

ASC 300 Meat Science

“America runs on meat!!”

-2010-

-“The General”, Cigar Dave; Cigar Dave Show-



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- Shelbyville, IL
 - 1987
 - FFA & 4-H
- Lake Land College, Mattoon, IL
- University of Illinois
 - Meats Judging Team & Meat Animal Evaluation Team
 - BS & MS
- University of Missouri
 - Coached Meats Judging Team
 - PhD
- University of Kentucky
 - Extension Meats Specialist
- Married, 1 daughter, 1 Golden Retriever, 2 Cats
- Motorcycles, Powerlifting, & Cigars



What are the functions of muscle, Why should we study muscles?

- Locomotion
- Protection
- Thermogenesis
- Attraction
- Sexual function
- Digestion
- Most abundant tissue
- Um, Um Tasty
- High protein source



The History of Meat



How it all began

- **First butcher 3.4 million years ago**
- **Domestication of animals**
 - Goat 9,000 years ago
 - Sheep 7,000
 - Pig 9,000
 - Cattle 5,000
 - Chicken 5,500
- **Home-based slaughter**
- **Local processor/Butcher Shop**
- **Large scale, centralized processing**



**Who is often credited with being
the first US meat processor?**

Sam Wilson



Development of the Industry

- **Porkopolis = Cincinnati**
- **1818 Elisa Mills opens Ohio's first slaughter house**
- **Salt pork a common food staple**
- **Largest pork processor, due to access to river**
- **1829 – Cincinnatians and the world began to call Cinncy "Porkopolis"**
- **1861 – the railroad killed the meats industry in Cincinnati, no pun intended!**



Development of the Railroad

- Mississippi River, shut down during Civil War
- Chicago was quickly becoming a hub of railroads due to westward expansion
- Chicago had several small stockyards and small butchers throughout the city
- The city became a logical location for the livestock and meats industry



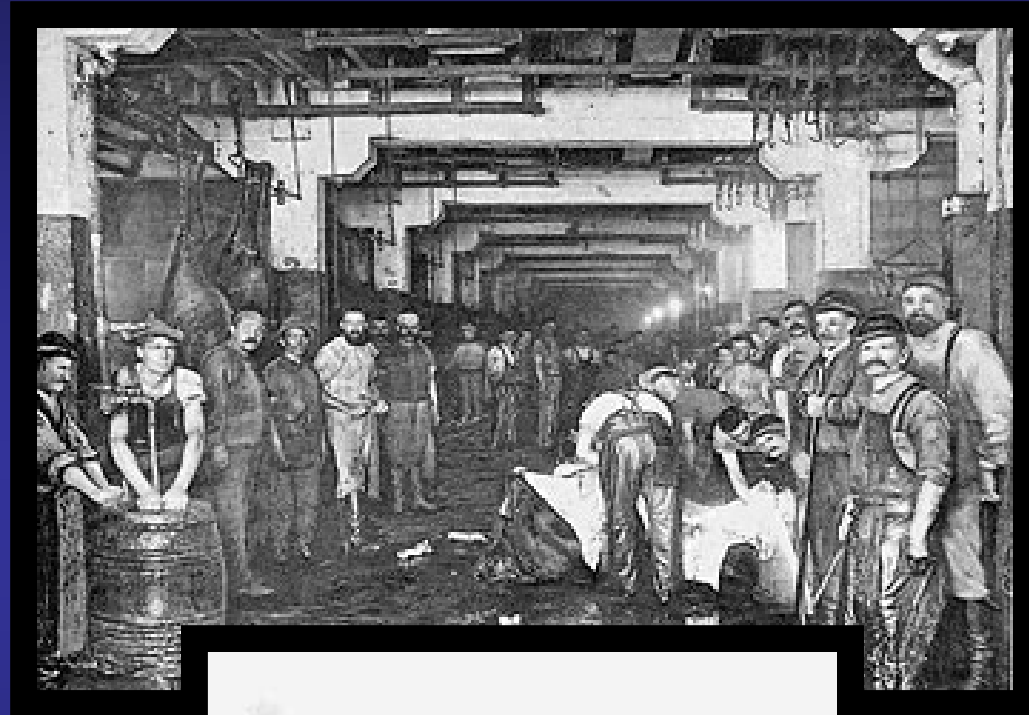
The Start of the Modern Industry

- 9 Railroad companies joined together and purchased 320 acres Southwest of Chicago
- Soon Livestock pens were built & 15 miles of track connected the stockyards to the main rail hub
- Dec. 25th, 1865 Union Stock Yard & Transit Co. was opened



Union Stock Yards

- 25,000 immigrant workers
- Armour was the first meat processor
- Swift, Morris, and Hammond followed
- 500,000 gallons of water used daily



Union Stock Yards

- 1900
- 50 miles of road & 130 miles of railroad track around the parameter
- 475 acres
- 82% of meat consumed



Union Stock Yards

- Post WWII
- Interstate Highway system
- 1954 the first meat processors closed doors
- Property taxes, urban sprawl, anti-pollution laws
- Midnight, July 31st, 1971

