

# Bottlenecks and Oil Price Spikes: Impact on U.S. Ethanol and Agriculture



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# Outline

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- Based on an update of our earlier study “Emerging Biofuels: Outlook of Effects on U.S. Grain, Oilseed, and Livestock Markets”

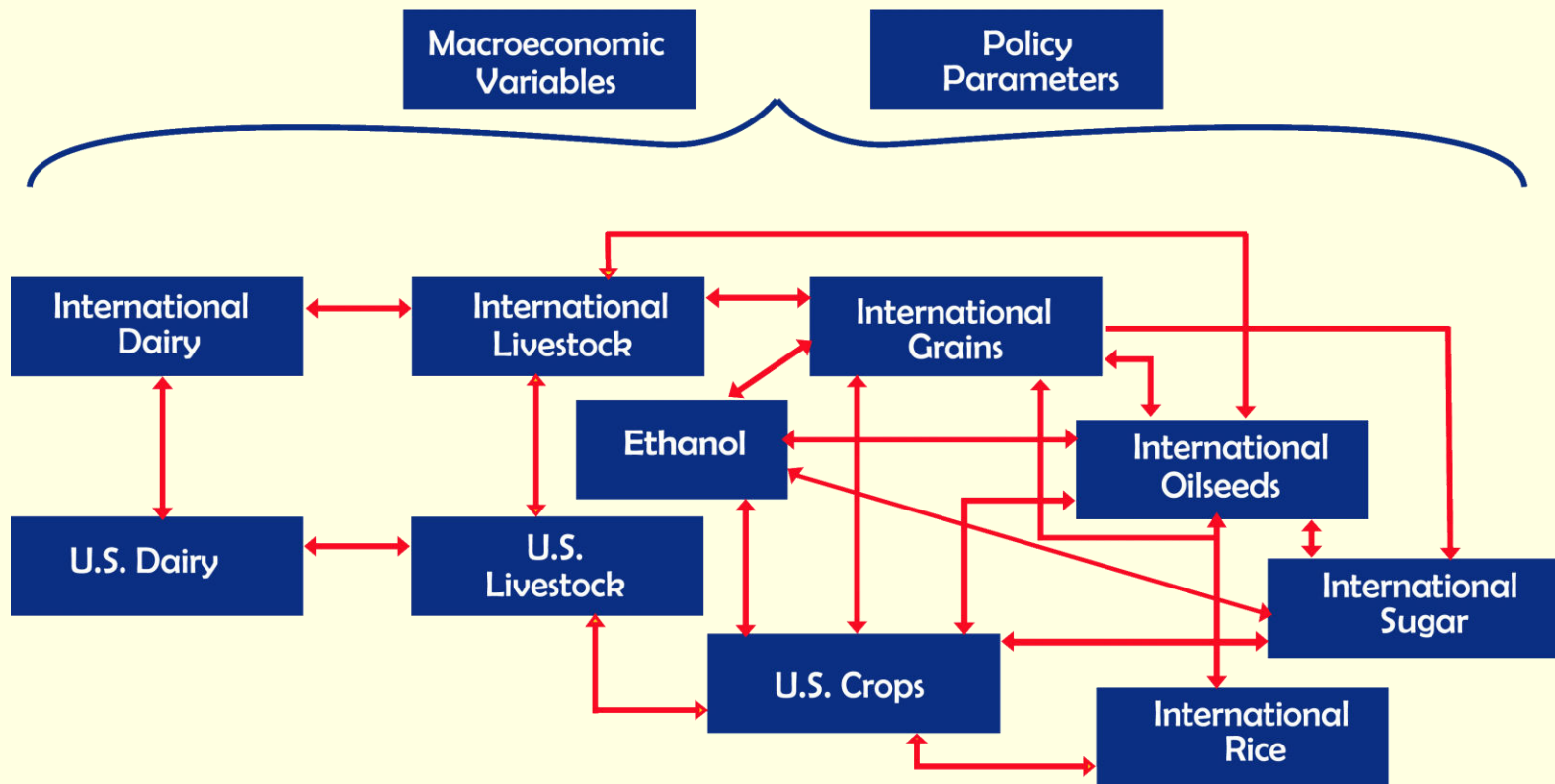
<http://www.card.iastate.edu/publications/synopsis.aspx?id=1050>

- Updated with available 2006 and 2007 data
- The objective is to estimate:
  - how large the biofuels sector in the U.S. could become
  - the impact of the biofuels sector on crops markets, trade, and on livestock markets
  - the response of world agricultural markets

