

# U.S. Ethanol Industry Outlook: Socio/Economic Impact of Booming Ethanol Industry

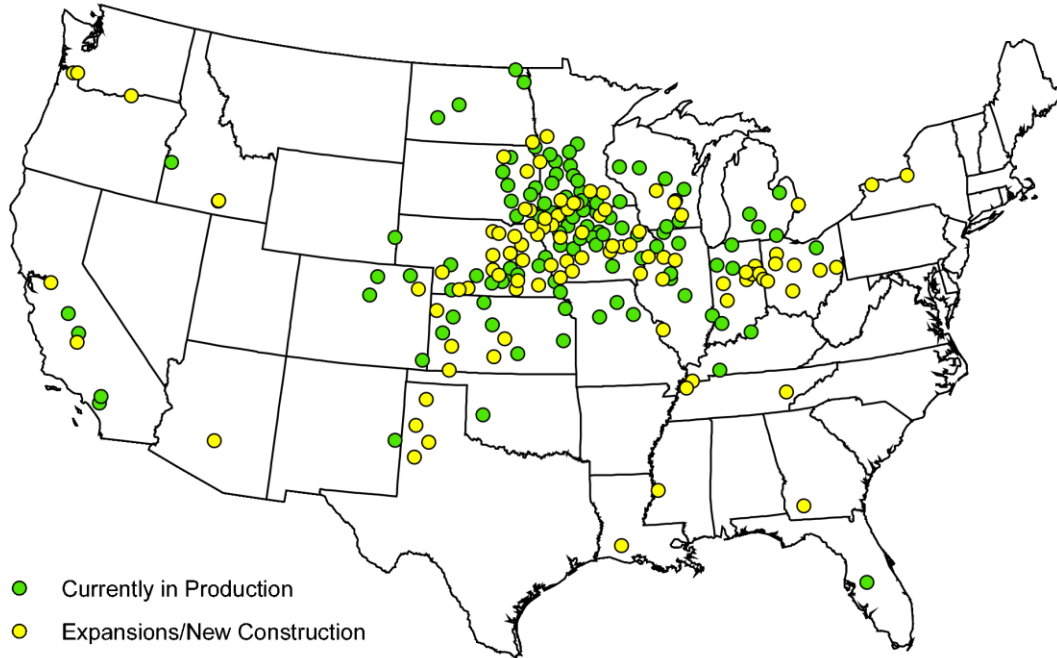
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Center for Agricultural and Rural Development  
Iowa State University

Presented at the ProBeef 07  
Ames, Iowa September 5, 2007

# Overview

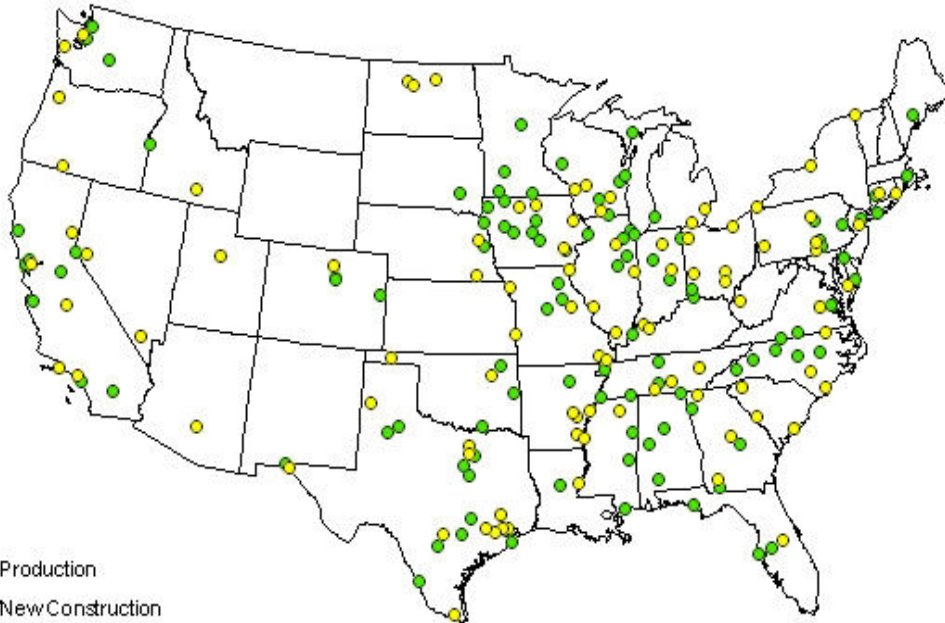
- Review where we are with ethanol and where we are going under current policies and oil prices
- What would happen if oil prices rise?
- What would happen if drought hit the U.S. Corn Belt?

# U.S. Ethanol Industry



- Current ethanol capacity: 6.5 billion gallons/year
- Total capacity under construction and expansion: 6.5 billion gallons/year
- 77 new ethanol plants and 8 expansion projects underway
- 2.2 billion bushels of corn were used in producing fuel ethanol in 2006/2007 marketing year.
- 3.2 billion bushels of corn are expected to be used in producing fuel ethanol for 2007/2008 marketing year.
- At 13 billion gallons, corn use = 4.7 billion bushels = 30 million acres

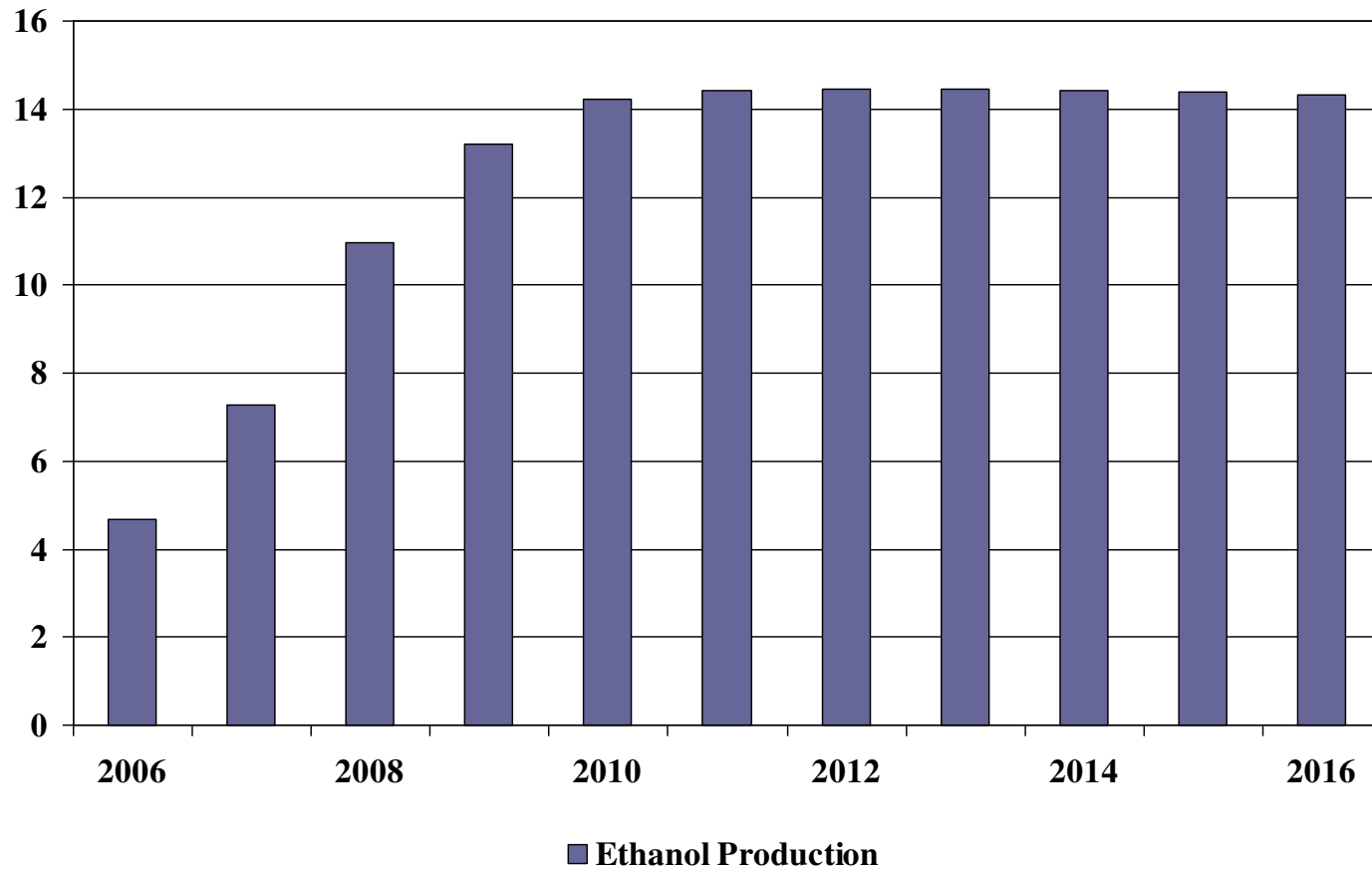
# U.S. Biodiesel Industry



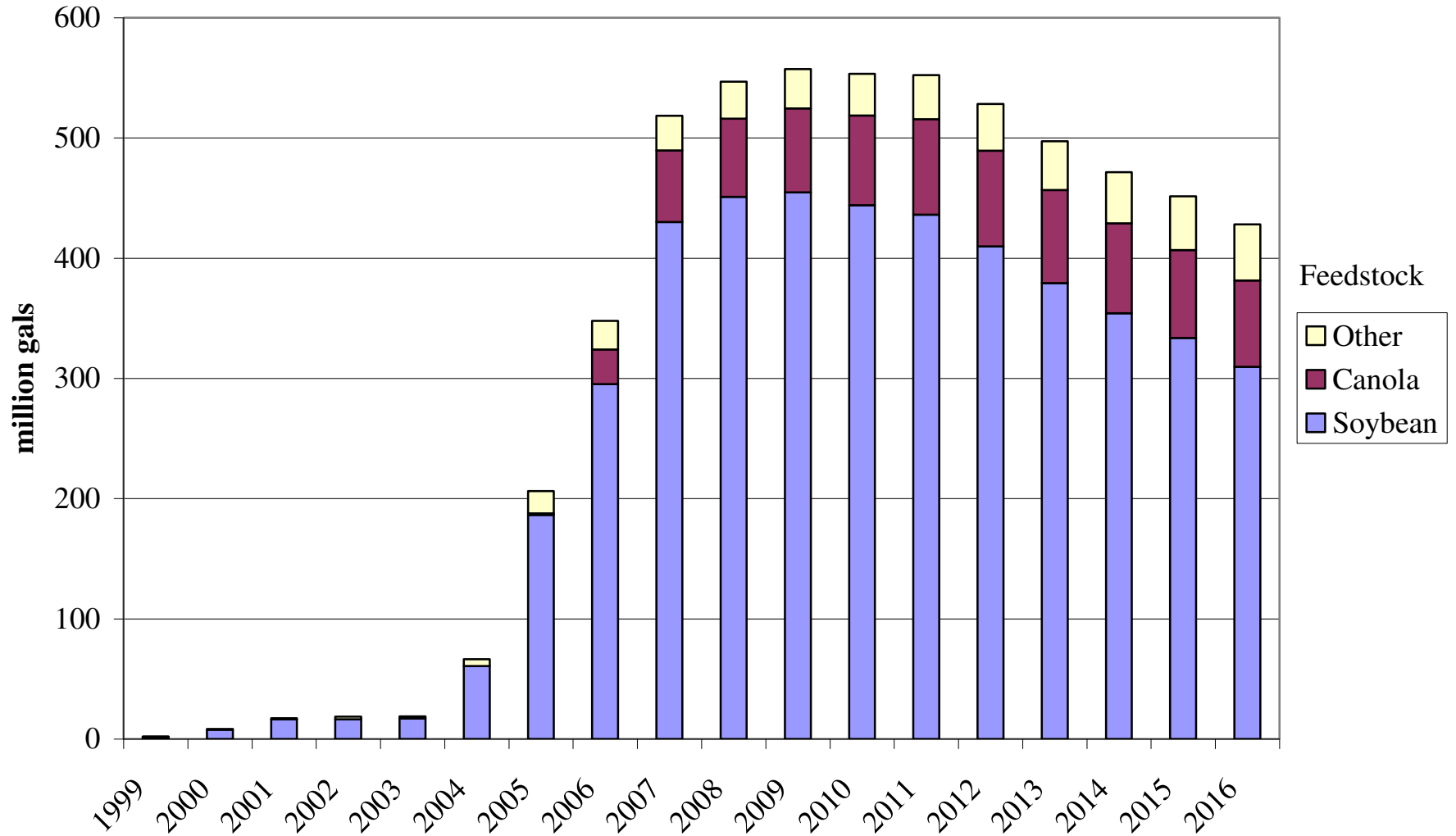
- Current capacity: 1.2 billion gallons/year
- Total capacity under construction and expansion: 0.7 billion gallons/year
- Carriquiry calculates that sales were less than 300 million gallons in 2006
- FAPRI also projects less than 30% capacity utilization because of low or negative operating margins

