodevelopmental disorders
- Obesity/overweight
- Insulin resistance/Diabetes
- Cardiovascular disease
- Metabolic syndrome (increasingly common in children
- Cancer(s)
- Asthma (increasingly persuasive evidence)
- ? Pre-term births
- Etc.

Influence of Nutrition on Chronic Diseases

- Increase risks
  - saturated and trans fats
  - high glycemic carbohydrates
  - lack of fruits/vegetables/omega 3s
  - excess omega 6s?

- Reduce risks
  - fruits, vegetables, nuts
  - omega 3s
  - low glycemic carbohydrates
  - “Mediterranean-type” diet

Toxicants in the Food System

- **Pesticides**
- **Bisphenol A**
- **Phthalates**
- **Dioxins, PCBs**
- **Metals**
  - **lead, mercury, cadmium, manganese**
- **PBDE flame retardants**

Pesticides and Children's Cancer

Epidemiologic studies associate pesticide exposure with cancer in children

- Leukemia, neuroblastoma, Wilms' tumor, soft-tissue sarcoma, Ewing's sarcoma, non-Hodgkin's lymphoma, and brain cancer

(Turner, Environ Health Perspect, 2010; Van Male-Fabry, Cancer Causes Control, 2010; Wigle, Environ Health Perspect, 2009)

Non-Cancer Adverse Health Effects

Prenatal Exposure to Organophosphate Pesticides

- **Decreased Bayley MDI and PDI scores at 36 months**
  (Rauh et al Pediatrics 2006)
- **Greater likelihood of cognitive and behavioral issues, including Pervasive Developmental Disorder** (Rauh et al Pediatrics 2006)
- **Abnormal primitive newborn reflexes** (Brazelton NBAS) (Engel et al. Am J of Epid 2007)
- **Decreased birth weight and length**
  (Whyatt et al. EHP 2004)
- **Decreased Bayley MDI at 24 mo.** (Eskanazi et al, EHP 2007)
- **MRI changes in brain ages 6-11 yrs.** (Rauh, Proc Natl Acad Sci, 2012)

OP Exposure in Children and ADHD

1139 children ages 8 – 15 (NHANES)