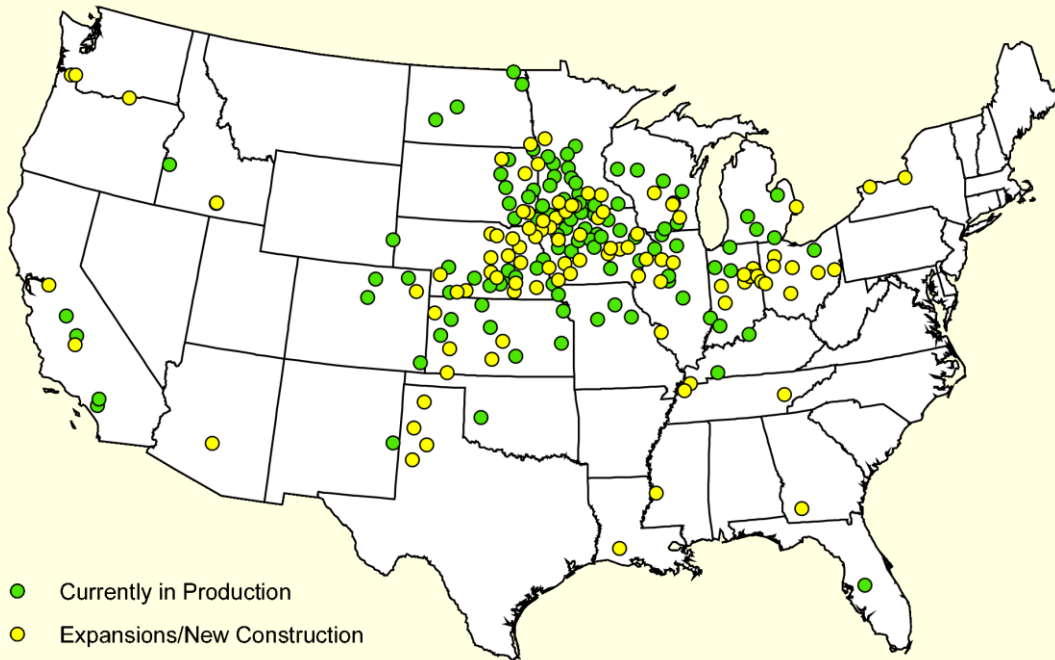
# Model Interactions

## Model Interactions

Trade, Prices, and Physical Flows



# U.S. Ethanol Industry



- Current ethanol capacity: 128 plants, 6.78 billion gallons/year
- Total capacity under construction and expansion: 6.65 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.
- 3.2-3.5 billion bushels of corn are expected to be used in producing fuel ethanol for 2007/2008 marketing year.

# Key Determinants of Impacts

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- Crude oil prices
  - Used NYMEX futures prices as a guide
- Policy incentives in the U.S.
  - \$0.51/gallon ethanol blenders credit
  - \$0.54/gallon import duty and 2.5% import tariff
- The “E-85 bottleneck”: the location and quantity of flex-fuel vehicles and E-85 pumps