# Projected U.S. Ethanol Production

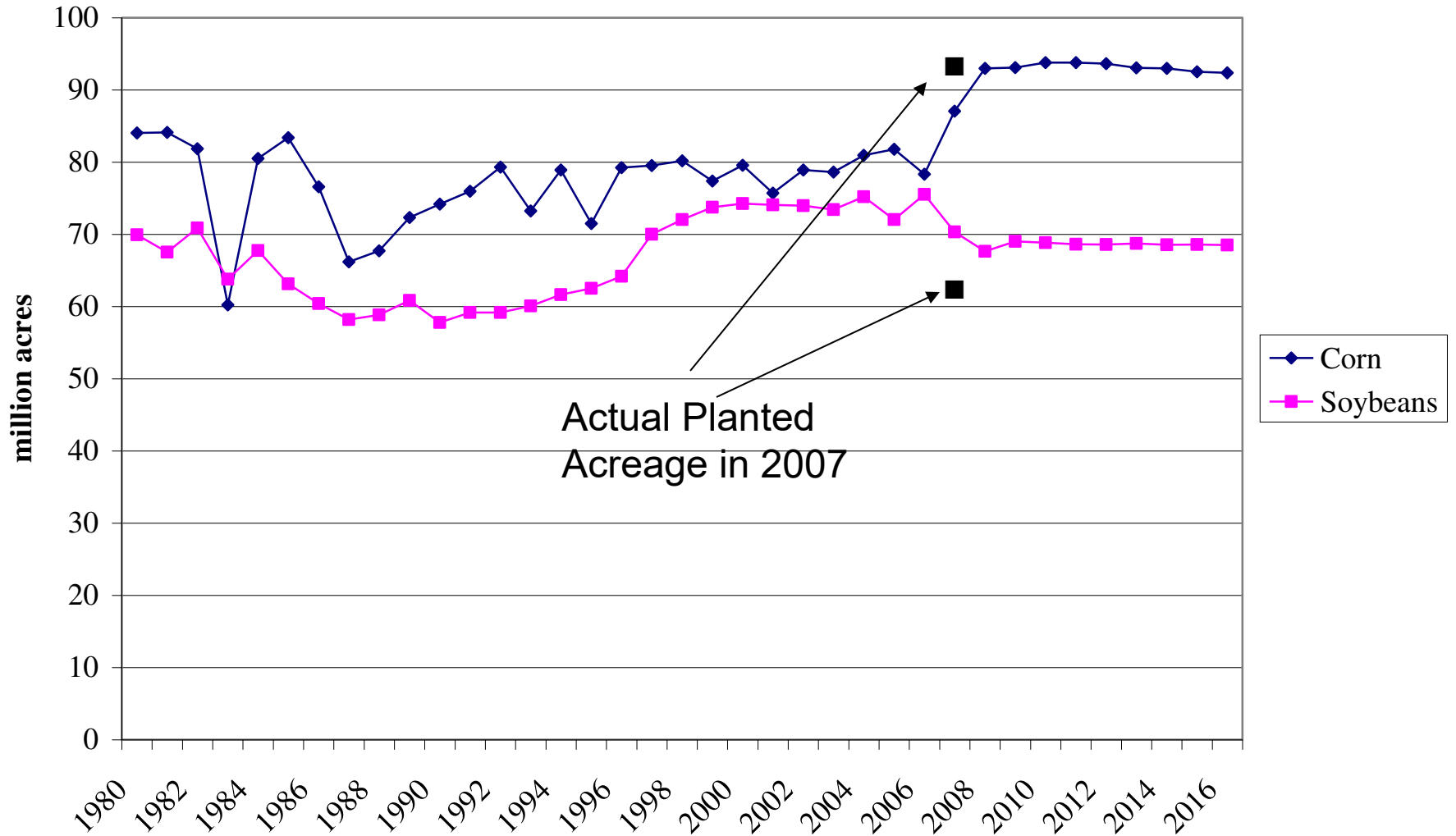
billion gallons



# Historical and Projected U.S. Biodiesel Production

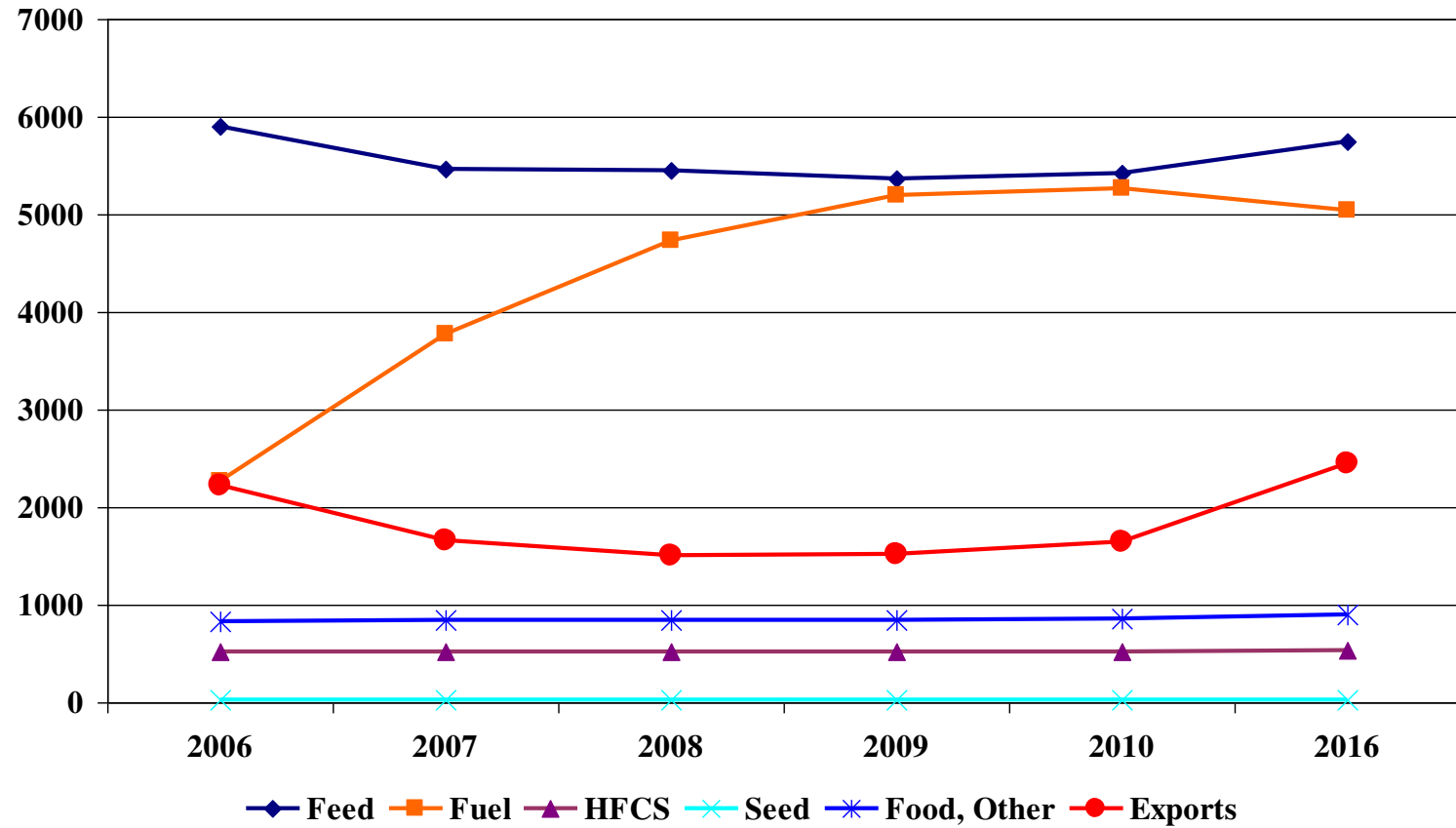


# Historical and Projected (Jan 2007) Planted Acreage



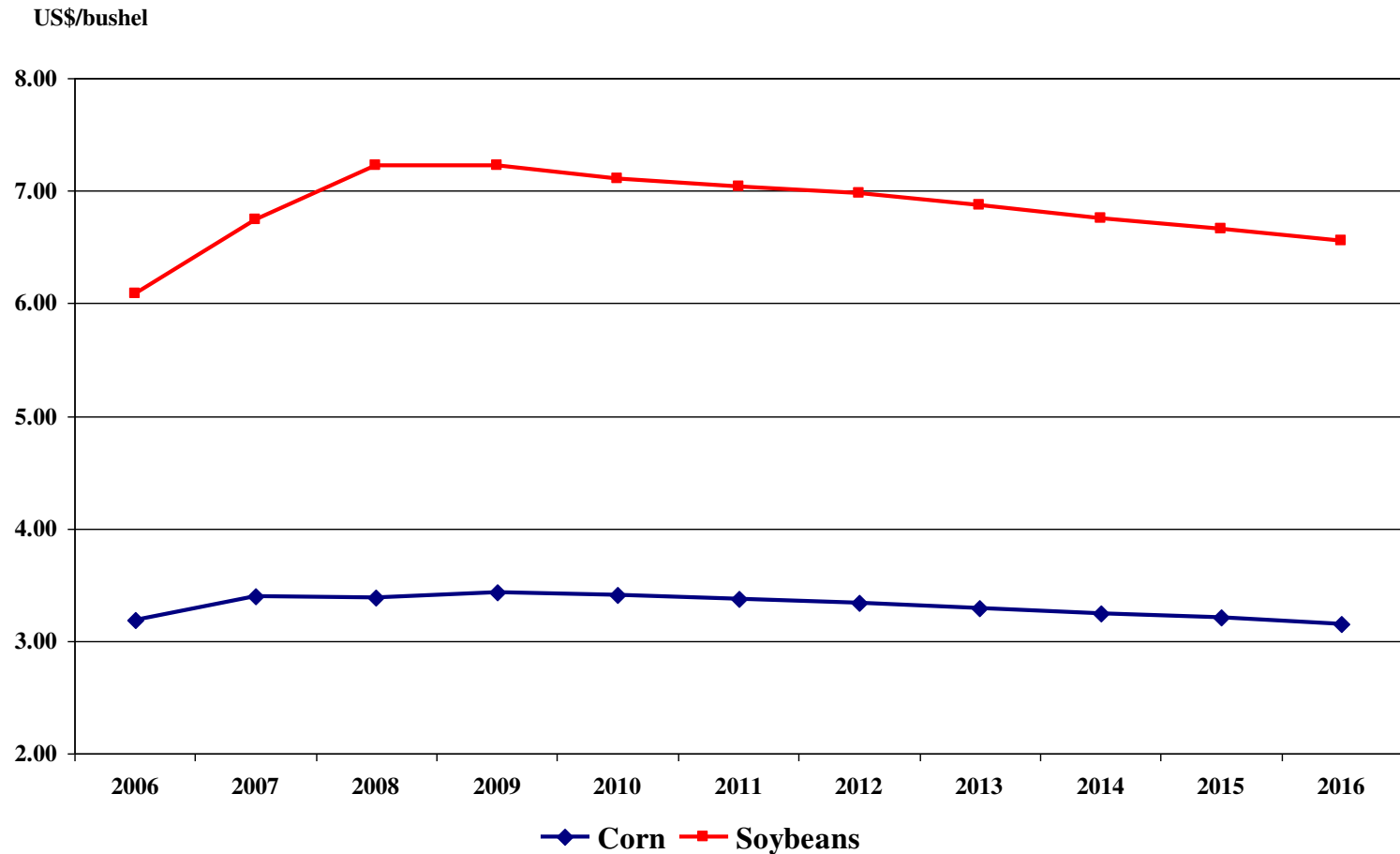
# Projected Utilization of Corn

million bushels

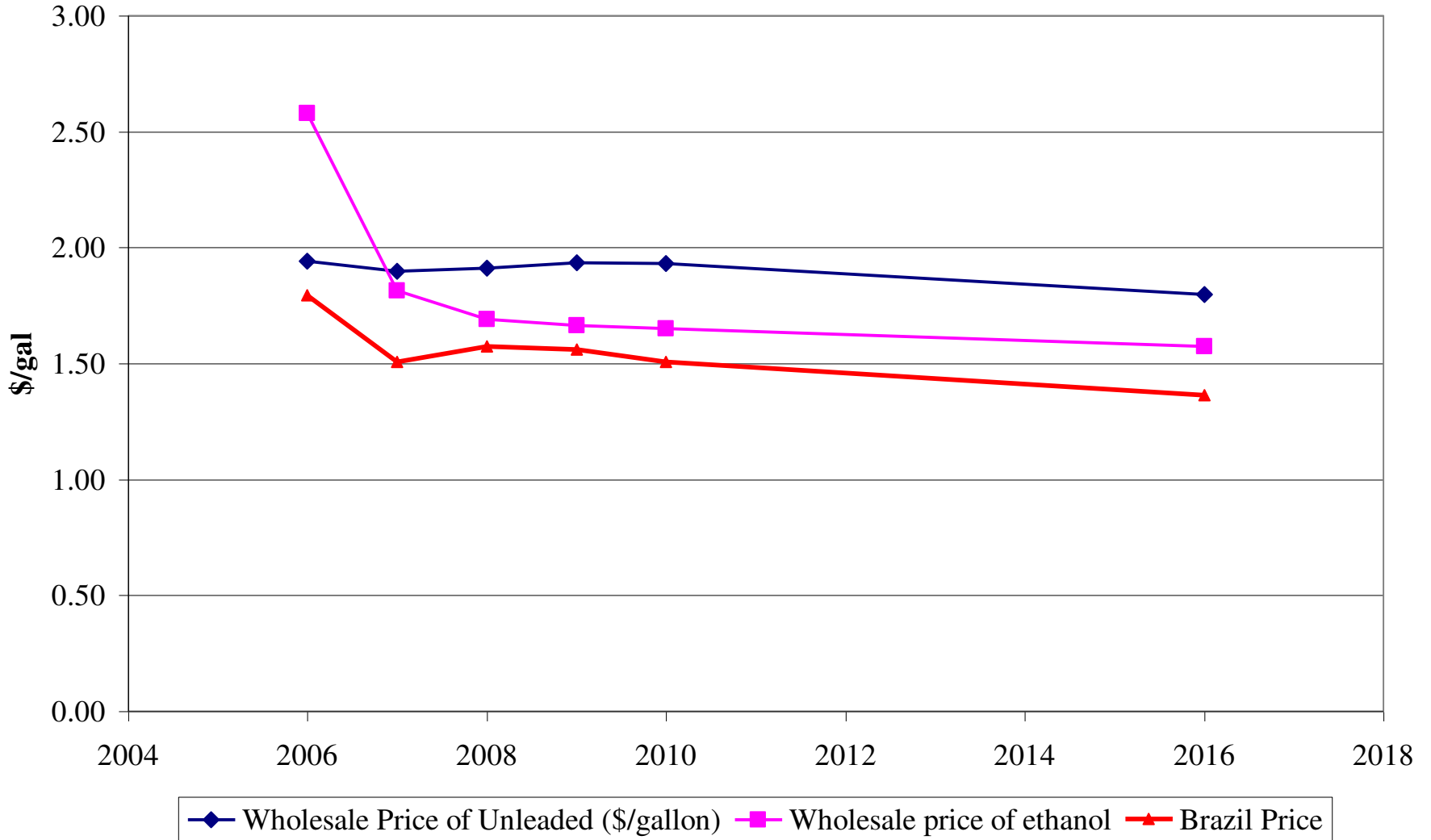