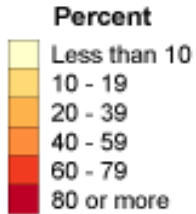
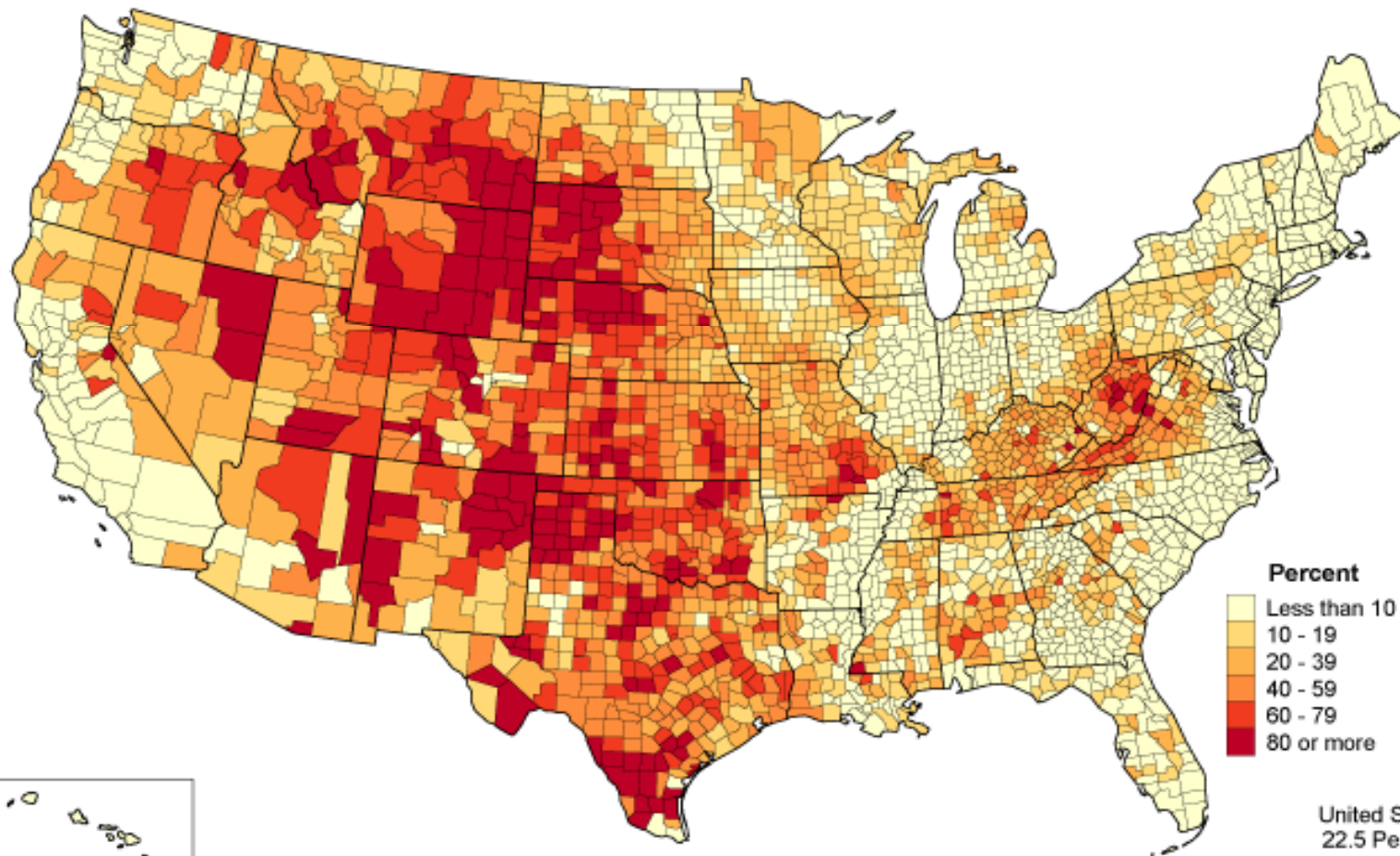


Contributions

- Insulated rail cars
- Perfection of mechanical refrigeration
- Refrigerated rail cars
- The assembly line
- Chicago Board of Trade and the futures market
- Changed the flow of the Chicago River
- Meat Inspection