Examined Urinary OP metabolites

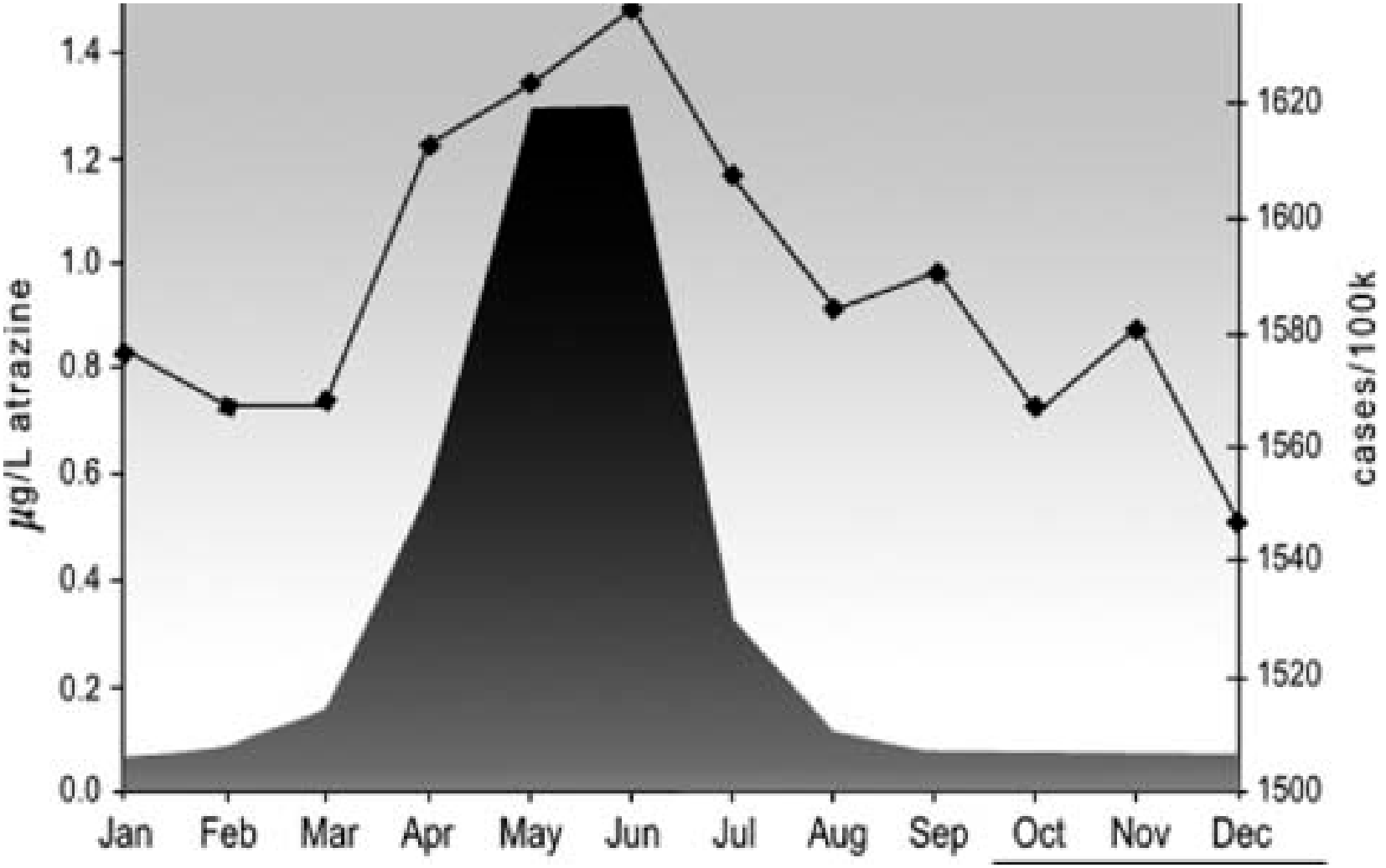
Diagnosis of ADHD by DISC-IV or Med use

- 10-fold ↑ in urinary DMAP associated with an adjusted OR of 1.55 (1.14 – 2.10) for ADHD

- Children with dimethyl thiophosphate > median had OR of 1.93 (1.23 - 3.02) for ADHD compared with children with ND levels