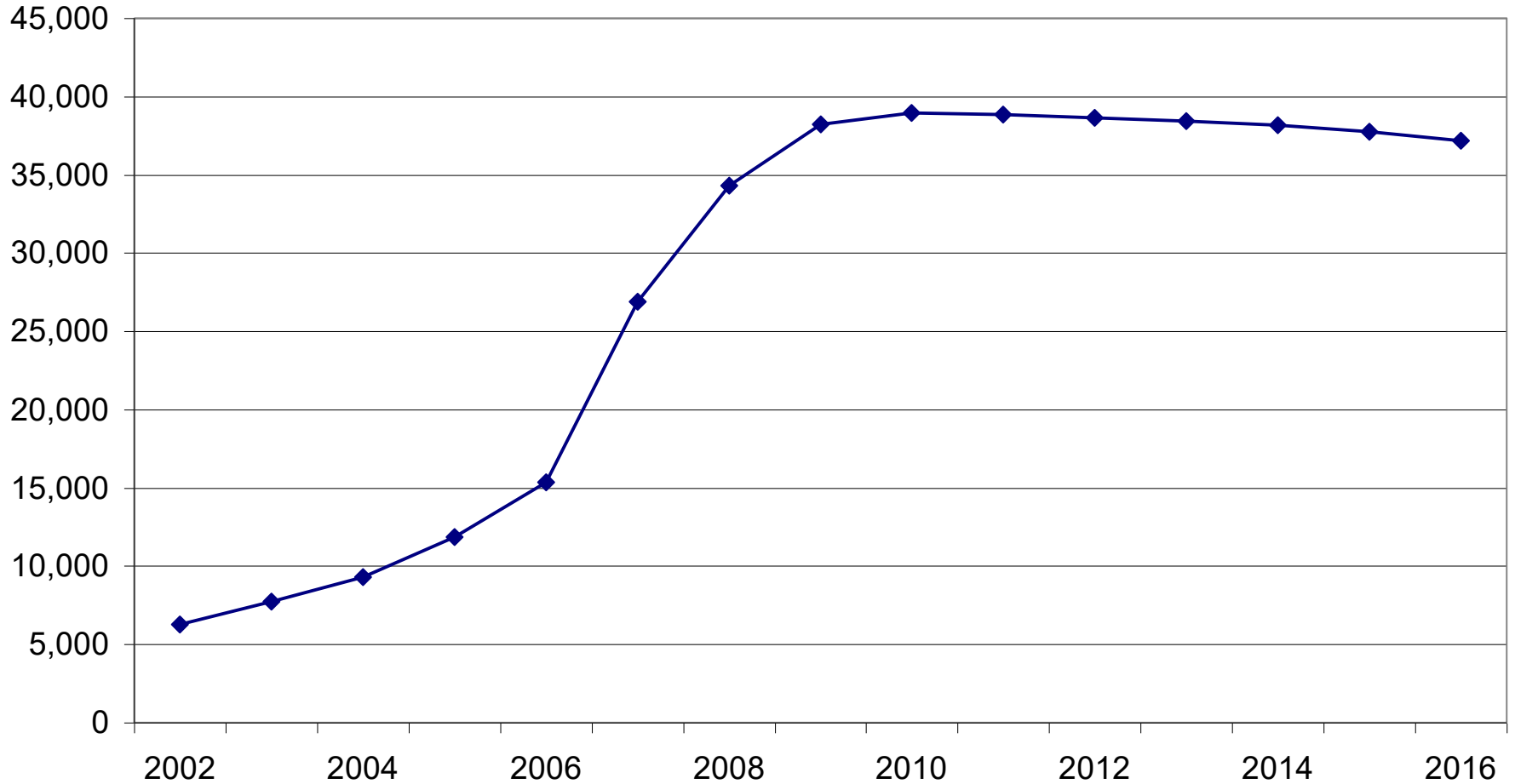
# Projected U.S. Corn and Soybean Prices



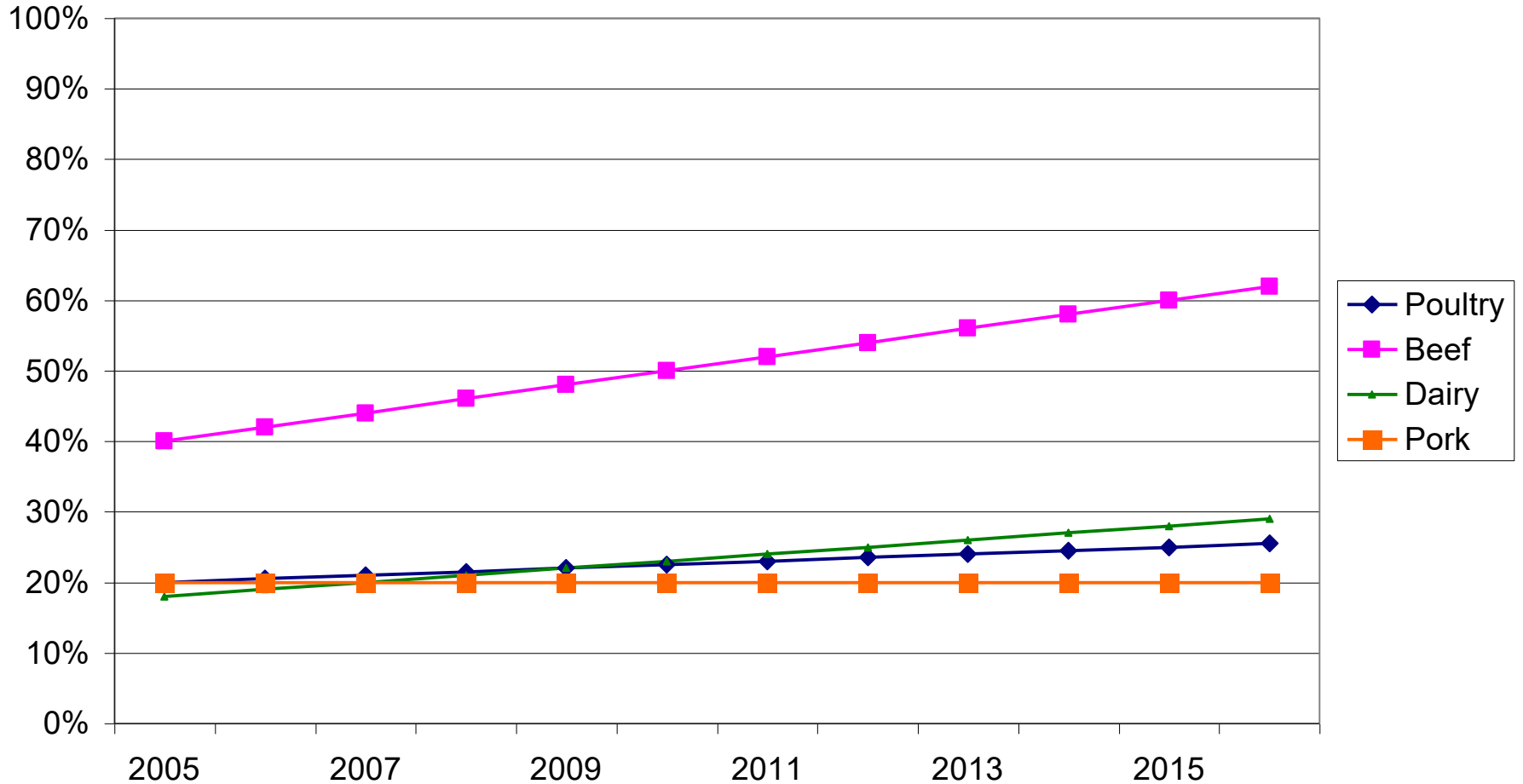
# Projected Gasoline and Ethanol Prices



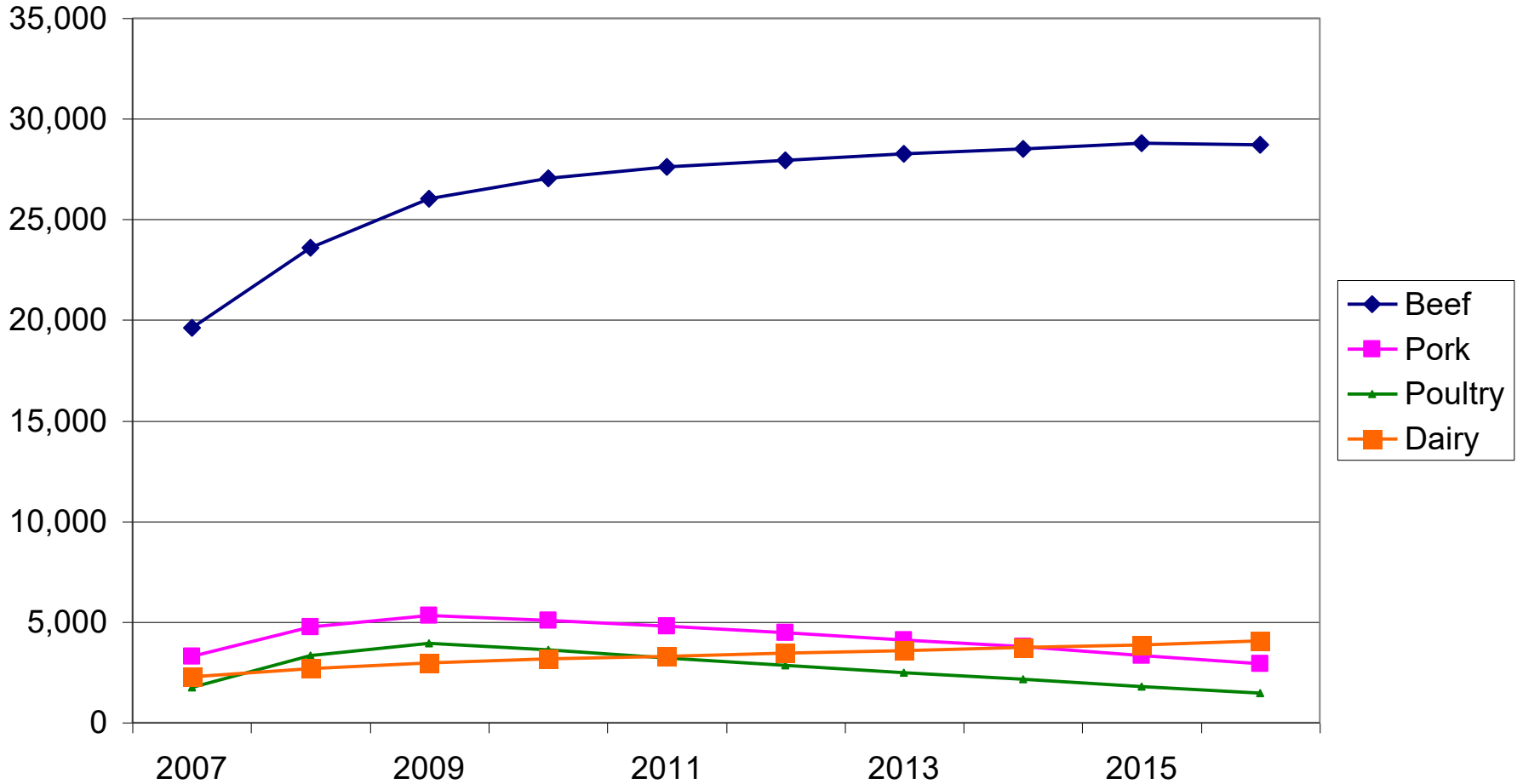
# Actual and Projected Use of DDGS in U.S. Feed ('000 tons)



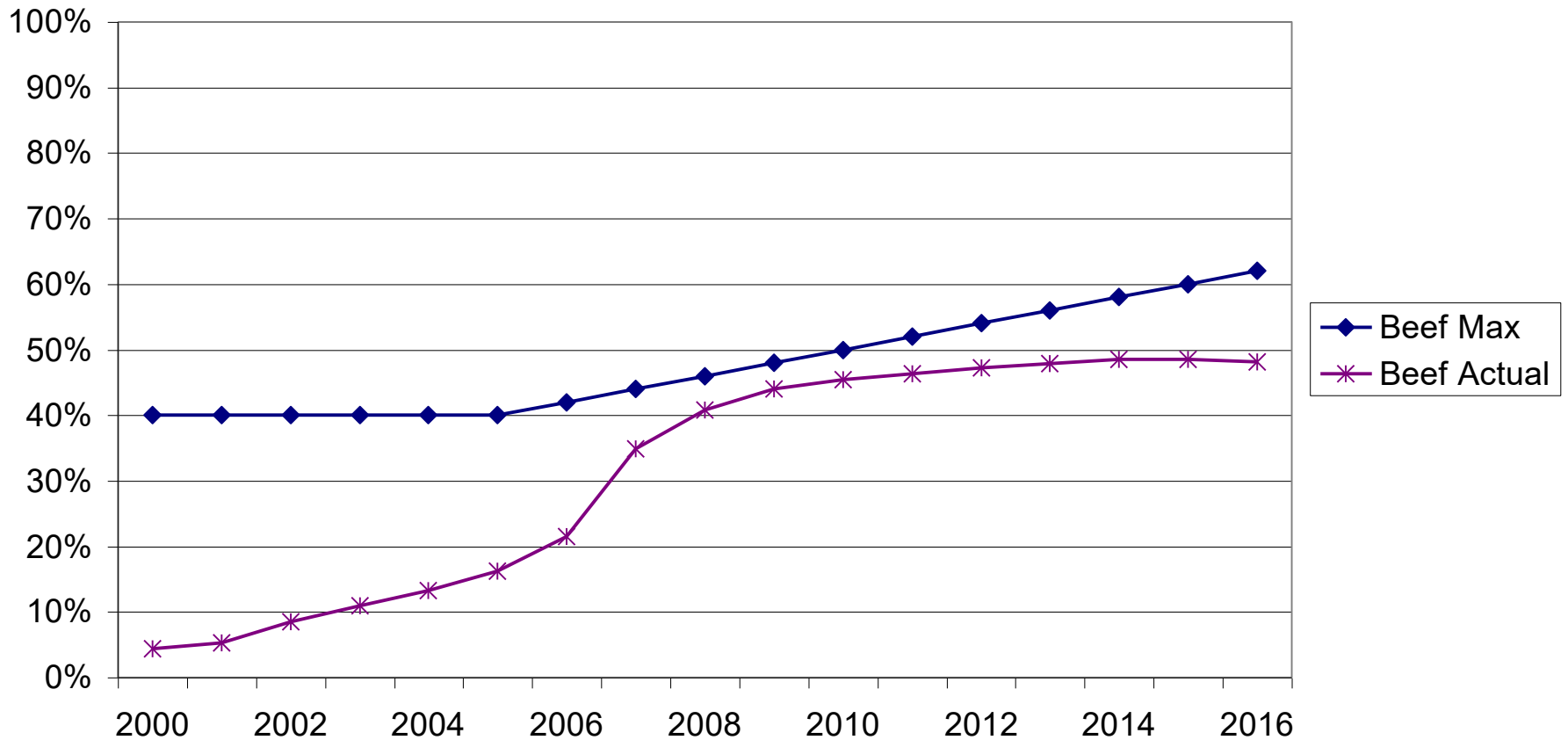
# Maximum Inclusion Rate of DDGS in Feed (Percent of Feed by Dry Matter Weight)