**Value of Cattle and Calves
as Percent of Total Market Value
of Agricultural Products Sold: 2002**

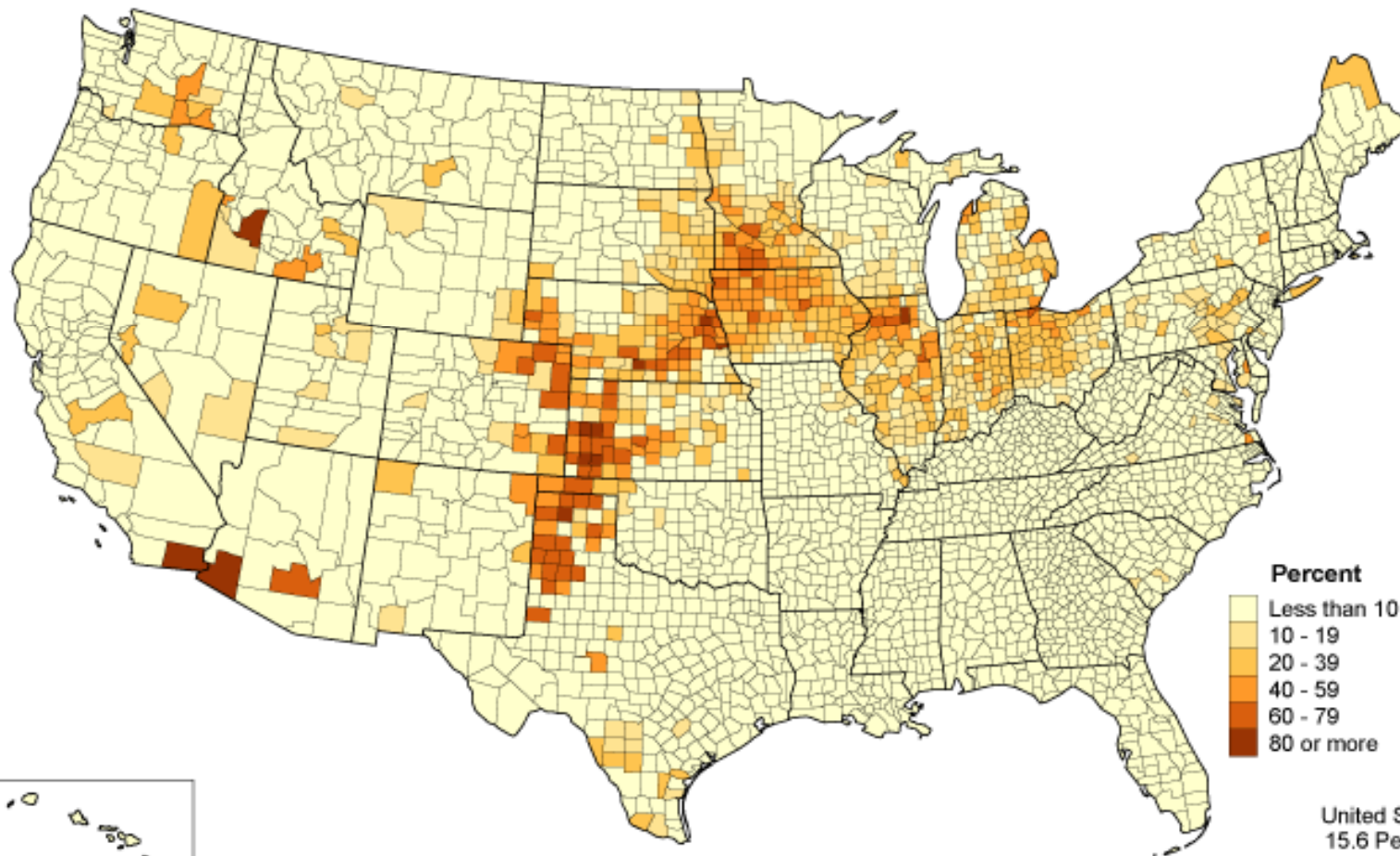


United States
22.5 Percent



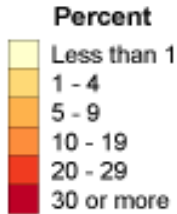
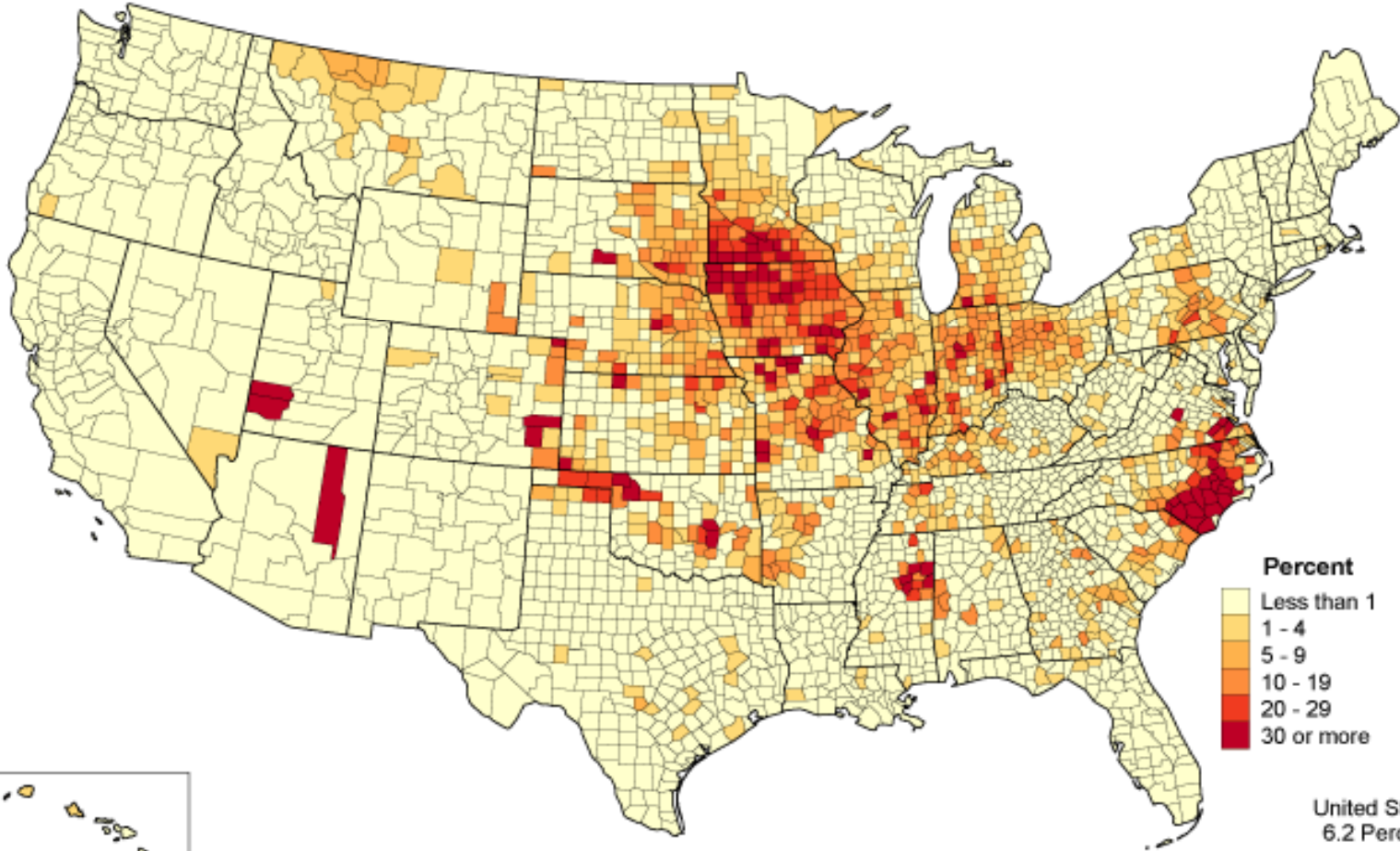
02-M029
U.S. Department of Agriculture, National Agricultural Statistics Service