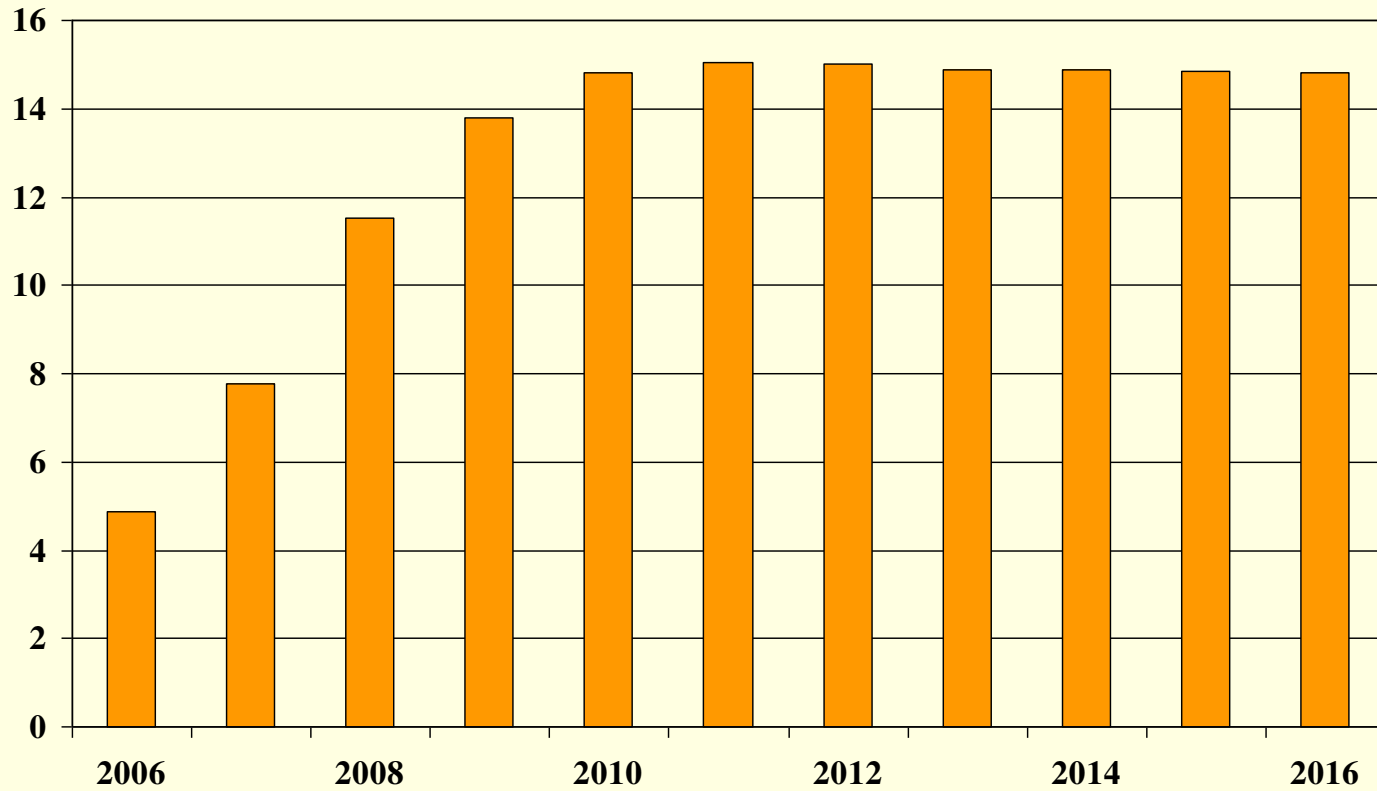
# Three Cases

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- Baseline
  - Current policies, “normal” weather
- Higher oil prices throughout projection period
  - Adding \$10/barrel to the crude oil price
- Drought in the 2012 crop year
  - Placing a 1988-style drought in the middle of the projection period