Bouchard et al. *Pediatrics*, 125(6), 2010

Agri-chemicals in surface water and birth defects in the United States



Winchester et al. Acta Paediatr. 2009 April; 98(4): 664–669

Farm Workers and Pesticides

- ↑ rates of many cancers & respiratory illness

  Mills and Kwong 2001, Linaker and Smedley 2002, Zahm 1997

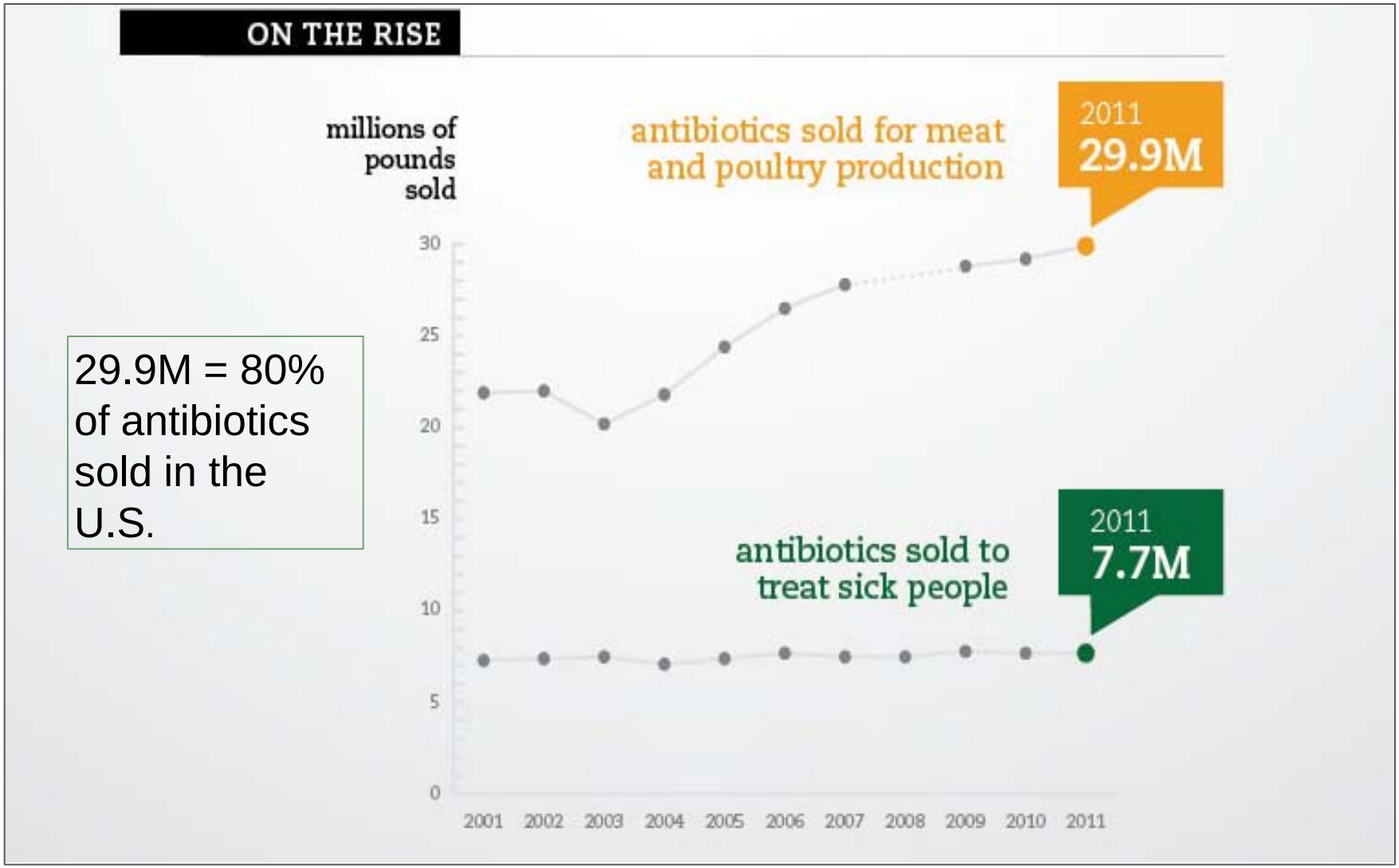
- ↑ rates of birth defects & childhood leukemia
  - Wigle et al. 2009, Van Maele-Fabry et al. 2010.

- 10,000–20,000 acute poisonings per year in the U.S.

  EPA 1992, Blondell 1997, Calvert 2008

Mark Harrison © The Seattle Times

United States Antibiotic Use



29.9M = 80% of antibiotics sold in the U.S.

Source: Pew Campaign on Human Health and Industrial Farming 2013

Agricultural Use of Antibiotics

There is consensus among independent experts that antibiotic use in agriculture contributes to resistant bacteria affecting humans.

Institute of Medicine, WHO, AMA, AAP, APHA, and many others

Banned in Denmark and
restricted in the European Union

Bisphenol-A (BPA)

Widespread Human Exposure

- Over 90% of Americans have residues in their urine (CDC)
- > 6 billions lbs produced / year

Health Concerns (animal and human data)

- Endocrine disruption
- Neurodevelopmental impairment
- Developmental toxicity
- Cancers
- Cardiovascular disease & diabetes
- Obesogen/Insulin Resistance