Cattle on Feed - Inventory as Percent of Cattle and Calves: 2002



02-M148
U.S. Department of Agriculture, National Agricultural Statistics Service

**Value of Hogs and Pigs
as Percent of Total Market Value
of Agricultural Products Sold: 2002**

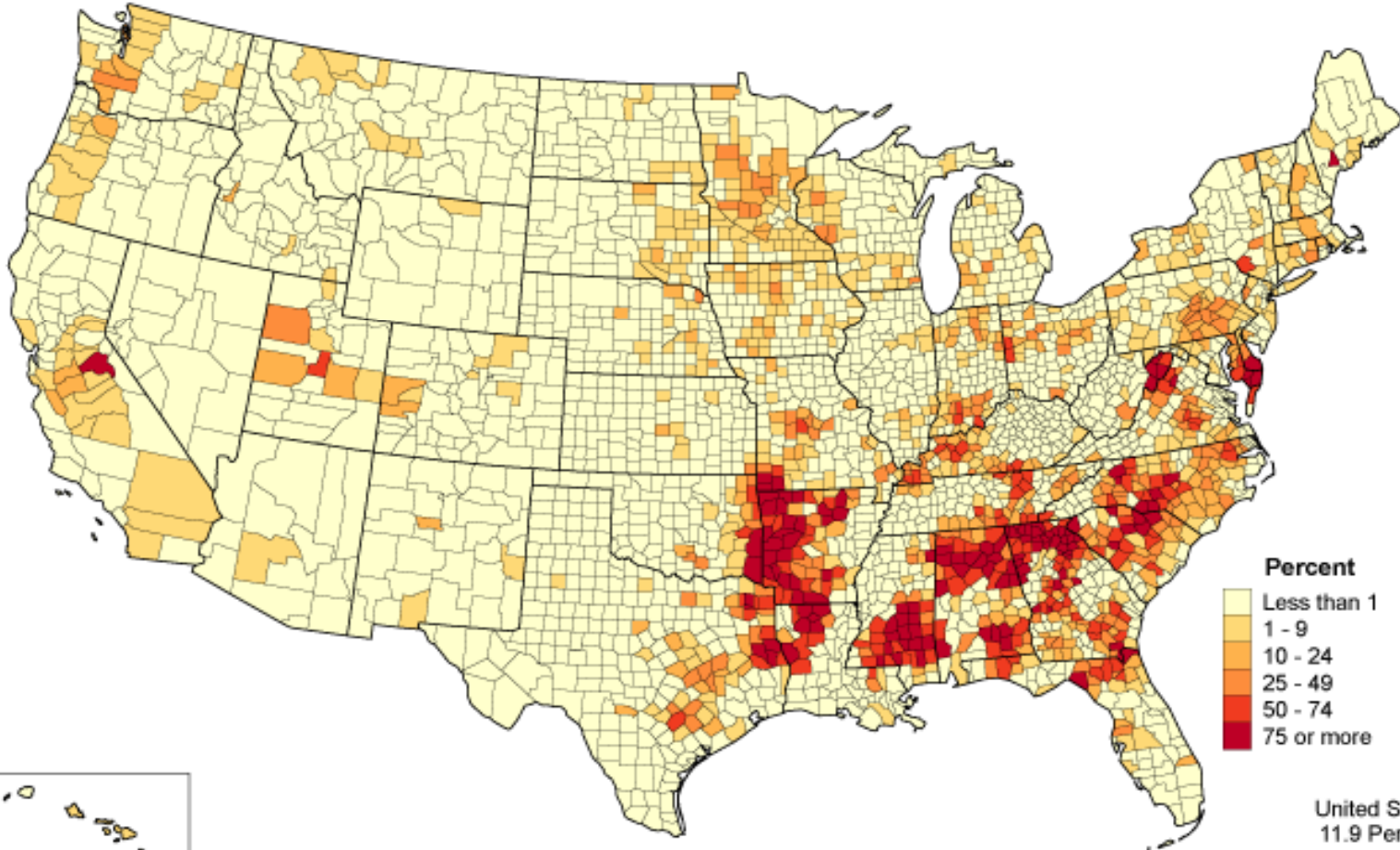


United States
6.2 Percent



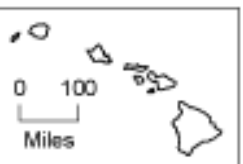
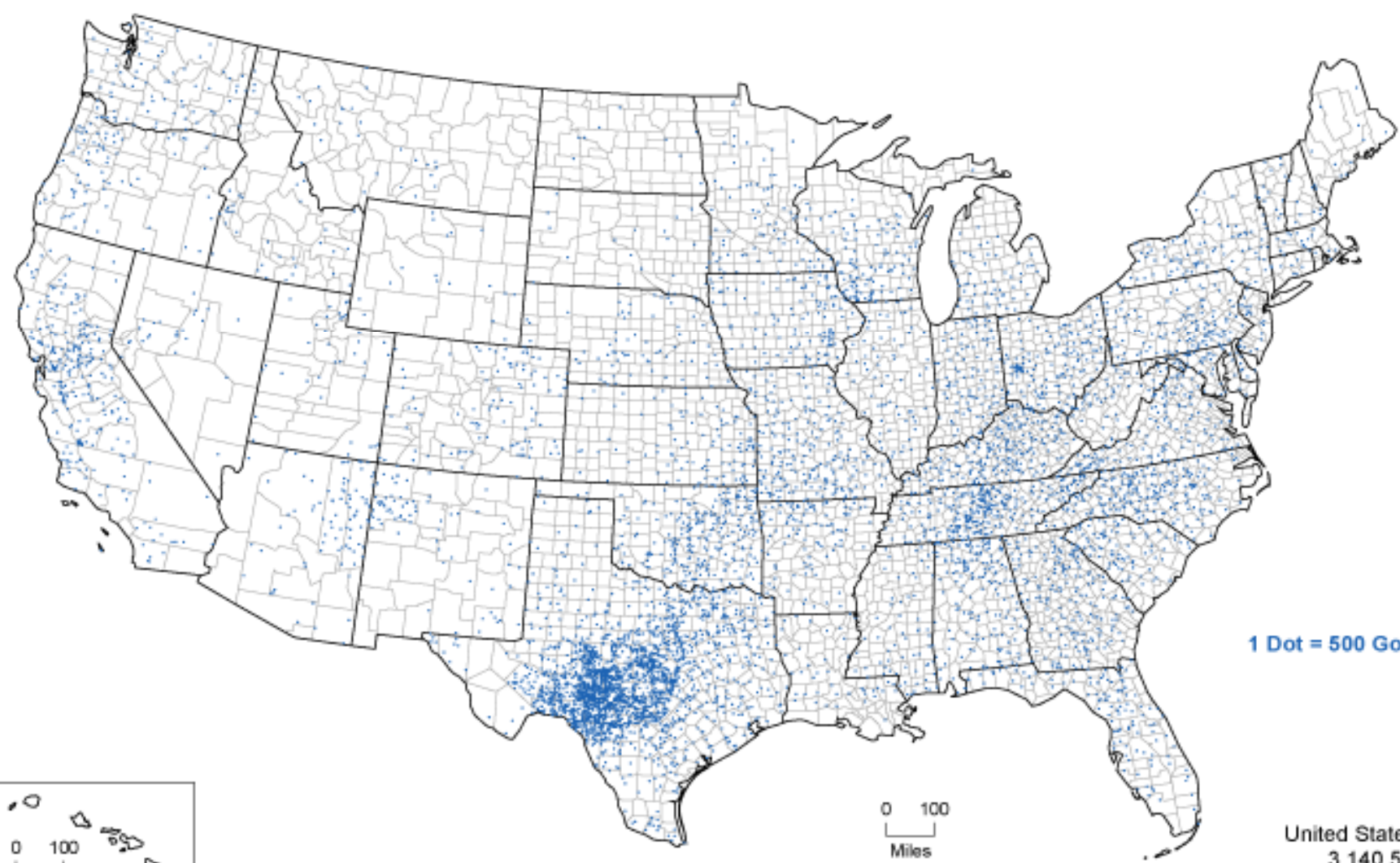
02-M030
U.S. Department of Agriculture, National Agricultural Statistics Service

**Value of Poultry and Eggs
as Percent of Total Market Value
of Agricultural Products Sold: 2002**



02-M027
U.S. Department of Agriculture, National Agricultural Statistics Service

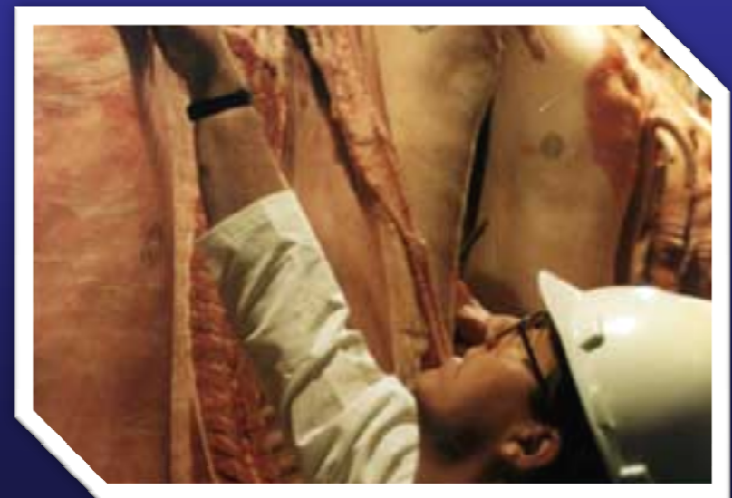
All Goats - Inventory: 2007



United States Total
3,140,529

Meat Inspection

- Ensure the wholesomeness
- Healthy Animals (no diseases)
- Facilities are clean and sanitary
- Proper labeling of meat products
- Mandatory, paid through taxes



The Law!