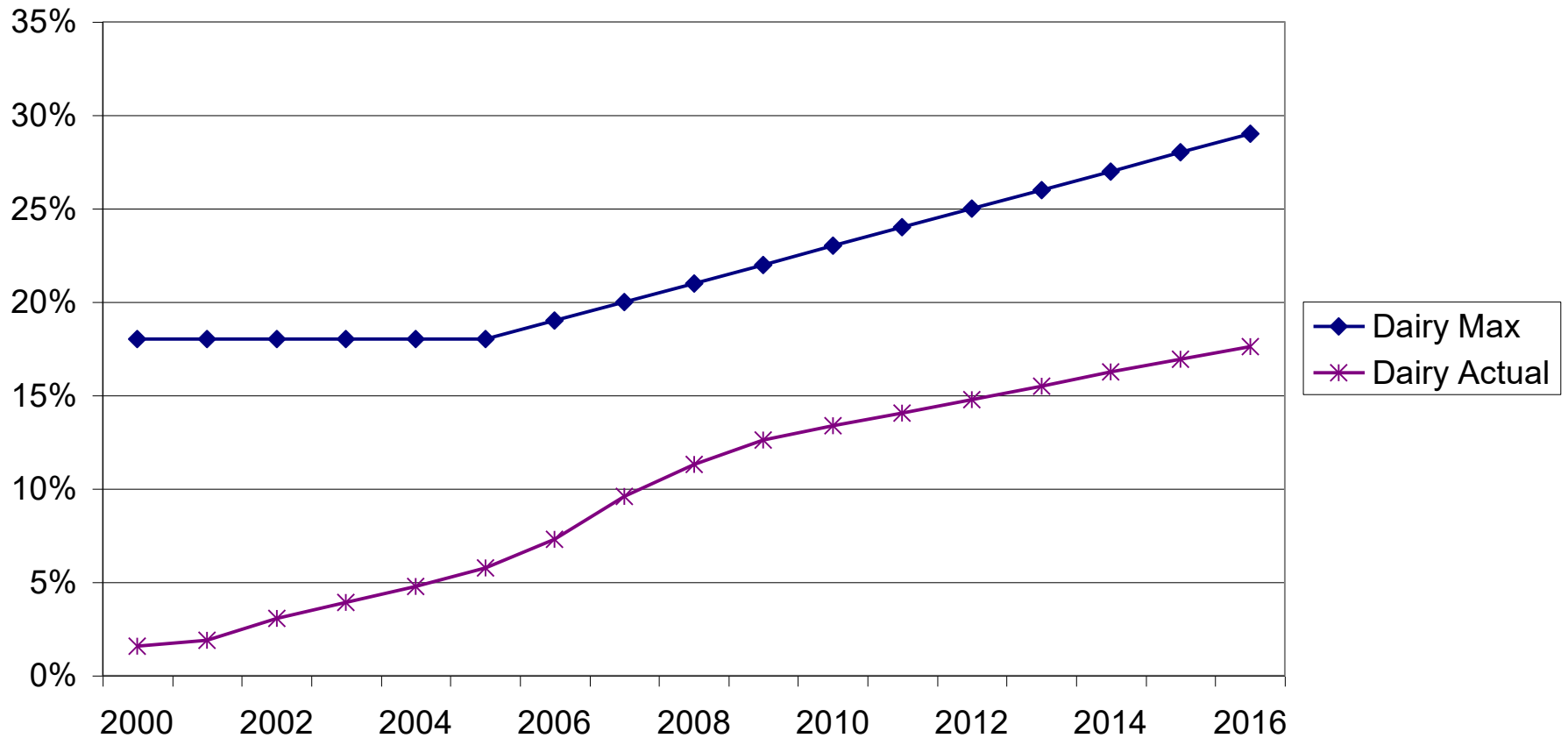
# Projected Use of DDGS in U.S. Feed ('000 tons)



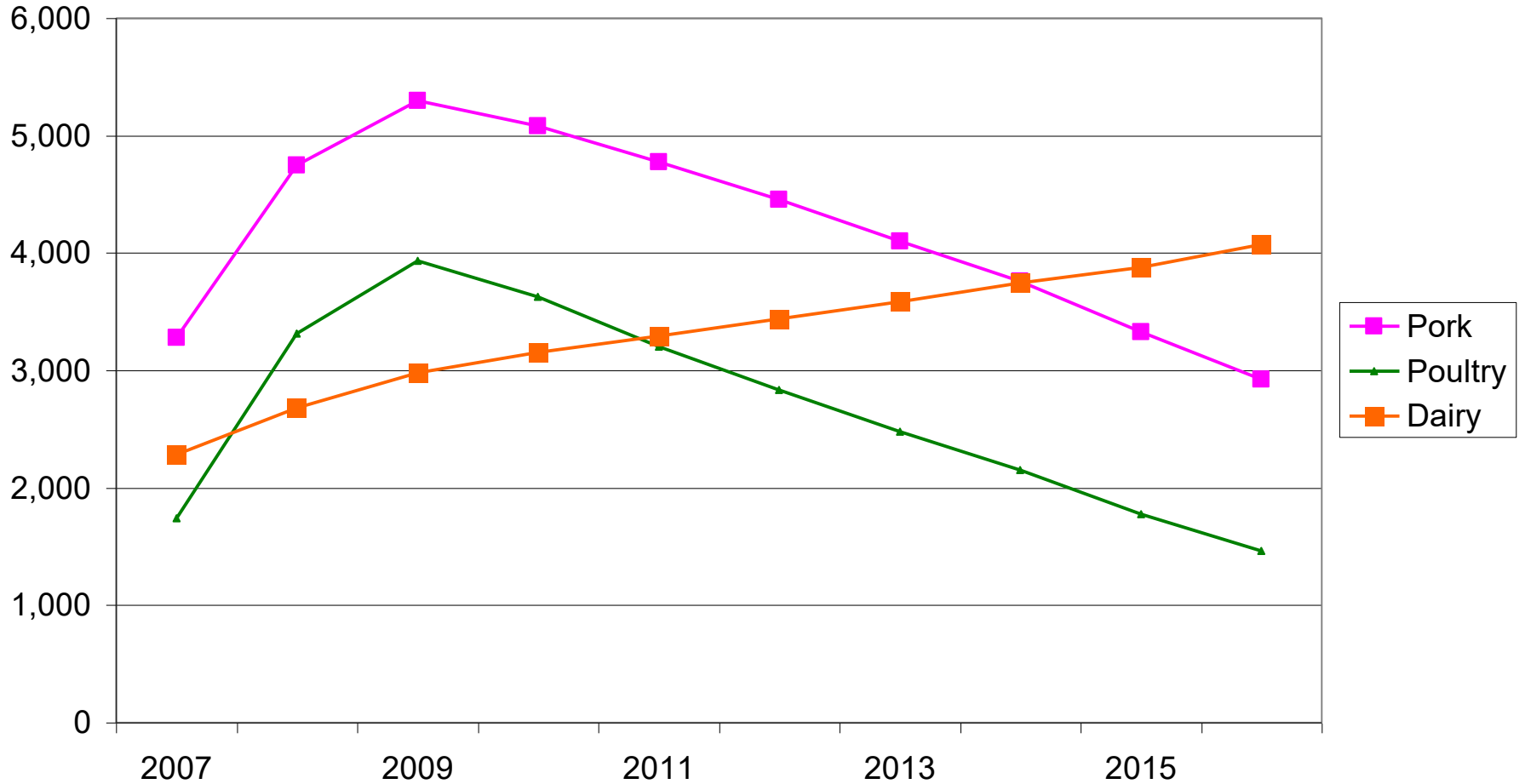
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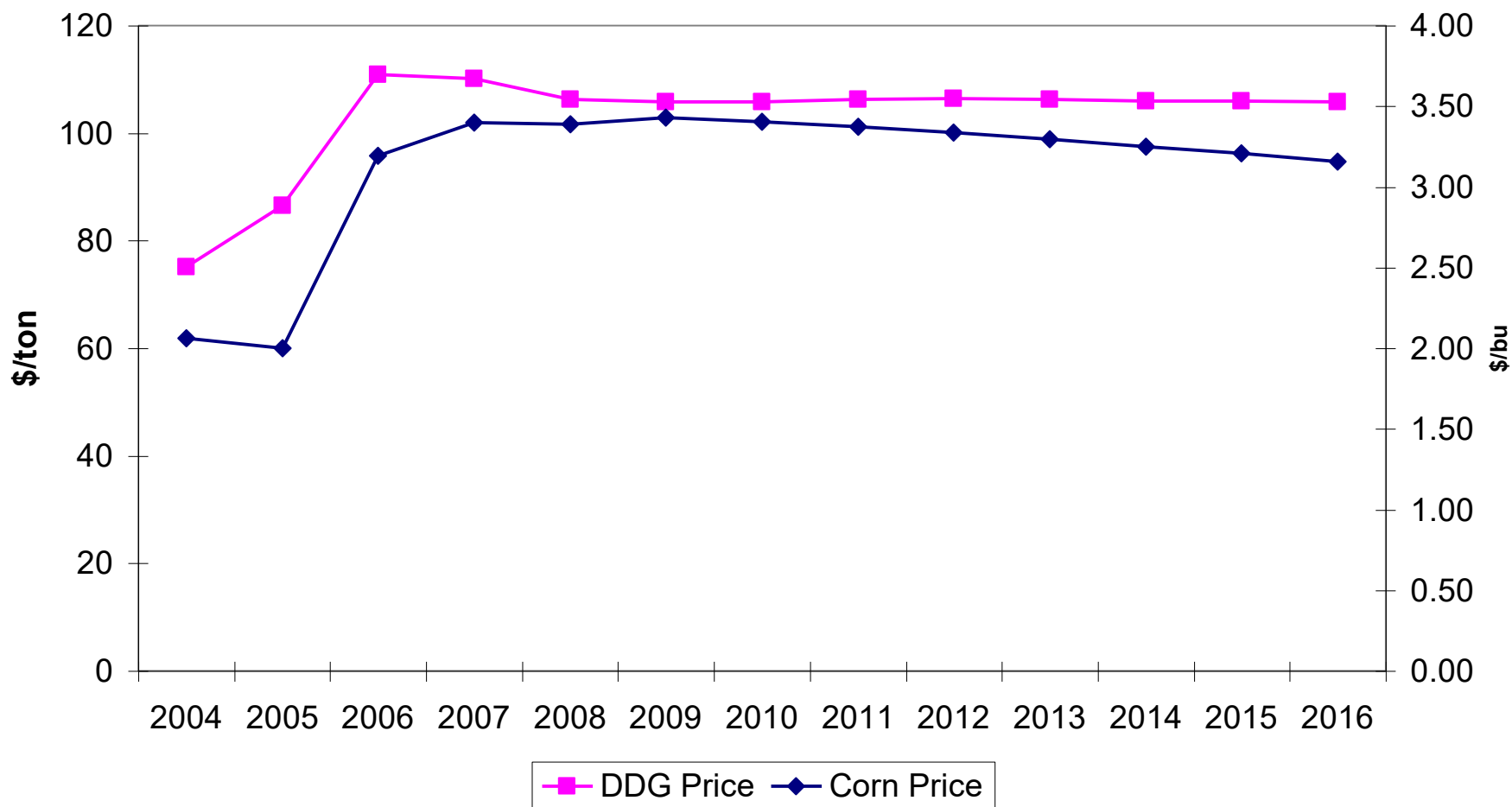