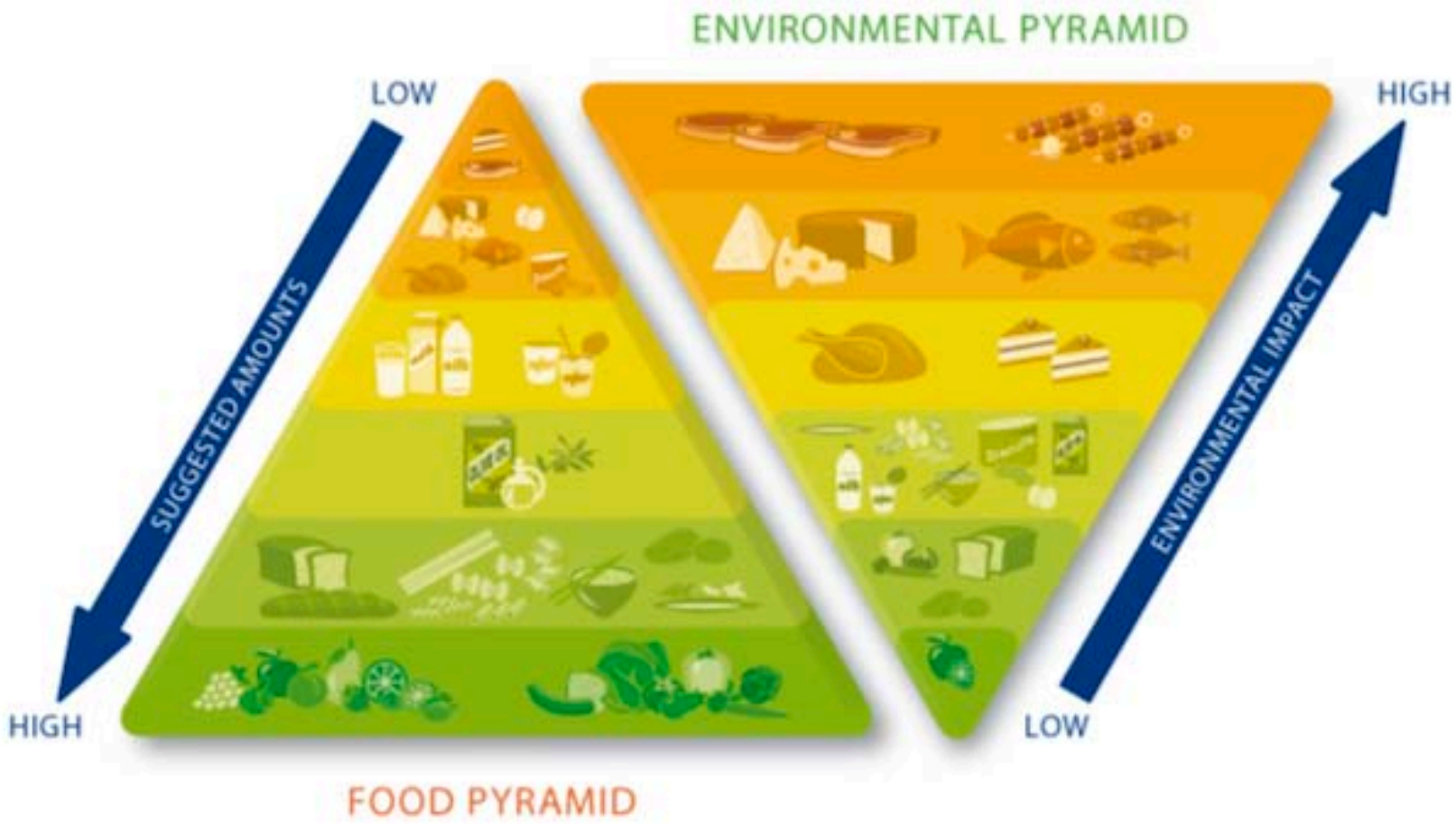
Confined animal feeding operations

- Produce three times as much waste as humans in US
- Water pollution
  - Surface water—eutrophication, antibiotic resistance, **hormonally active substances, endocrine disruption**, fish kills
  - Ground water—**nitrate** (also related to corn production as a main source of animal food); "blue baby" syndrome; thyroid effects
- Air pollution—irritants, asthma triggers
- Green house gases; climate change

The E.P.A. Backs Off on Factory Farms
New York Times; June 14, 2013

Iowa copes with nitrate surge in drinking water (June 14, 2013; Centre Daily Times)

Interconnections Between Nutrition and Environment



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