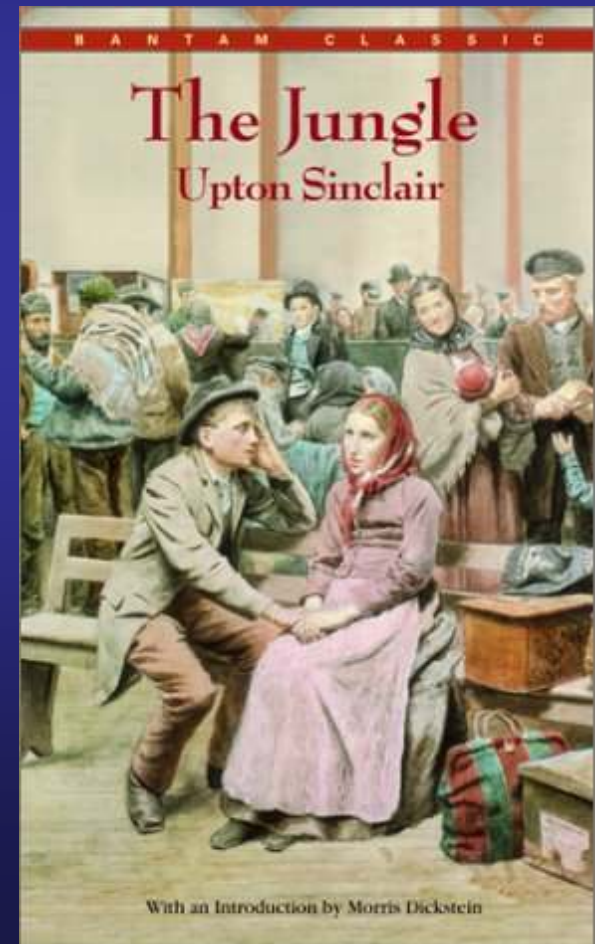
- **Meat Inspection**
- **1891 – First meat inspection act**
- **Called for voluntary inspection of livestock and meat intended for interstate and foreign commerce**
- **Do we still operate under this law?**



Legal Stuff

Meat Inspection came about due to a book about the Chicago Meat Industry

- **The Jungle**; by Upton Sinclair
- Listen to this passage....



Current Meat Inspection

- **The Federal Meat Inspection Act of 1906**
- **Mandated that a federal meat inspector be present at any packing plant processing meat for interstate commerce**
- **Started October 1, 1906**
- **Two types of inspection practices:**
 - **Antemortem Inspection**
 - **Postmortem Inspection**



What Happens?: Antemortem

- Inspector will:
 - Walk the pens prior to slaughter
- US Suspect – seriously crippled, minor eye problems
- US Condemned – downers (cattle), deads, moribund (about to die), comatose, temperature above 105°F (106°F swine), suspect dies in pen, obvious signs of disease



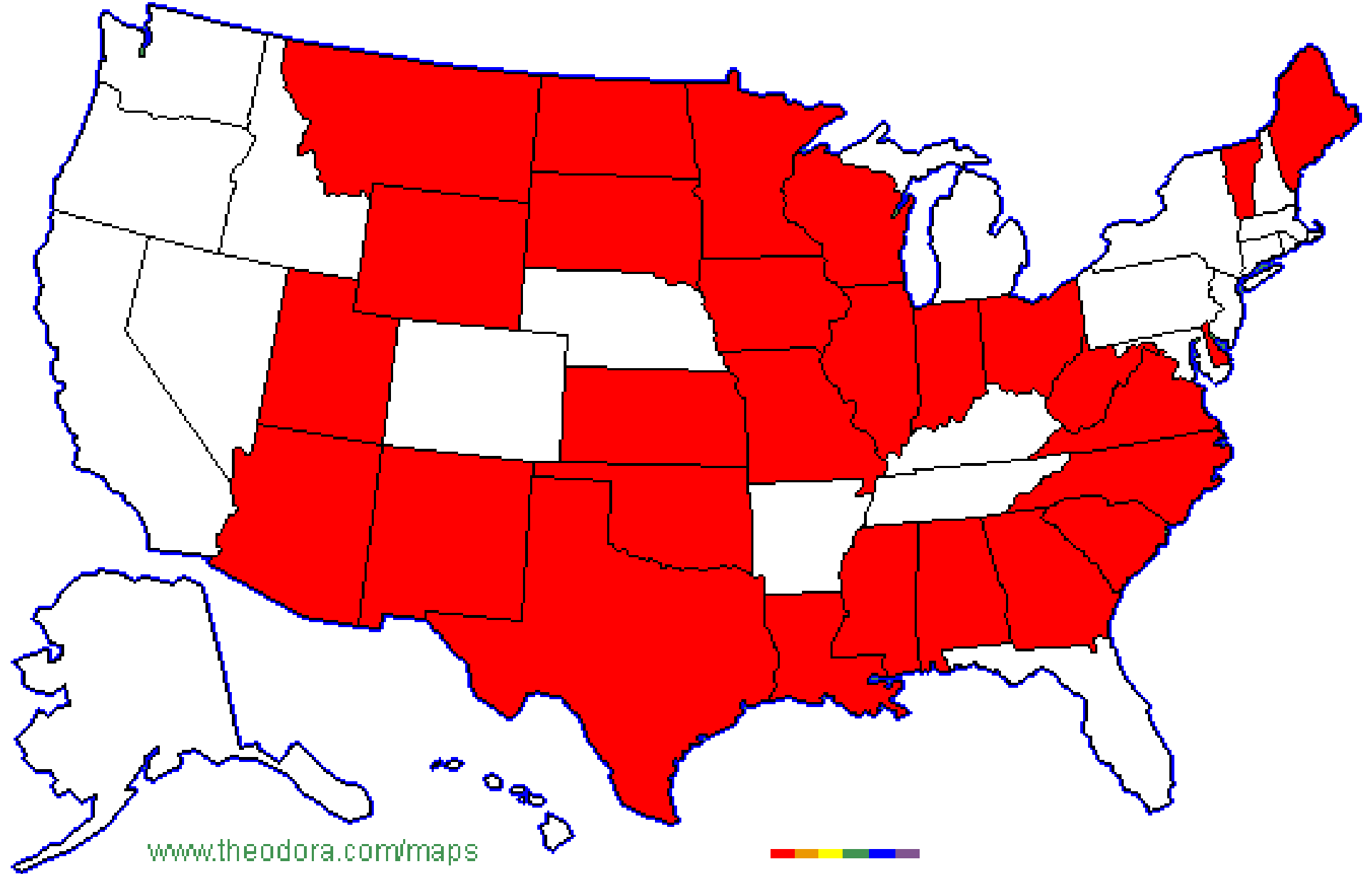
What happens?: Postmortem

- **Inspector will:**
 - Facilities are clean and sanitary
 - Ensure humane handling & slaughter
- **Inspects the head (cattle, swine), viscera, and carcass**
- **US Retained – temporary, but can be condemned. Can retain whole carcass or part of a carcass**
- **US Condemned – cannot enter food chain!
Tuberculosis, hog cholera, pneumonia, abscesses, arthritis, bruises, contamination from kill floor**