# Projected Use of DDGS in U.S. Feed ('000 tons)



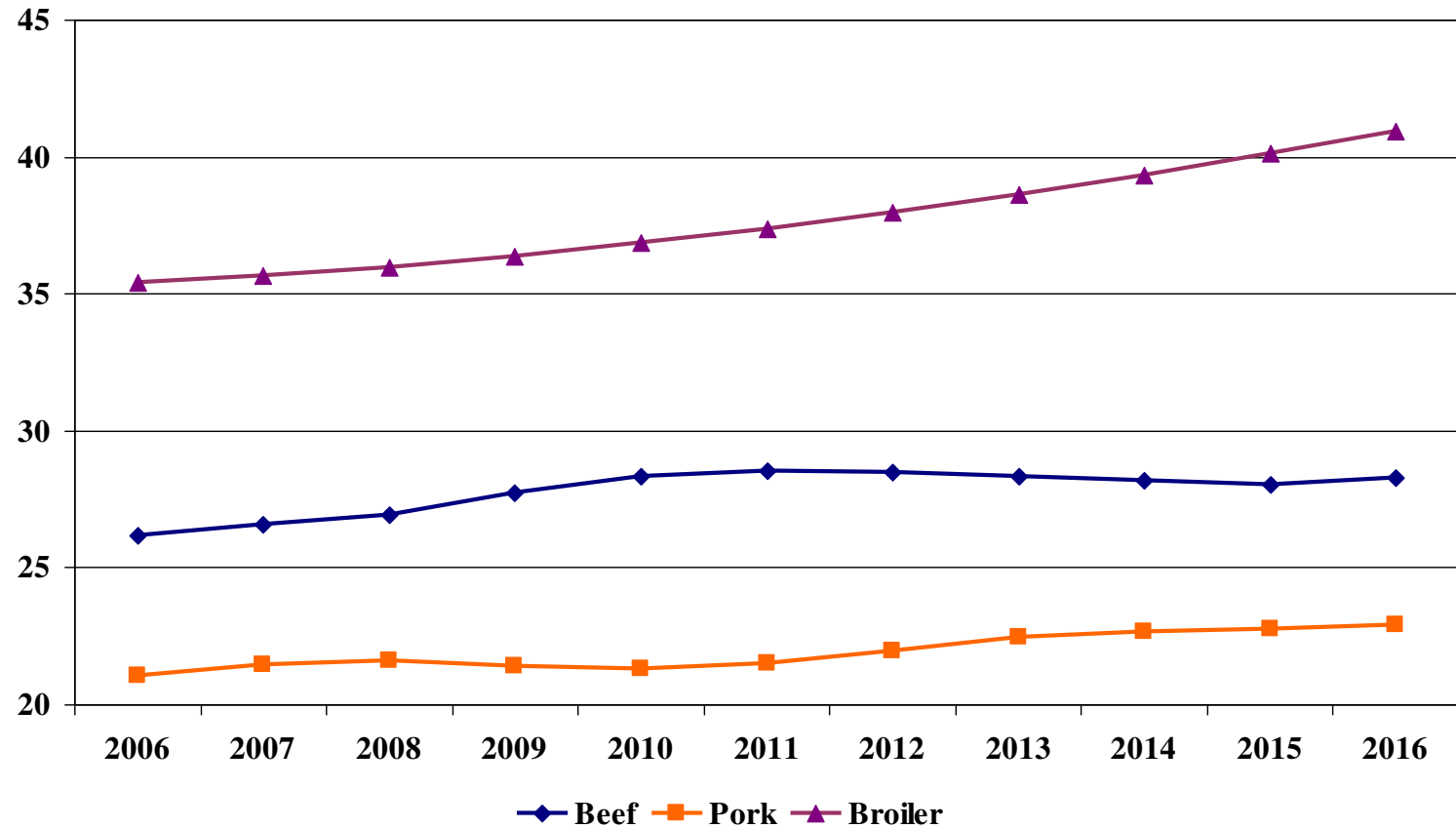


# Relationship Between DDGS Price and Corn Price

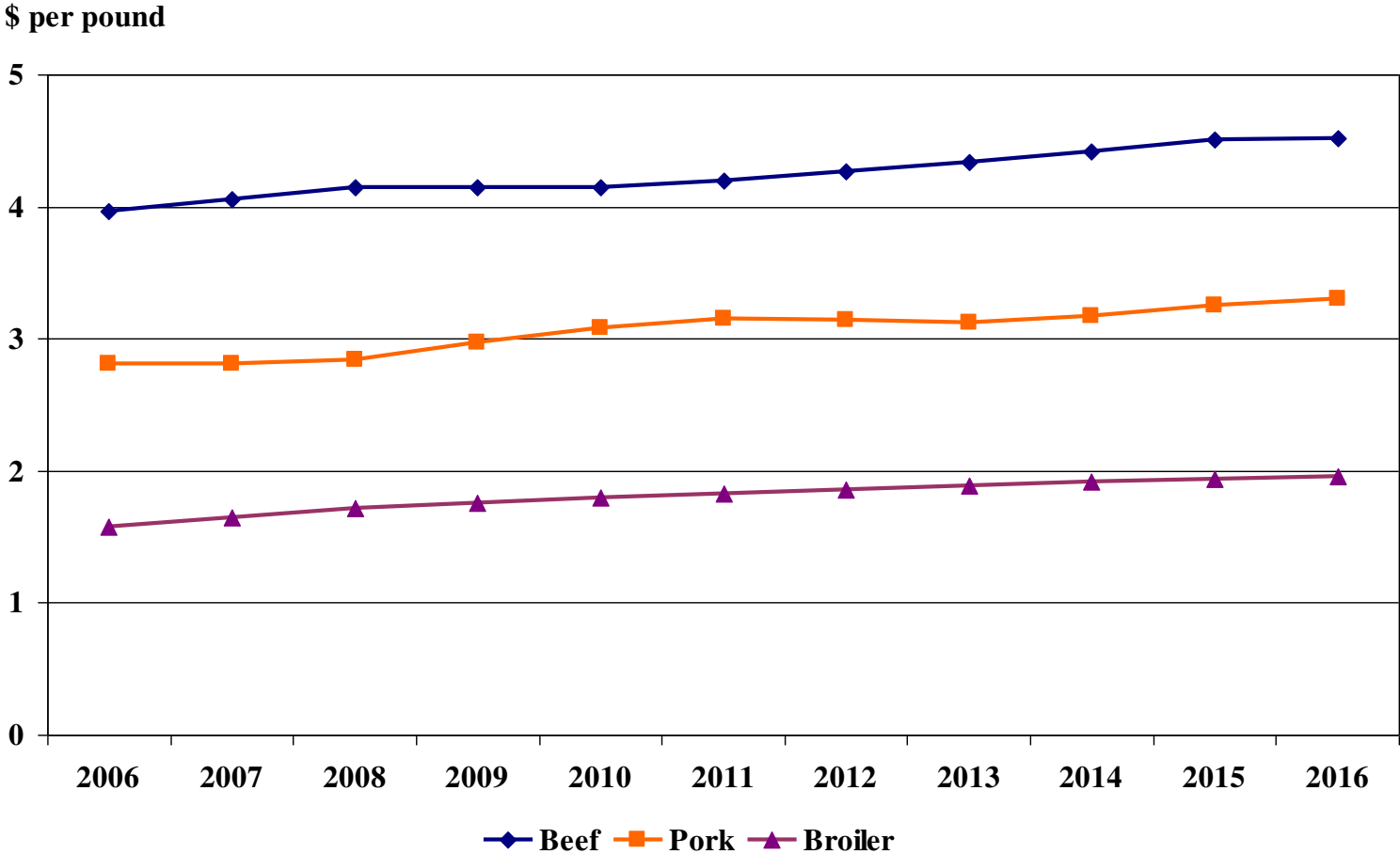


# Projected U.S. Meat Production

billion pounds

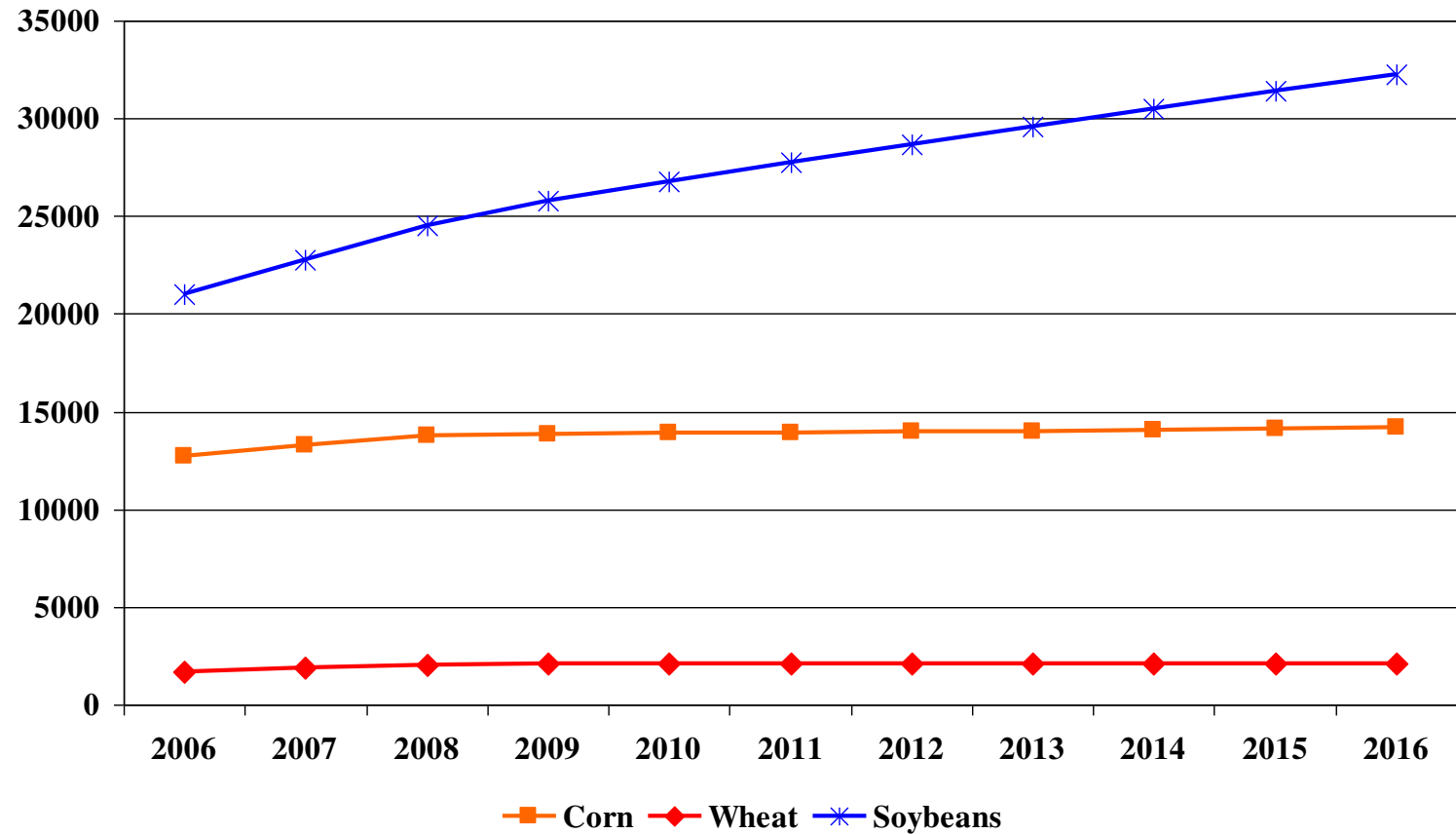


# Projected U.S. Retail Meat Prices



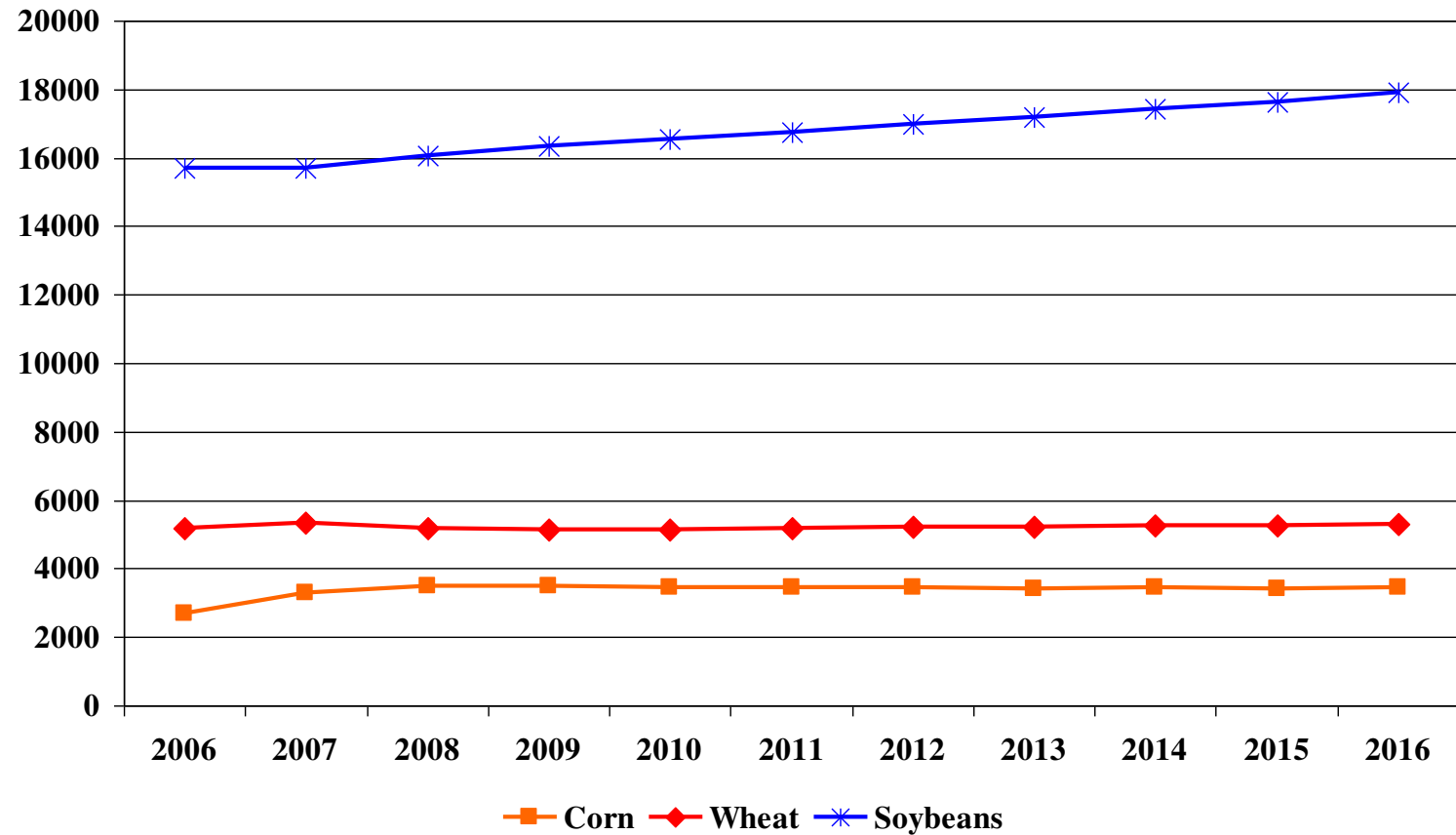
# Projected Brazilian Area Harvested

thousand hectares



# Projected Argentine Area Harvested

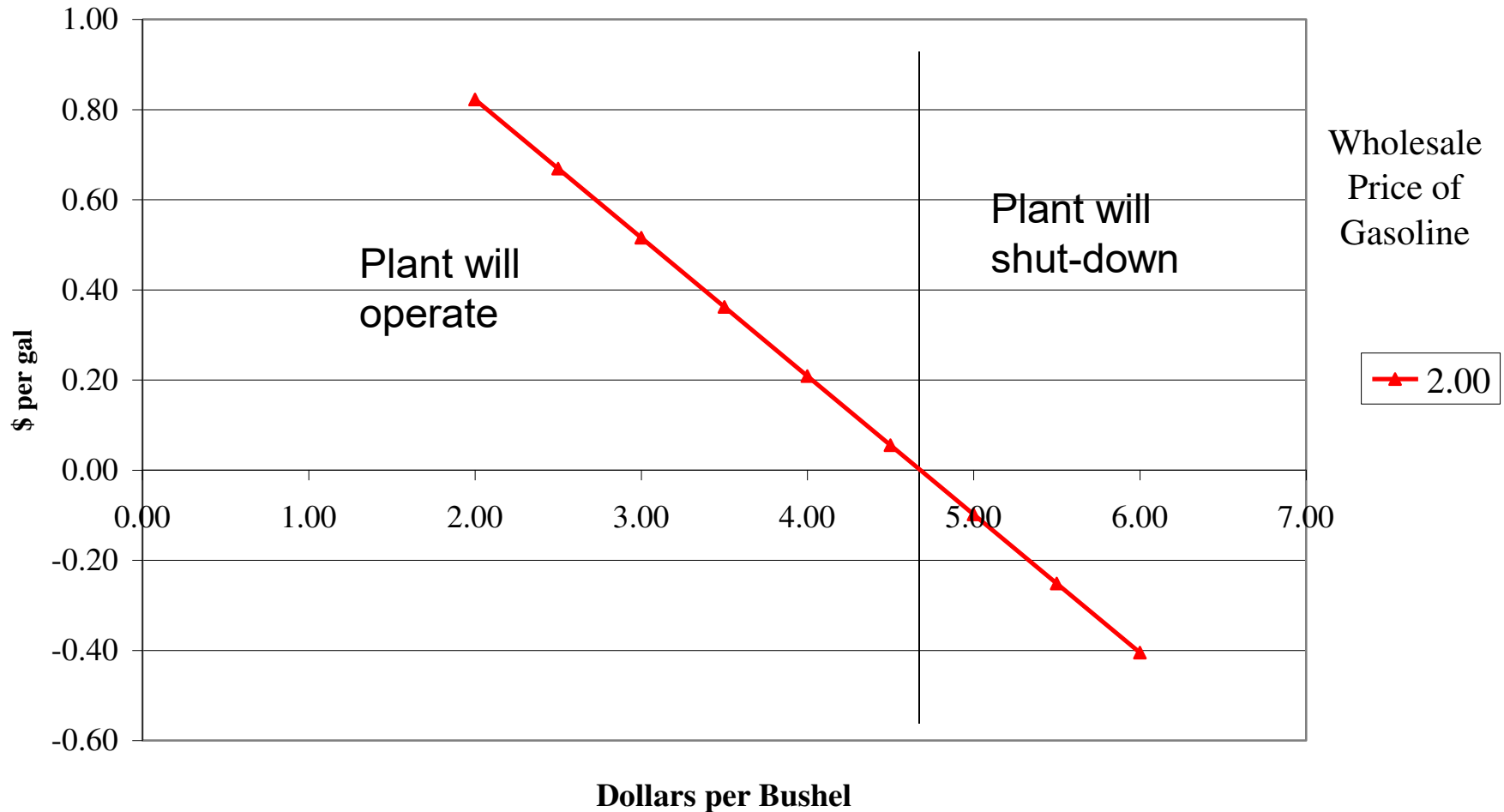
thousand hectares



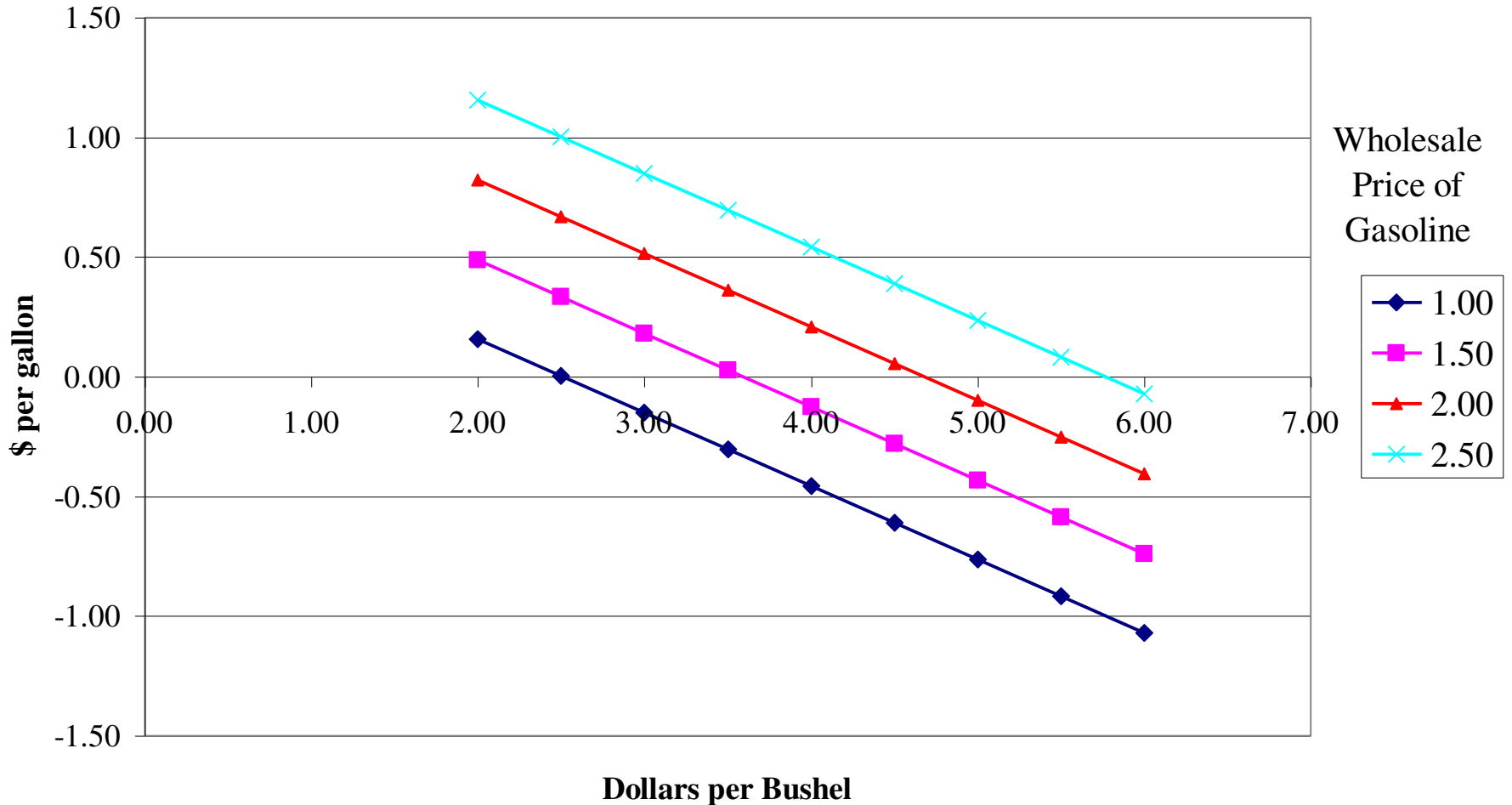
# Importance of Margin

- Without prospect of a positive margin, ethanol plants will not get built
- With plants operating at full capacity there is a corn price that shuts down ethanol plants, freeing up corn to feed livestock
- If there is excess capacity, there is a corn price that will cause plants to run at full capacity