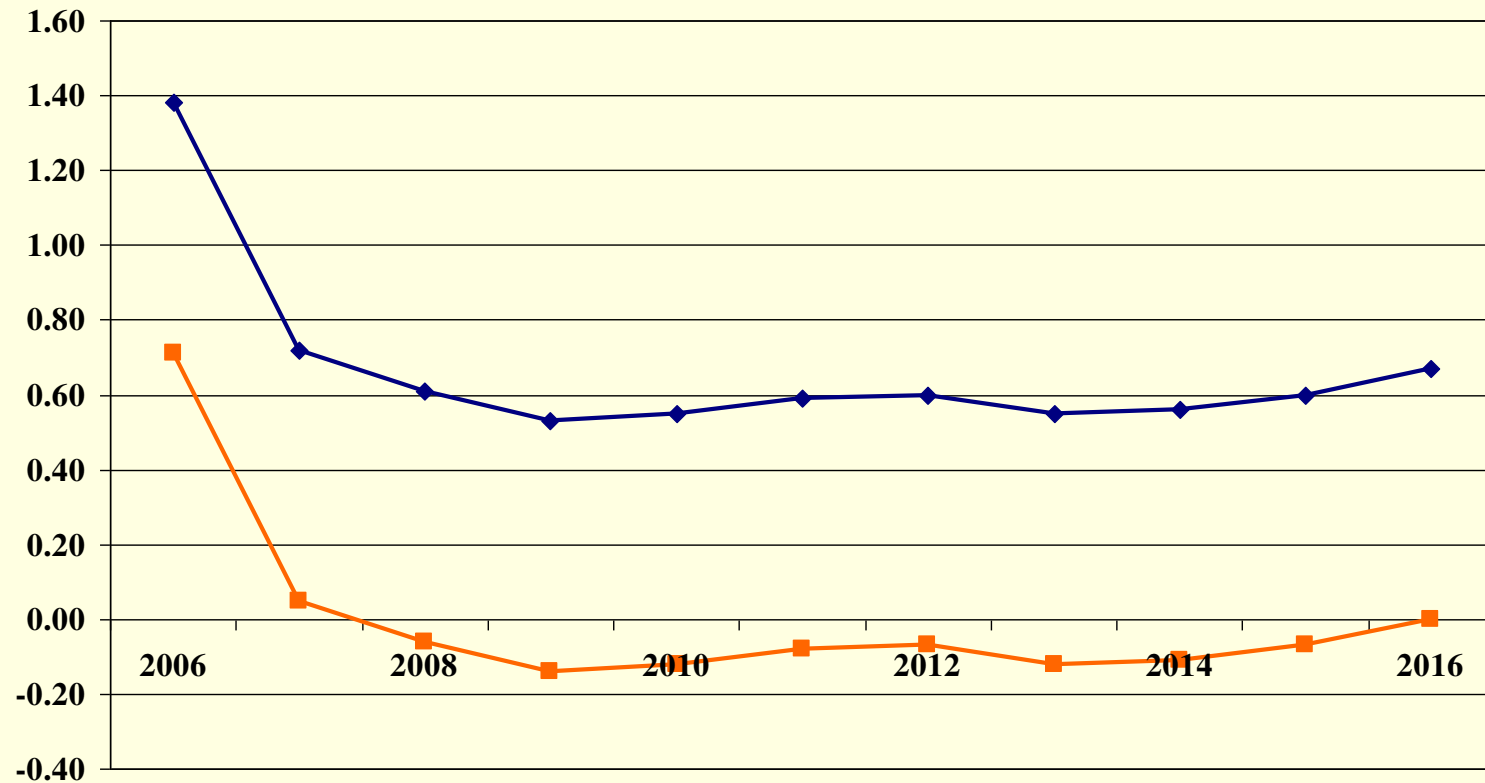
# Projected U.S. Ethanol Production

billion gallons



# Projected U.S. Dry Mill Margins