Types of Meat Inspection

- Custom = Contract between livestock producer and processor; must be labeled “NOT FOR SALE”
- What’s the difference between Federal and State Inspection?
- Federal = any of the 50 states
- State = within state lines



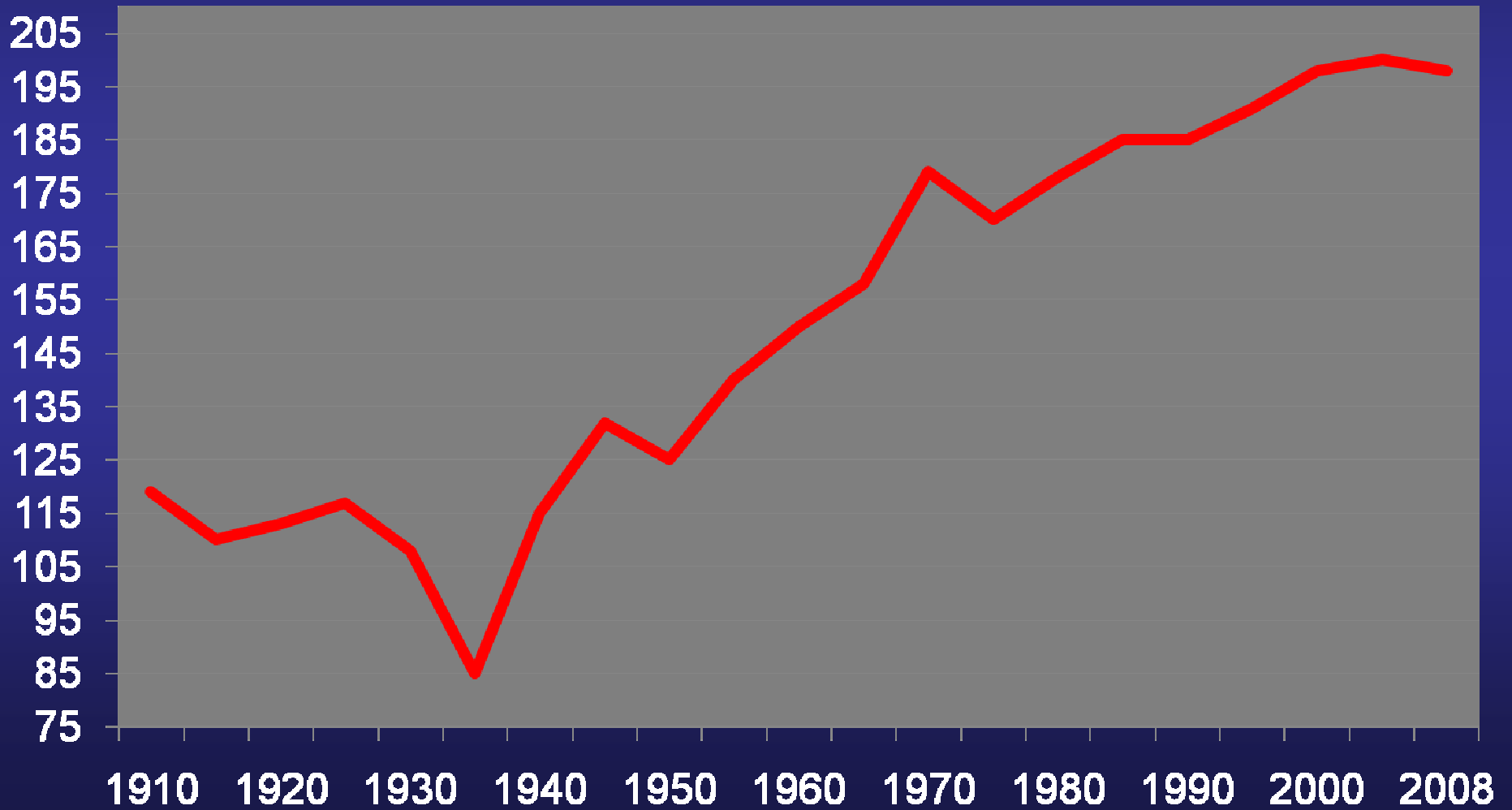


Other red letter dates!

- Meat Inspection was later broadened to include
- Horse Meat Act: 1919
- Imported Meat Act: 1930
- Humane Slaughter Act: 1958, 1973, 2002
- Poultry Producer Meat Act: 1959
- Wholesome Meat Act: 1967
- HACCP (Final Rule): 1997
- Country of Origin Labeling (COOL): 2008



Total Muscle Protein Consumption in the United States (1910-2008)