- Both floor and ceiling prices are determined by price of gasoline.

# Dry Mill Ethanol Plant Operating Margins at Different Corn Prices with \$2.00 Gasoline (\$1.84 Ethanol)



# Dry Mill Ethanol Plant Operating Margins at Different Corn and Gasoline Prices





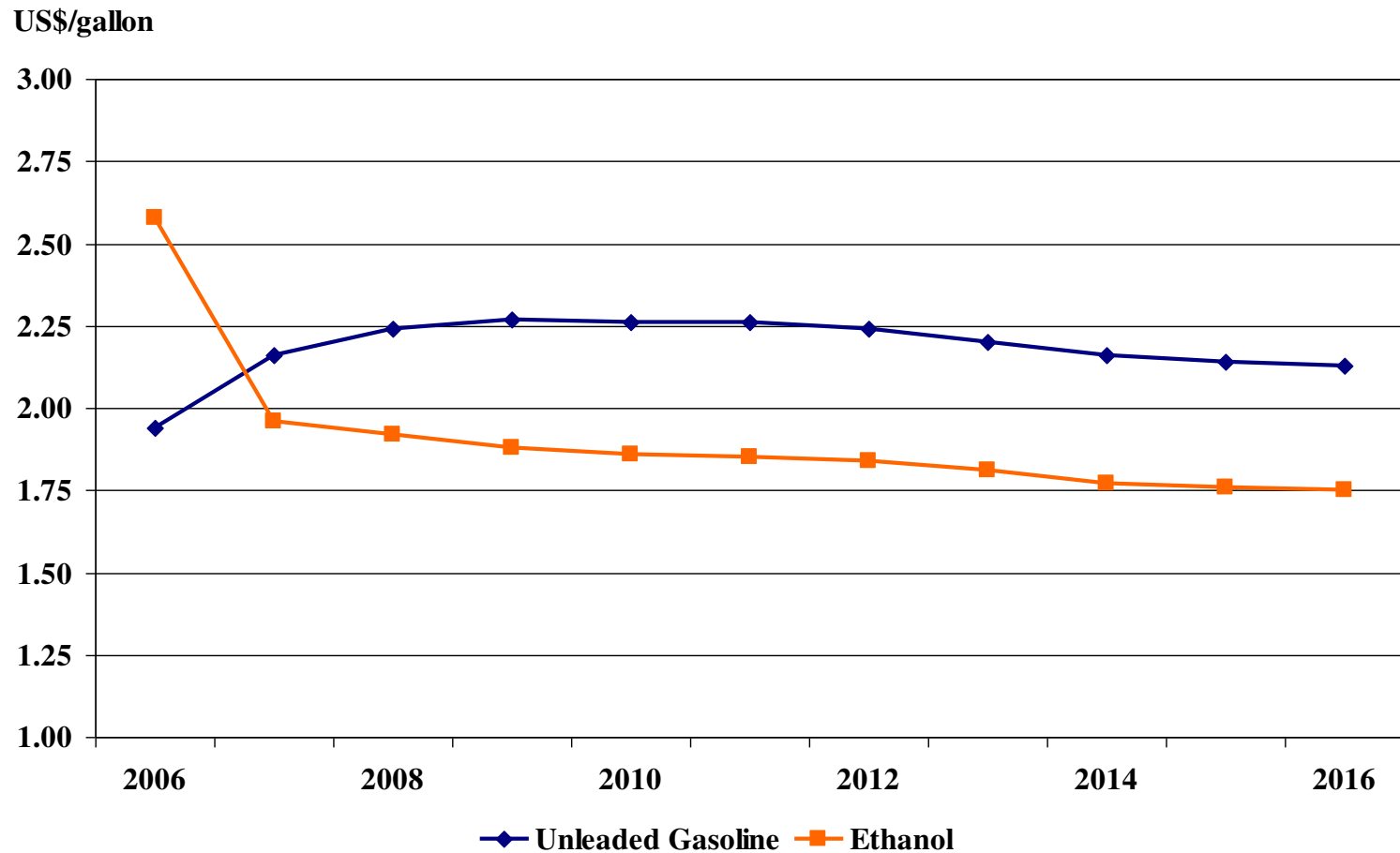
# Three Scenarios

1. Price of gasoline falls to \$1.00/gallon after 14 billion gallons of ethanol capacity is built
  - Price of corn will be bid up to \$2.50 per bushel
2. Price of gasoline remains at \$2.00/gallon, 35 million acres needed to run ethanol plants
  - Price of corn will be above \$3.30/bu, but will not rise above \$4.75/bu even under short crop conditions
3. Price of gasoline rises to \$2.25 per gallon because crude oil prices increase \$10 above baseline levels