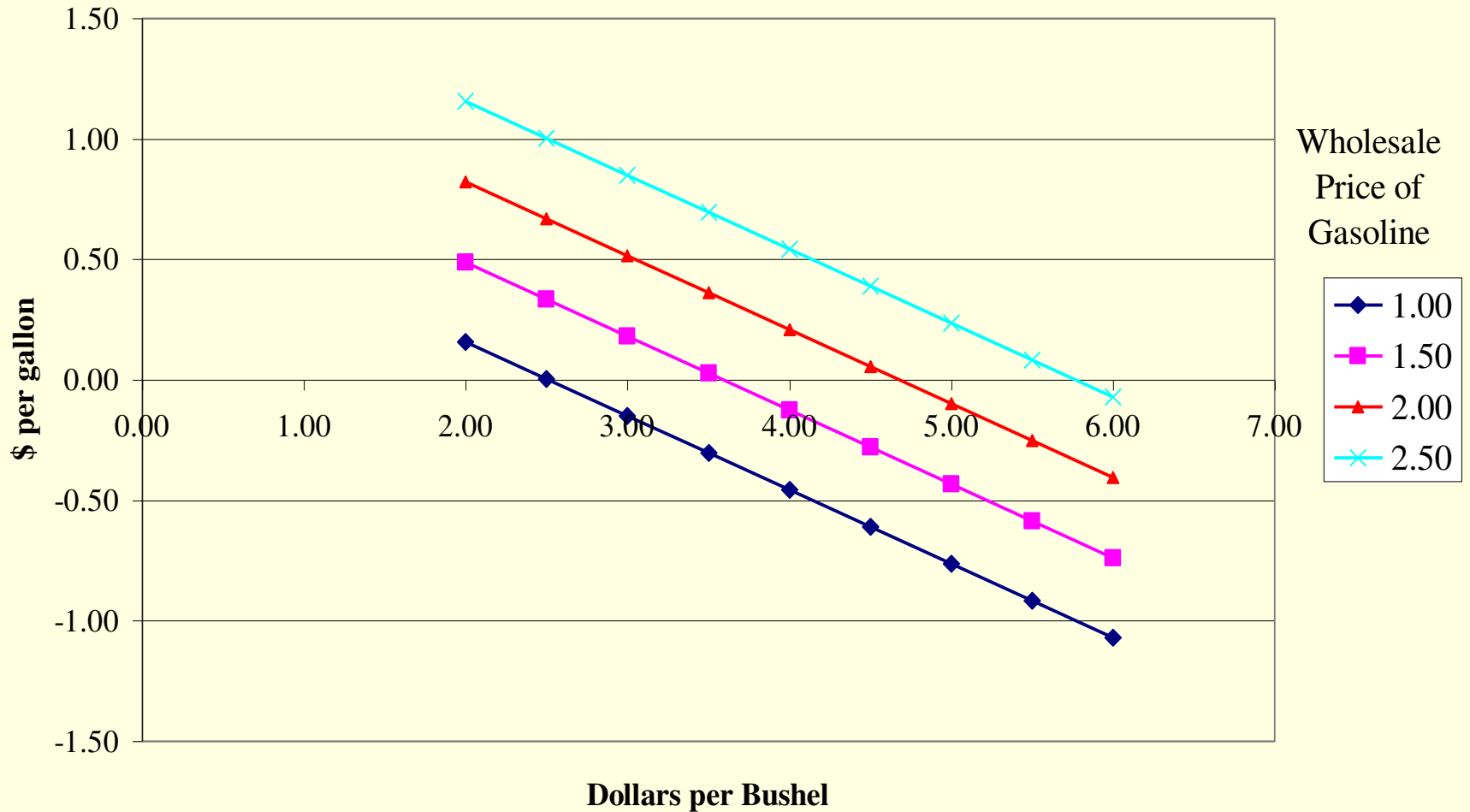
US\$/bushel



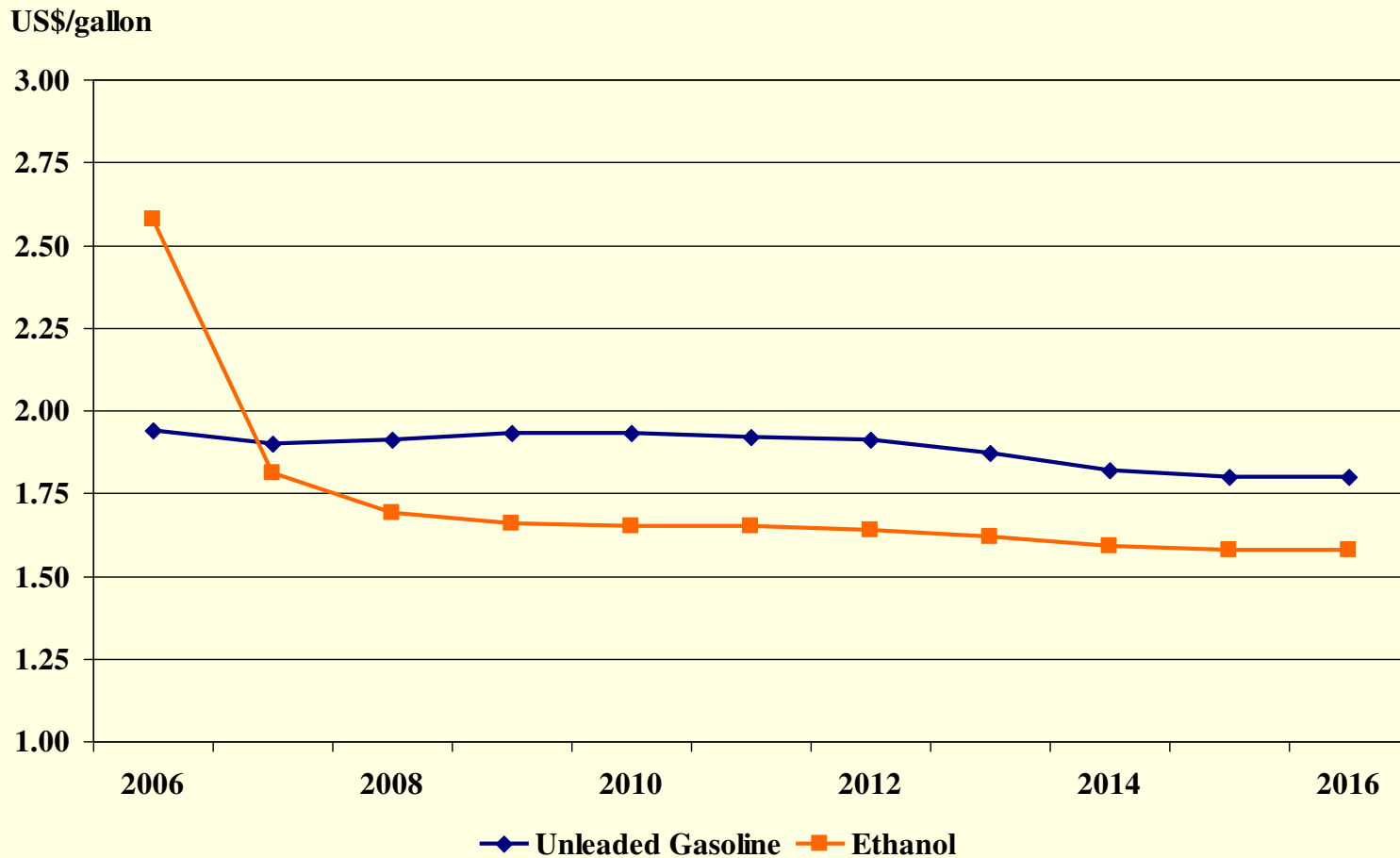
◆ Margin Over Operating Costs ■ Margin Over Total Cost