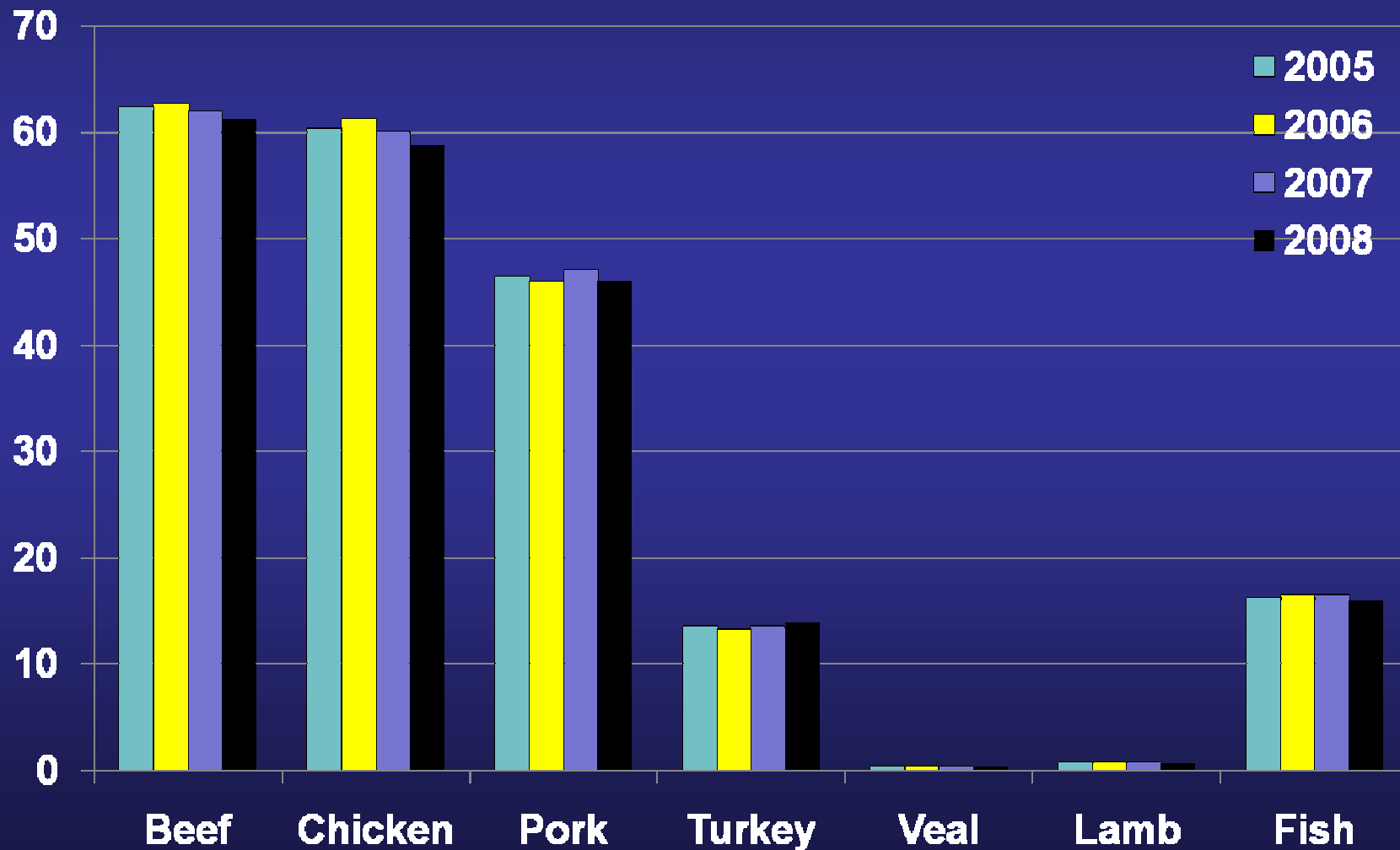
We eat a lot of meat!

- Per capita consumption of red meat, poultry, and fish, boneless
- 2000 – 196.7
- 2001 – 196.7
- 2002 – 200.3
- 2003 – 199
- 2004 – 201.3
- 2005 – 199.8
- 2006 – 200.9
- 2007 – 200.4
- 2008 – 196.9

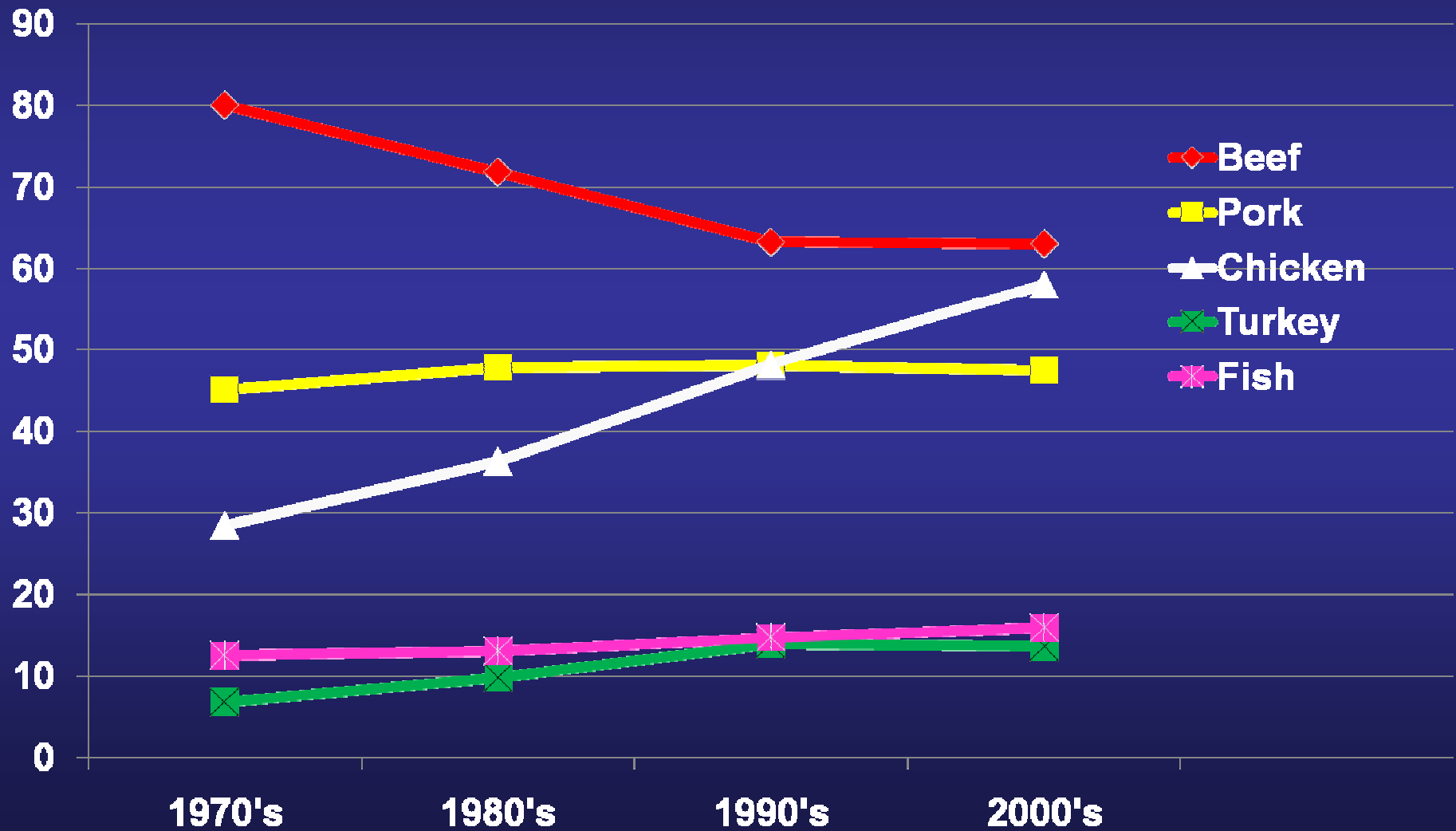


Source: <http://www.amimeat.org>

Per Capita Consumption '05 – '08



Consumption Data



Fun History; SPAM

- Created in 1937
- Spiced Ham
- Not
 - Stuff Posing As Meat, Shoulder Pork And Ham, Scientifically Processed Artificial Meat, Special Product of Austin Minnesota
- #1 meat in Hawaii and Guam (16 tins per person)