# Impact of Higher Crude Oil Price

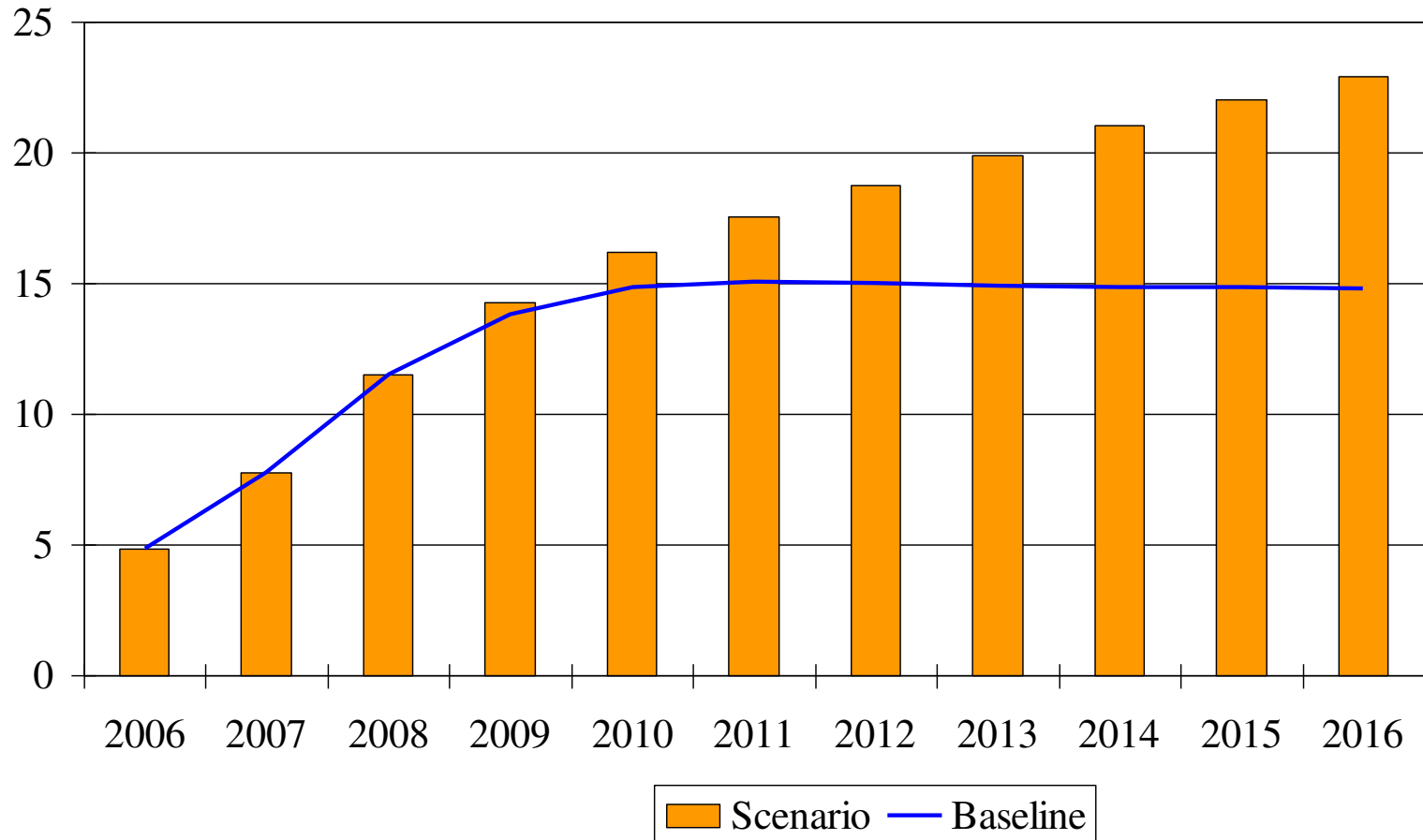
- Increased crude oil price by \$10/barrel over the projection
- Margins on ethanol plants increase
- New incentive to invest in added capacity for ethanol production
- Eventually, a new equilibrium reached where there is no incentive to invest in or exit the ethanol industry
- Will demand for ethanol be enough?
  - E-10 market will saturate around 15 billion gallons
  - Drop in ethanol price relative to gasoline will eventually encourage increase in demand for the flex-fuel cars