# Margins at Various Corn and Gasoline Prices

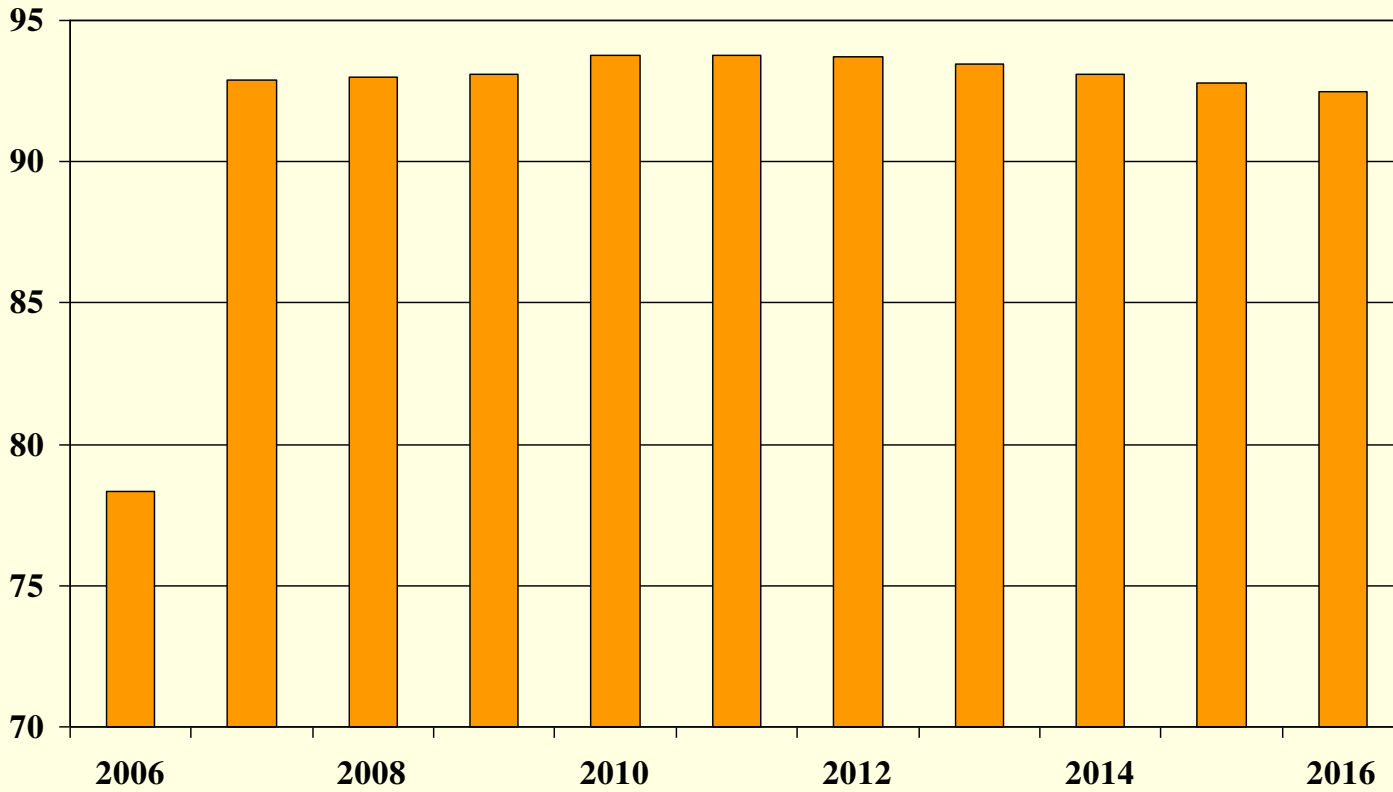


# Wholesale Gasoline and Ethanol Prices