SPAM

- **Flavors:**

- Spam (original)

- Spam Hickory Smoked



- Spam Hot and Spicy (Tabasco)



- Spam Less Sodium (25% less sodium)



- Spam Lite (25% less cal, 50% less fat)



- Spam Oven Roasted Turkey



- Spam with Bacon



- Spam with Cheese



- Spam Garlic



- Spam Golden Honey Grail (Monty Python's Spamalot)

- Spam Spread



- Spam Hawaii



"Oh" inspiring...
SPAM[®] 'N' LIMAS



SPAM[®] 'N' LIMAS

FROM THE HORMEL MEAT FULL

Make a Spanish sauce of canned tomatoes, chopped onions, green peppers and celery leaves with a little salt, sugar, lard. Add to fresh or frozen, precooked limas in casserole, partly lay 8 or 10 slices of Spam in top, garnish with pimiento squares and bake 25 minutes at 350°

HORMEL
GOOD FOODS



COLD OR HOT

SPAM HITS THE SPOT!

"Spam" is a registered trademark. © Hormel Foods Corporation.
product packed only in 12 ounce cans made exclusively
by Hormel Foods Corporation, Austin, Minn.

How have animals changed?

- More and more crossbreeding
- Composite breeds
- EPD's (Expected Progeny Differences)
- Cattle; everything black
 - “Belt Buckle Cattle” to “Sky Scraper Cattle”
- Pigs; everything white
 - Fat to extremely lean
- Goats

Objective

- **To assess differences in economically important traits between pigs representative of 1980 and 2005 commercial industry when fed feeding programs representative of the same time periods**
- Differences in Economically Important Traits of 1980 vs. 2005 Pigs When Fed 1980 or 2005 Feeding Programs;
 - J. S. Fix*, D. J. Hanson, E. van Heugten, J. P. Cassady and M. T. See

Carcass Data

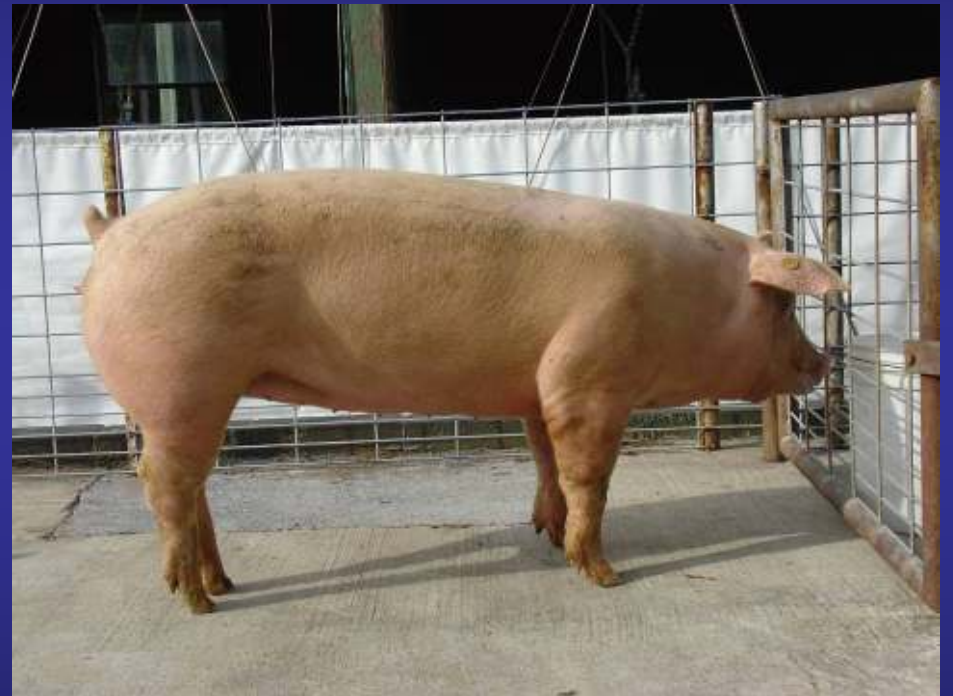
Genetics	1980		2005	
Diet	1980	2005	1980	2005
10th rib fat, in	1.23	1.26	1.02	1.03
LEA, sq inch	5.89	6.38	6.78	7.45
Color Score	2.33	2.37	2.61	2.16
Marbling Sc	1.72	1.94	2.43	1.63

	1980		2005	
	1980	2005	1980	2005
ADG, lbs	1.69	1.85	1.70	1.84
ADFI, lbs	4.73	4.27	4.56	4.44
ADG:ADFI	0.36	0.43	0.38	0.42

1980's



2005's



The Current Industry

- Plants have moved to the animals
- Clean and Sanitary
- Humane Handling
- Automated
- Slaughter Rates:
 - Cattle = 450 to 500/h
 - Pigs = 1,000 to 1,300/h
 - Chickens = 12,000/h;
200,000/d



Top Companies

1.) Tyson Foods, \$26,704 millions, 93
Plants 

2.) Cargill Meat Solutions, \$15,000 millions,
21 Plants 

3.) Smithfield Foods, Inc, \$12,488 millions,
34 Plants 

4.) JBS USA Holdings Inc, \$9,350 millions,
13 Plants 

5.) Pilgrim's Pride Corp, \$7,100 millions, 38
Plants 

The Winds of Change!

- How have things changed in the last 100 years?
 - Vertical Integration
 - Animal Handling
 - Animal Welfare/Rights
 - Ground Beef
 - BSE, H1N1 Virus (Swine Flu), Foot and Mouth Disease
 - HACCP
 - Export
 - Country of Origin Labeling



Current Trends

- Convenience
- Fast, Fast, Faster
- 4:30 pm meal solution
- Organic
- Natural
- Family raised, locally grown (Kentucky Proud), Free range, Free roaming, Predator Friendly
- Grass/ Forage Fed
- No Nitrites Added



Essential Question

- **What is meat quality?**
- **Described as:**
 - **Color**
 - **Marbling**
 - **Tenderness**
- **But everything we cover will affect one, two, or all three of these factors**
- **We'll start from the beginning to hot dogs**

Be gone children, get out of here