# Wholesale Gasoline and Ethanol Prices



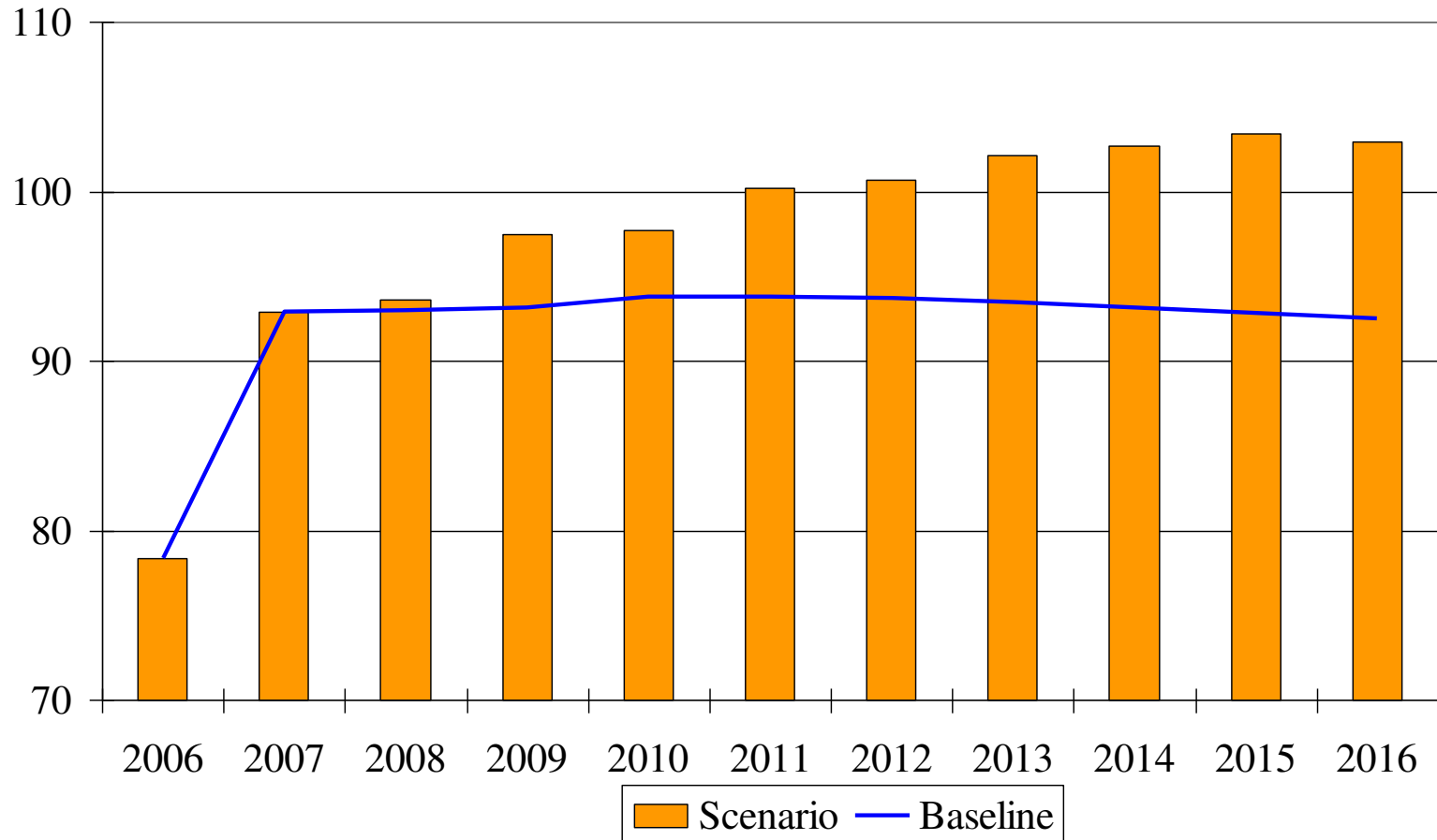
# Projected U.S. Ethanol Production

billion gallons

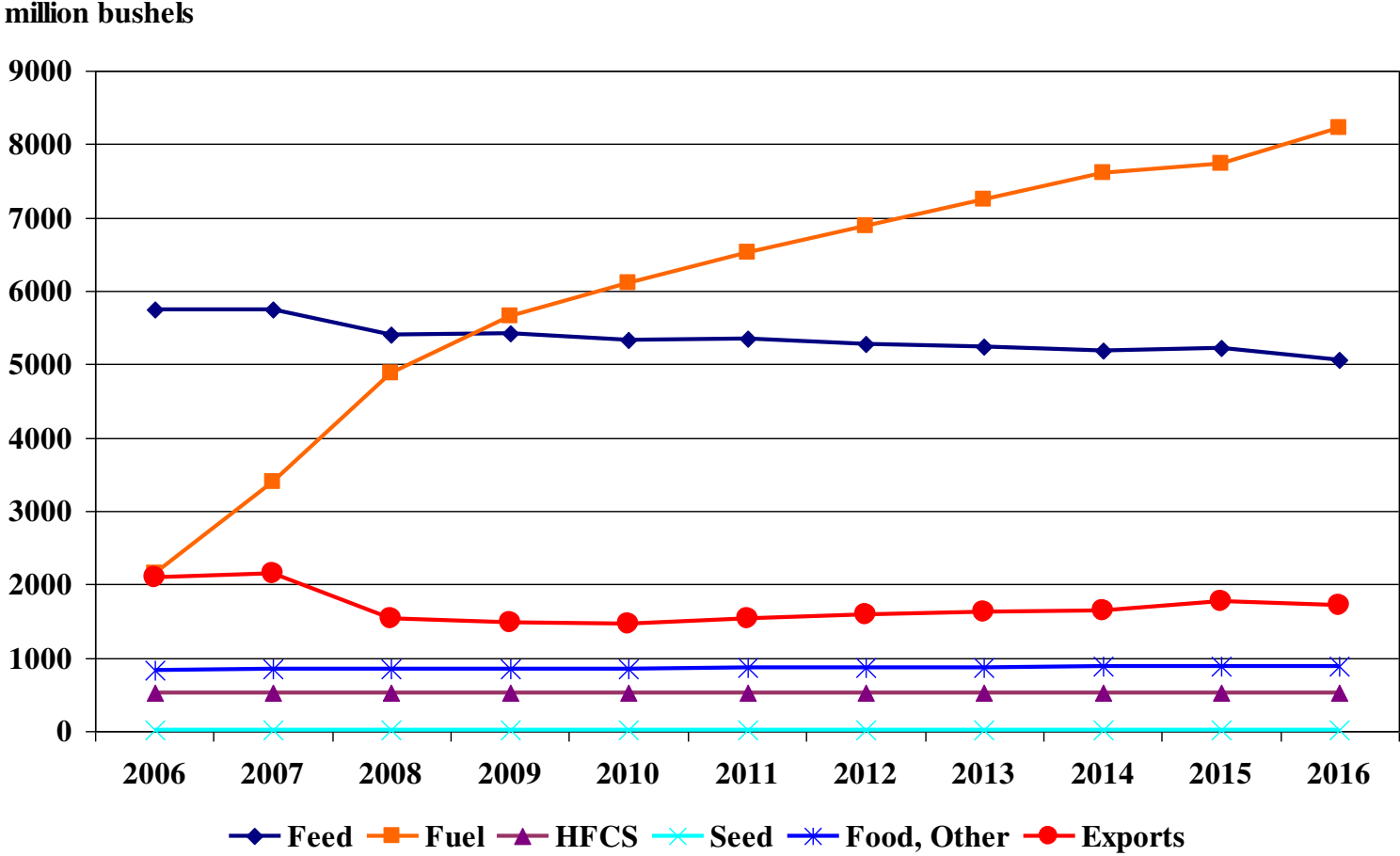


# Projected U.S. Corn Planted Area

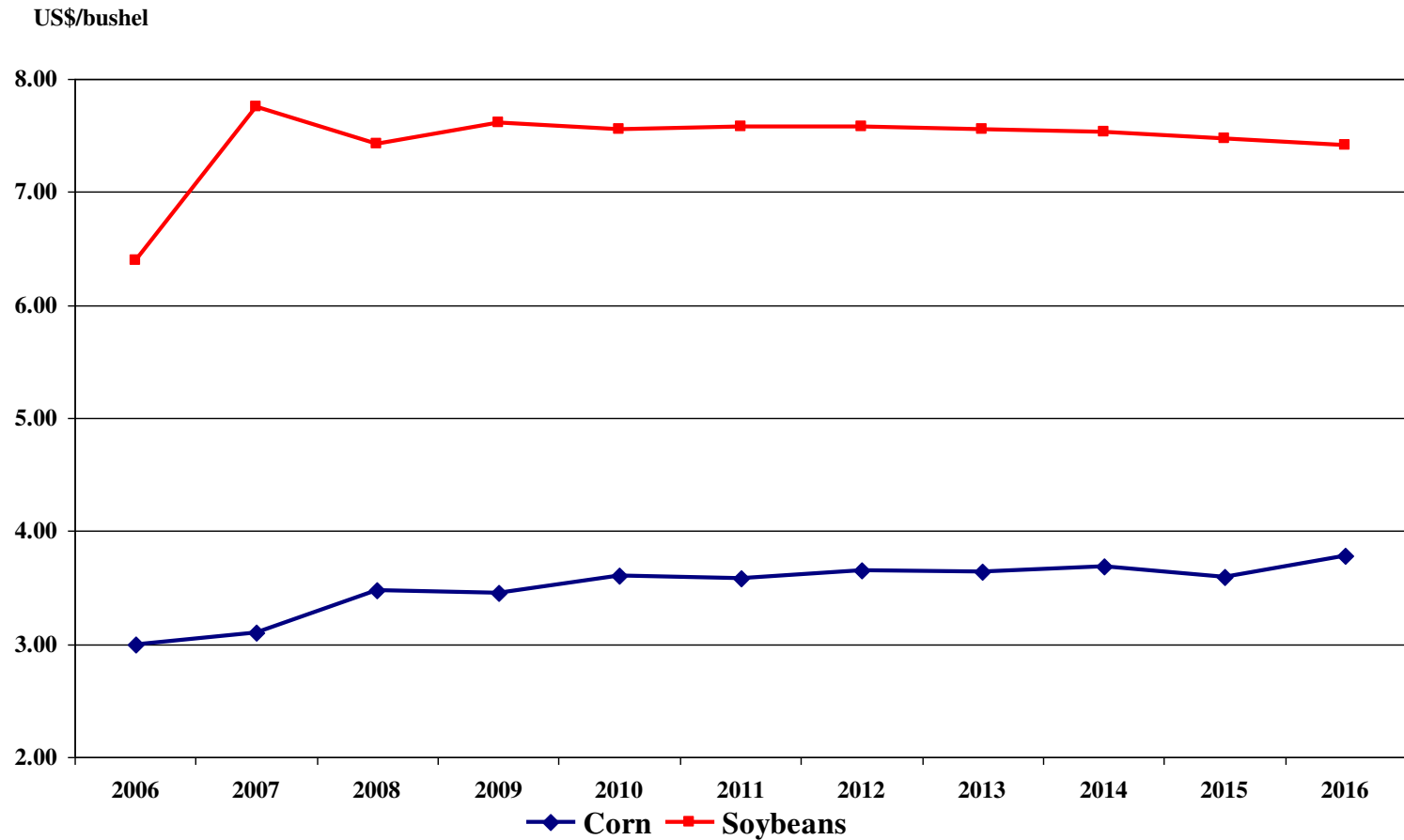
million acres



# Projected Utilization of U.S. Corn

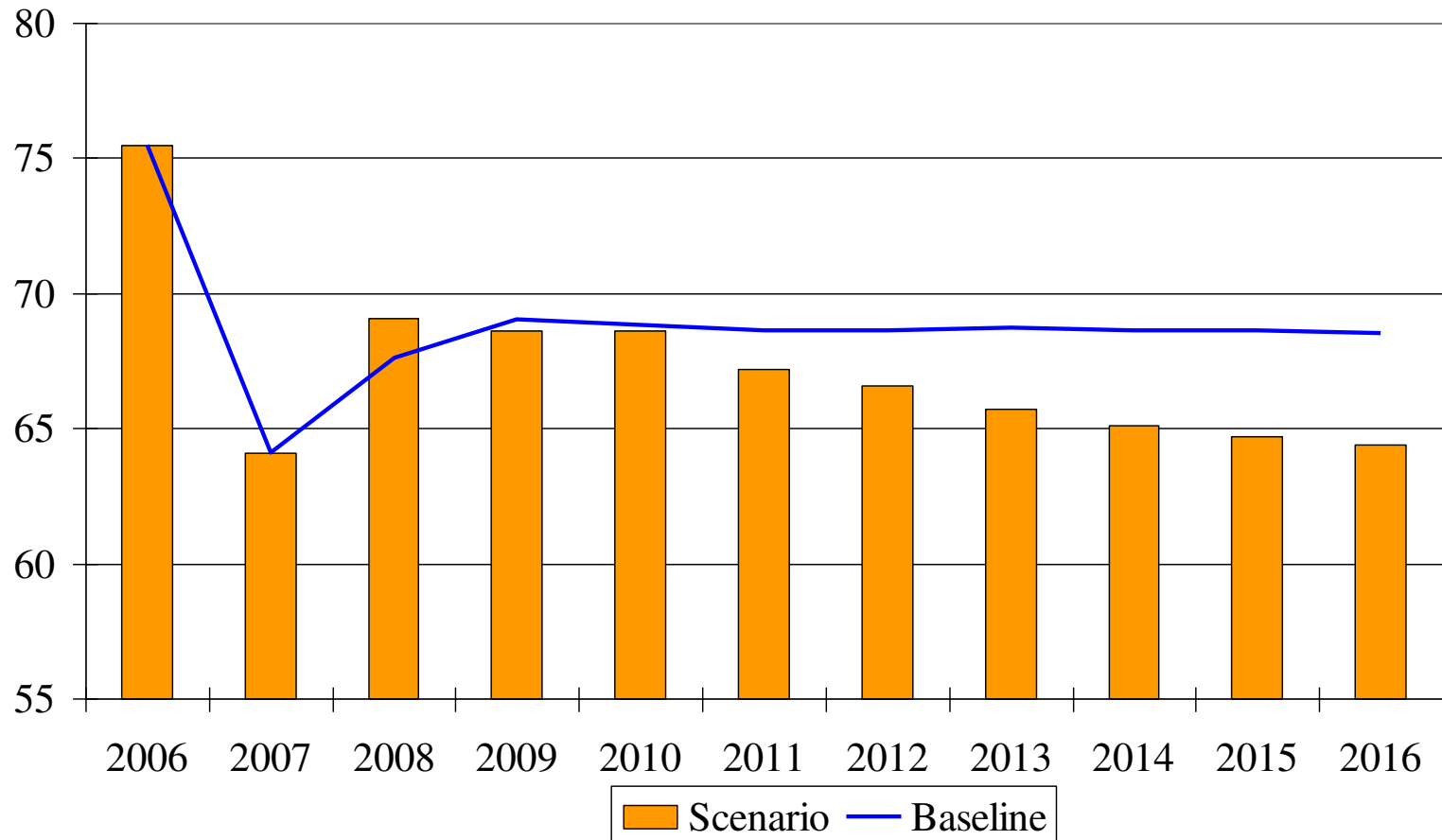


# Projected U.S. Corn and Soybean Prices



# Projected U.S. Soybean Planted Area

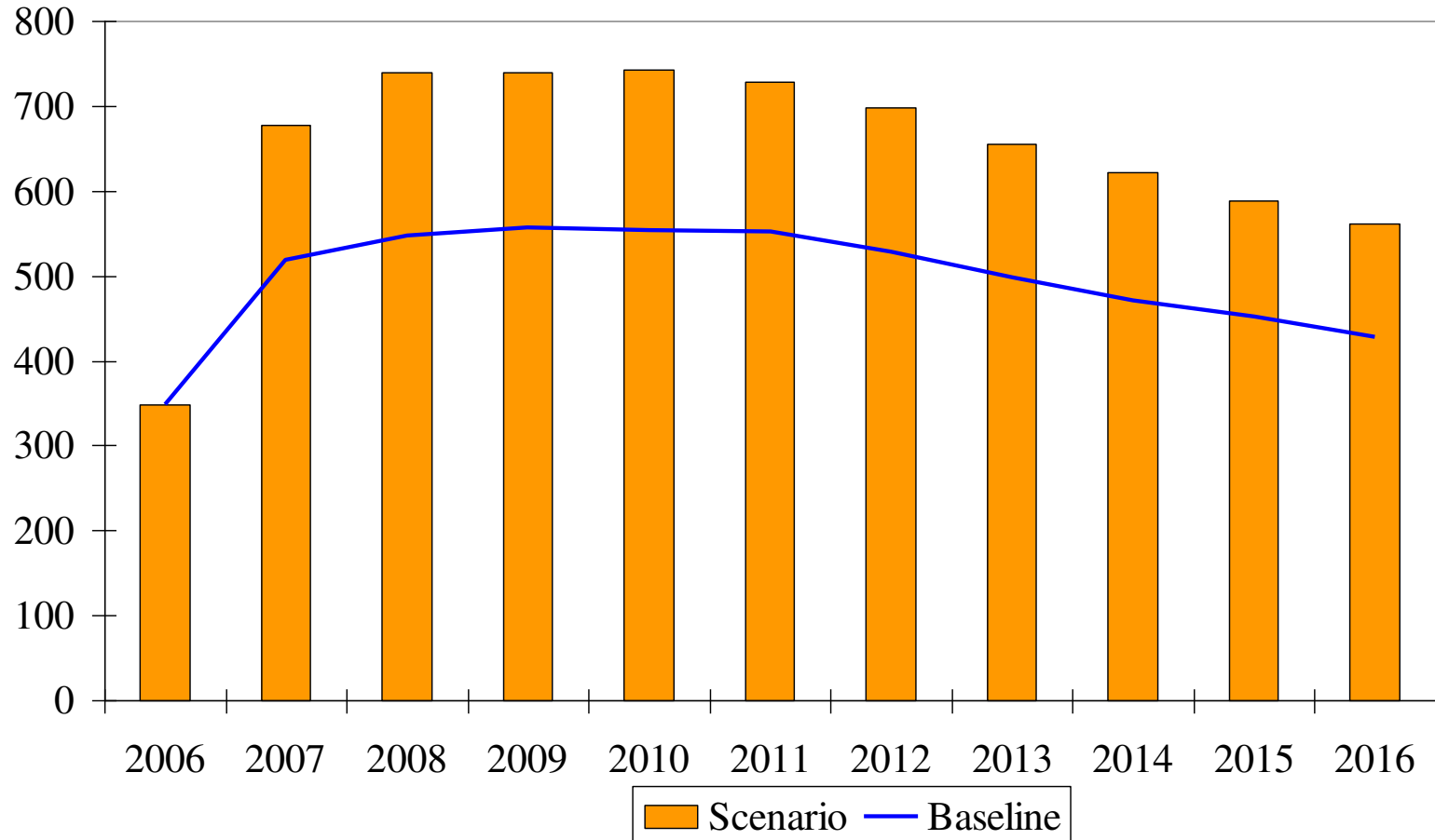
million acres





# Projected U.S. Biodiesel Production

million gallons



# U.S. Meat, Egg, and Dairy Price Changes

	Baseline	Scenario	Percentage Change
Beef Retail Price (\$/pound)	4.52	4.62	2.2%
Pork Retail Price (\$/pound)	3.30	3.35	1.5%
Broiler Retail Price (\$/pound)	1.96	2.00	2.0%
Turkey Retail Price (\$/pound)	1.26	1.30	3.2%
Egg Retail Price (\$/dozen)	1.63	1.68	3.1%

# Farm to Retail Food Price Spread

Food	Farm Value Share of Retail Food Price	Food	Farm Value Share of Retail Food Price
Eggs	53	Canned Corn	22
Beef	49	Sugar	27
Chicken	48	Wheat Flour	19
Milk	34	Bread	5
Pork	31	Corn Flakes	4
Orange Juice	33	Corn Syrup	3

Source: USDA-Economic Research Service, 2001

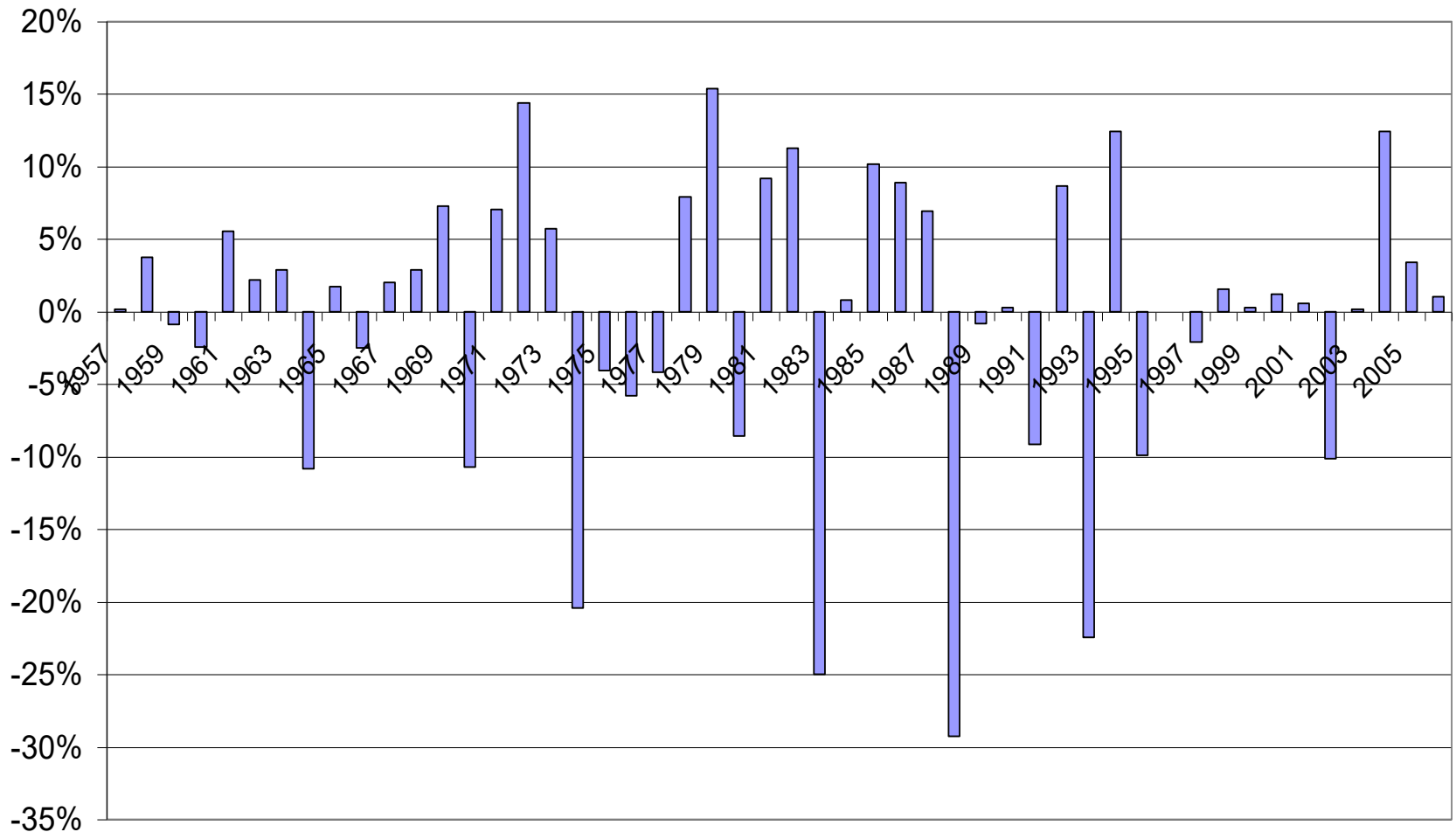
# Impact on Rest of the World

- World grain and oilseed prices increase
- Result in higher feed and food prices
- Higher food prices
- Higher livestock production cost
- Countries in South America and Asia fill the gap

# Impact of Short Crop Scenario

- Drought in 2012 similar to 1988
  - Regional yields of corn, soybeans and wheat changed from trend levels
  - Yields were off by 25% for corn, 18% for soybeans, and 11% for wheat in 1988
- Ethanol mandate for 2012 assumed to be 14.7 billion gallons

# Historical U.S. Corn Production Deviations



# Corn, Soybean and Ethanol Markets

- Corn price increases by 44% above baseline levels
- Soybean price rises by 22%
- Corn exports and stock levels decline by more than 60%
- Corn exports from South America, China, etc. fill part of the gap from decline in U.S. corn exports
- Corn feed use declines by 16% (switch to other feeds)
- Ethanol trade increases moderately

# Livestock Market

- Higher feed costs affect the livestock sector but to a lesser extent as shock is perceived as temporary
  - Production declines
    - Broiler production declines the most (over 2.5%)
    - Milk production declines the least (0.5%)
  - Retail prices increase
    - Egg prices increase the most (about 5.5%)
    - Prices of other products increase by a range between 2% and 4%



# Conclusions

- U.S. biofuels policy choices combined with the price of crude oil will determine future feed prices
- Food prices primarily determined by factors other than the price of feed
- Cellulosic ethanol will not replace corn-based ethanol without a change in policy incentives