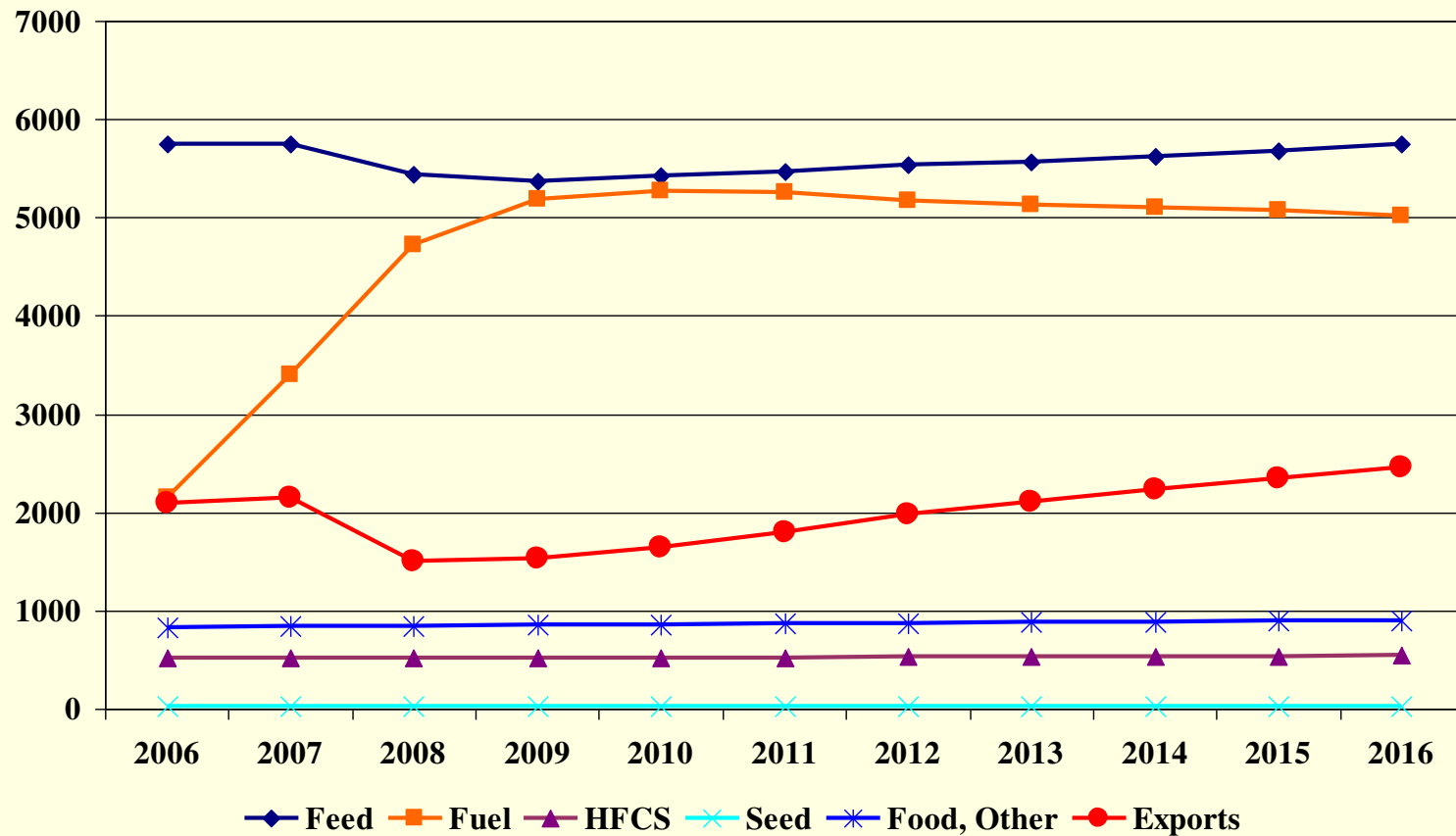
# Projected U.S. Corn Planted Area

million acres

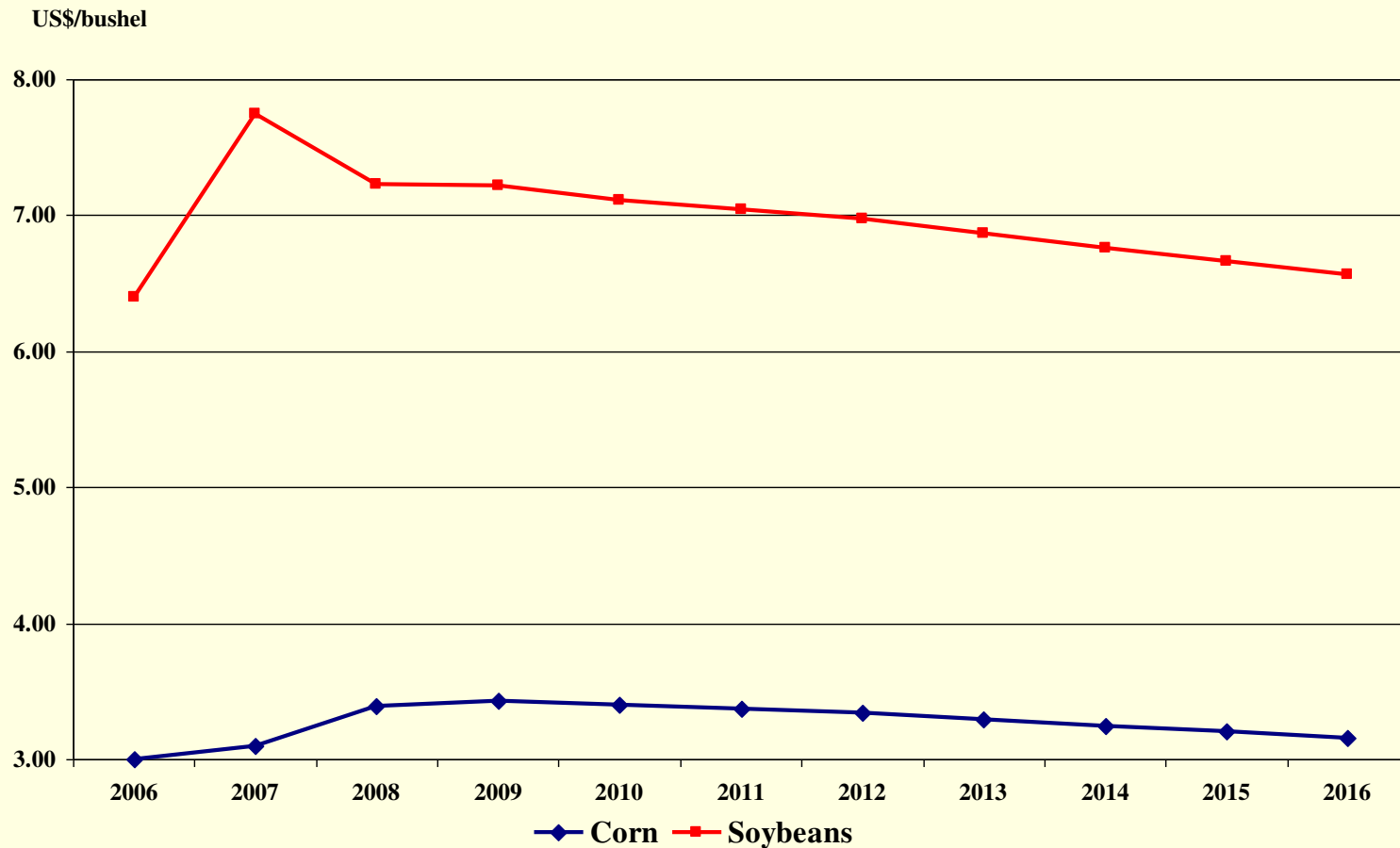


# Projected Utilization of U.S. Corn

million bushels

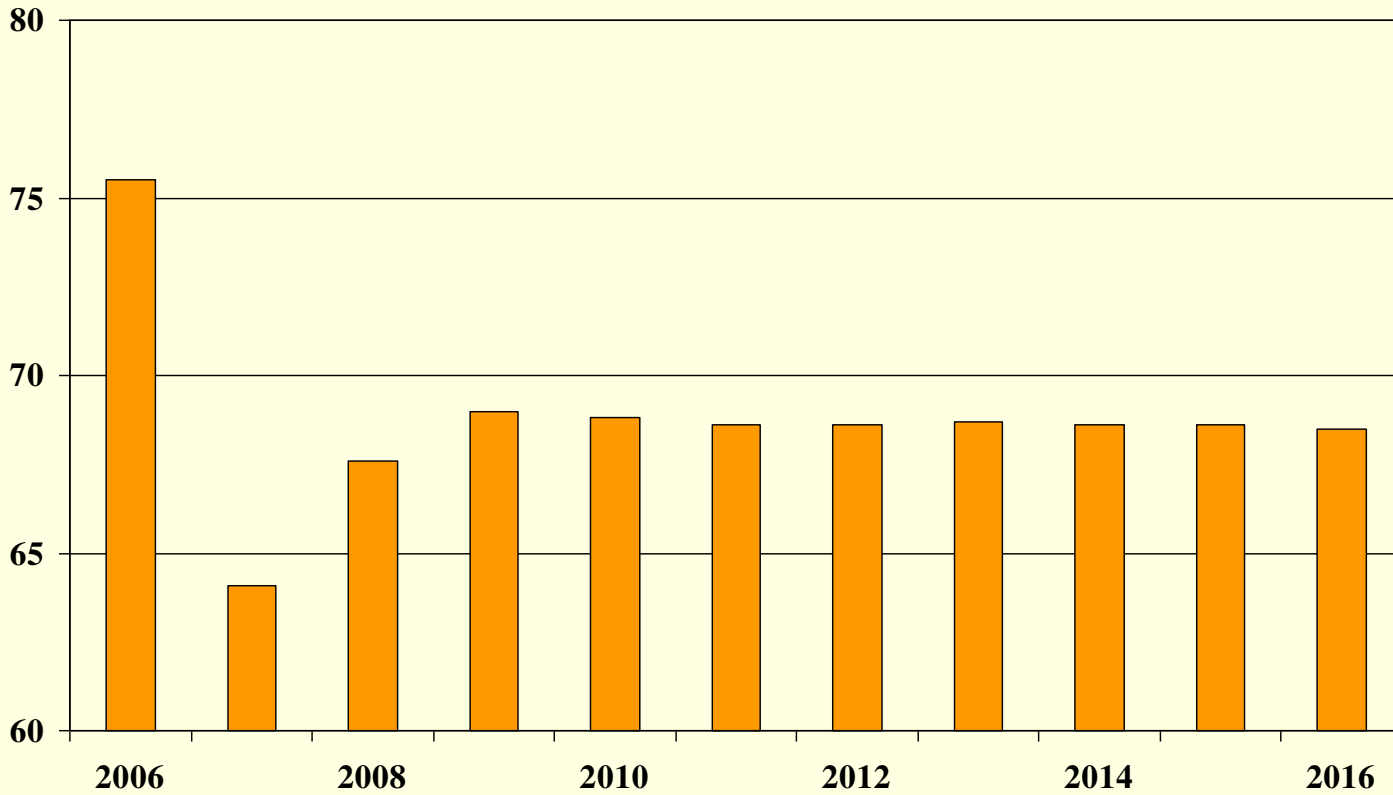


# Projected U.S. Corn and Soybean Prices



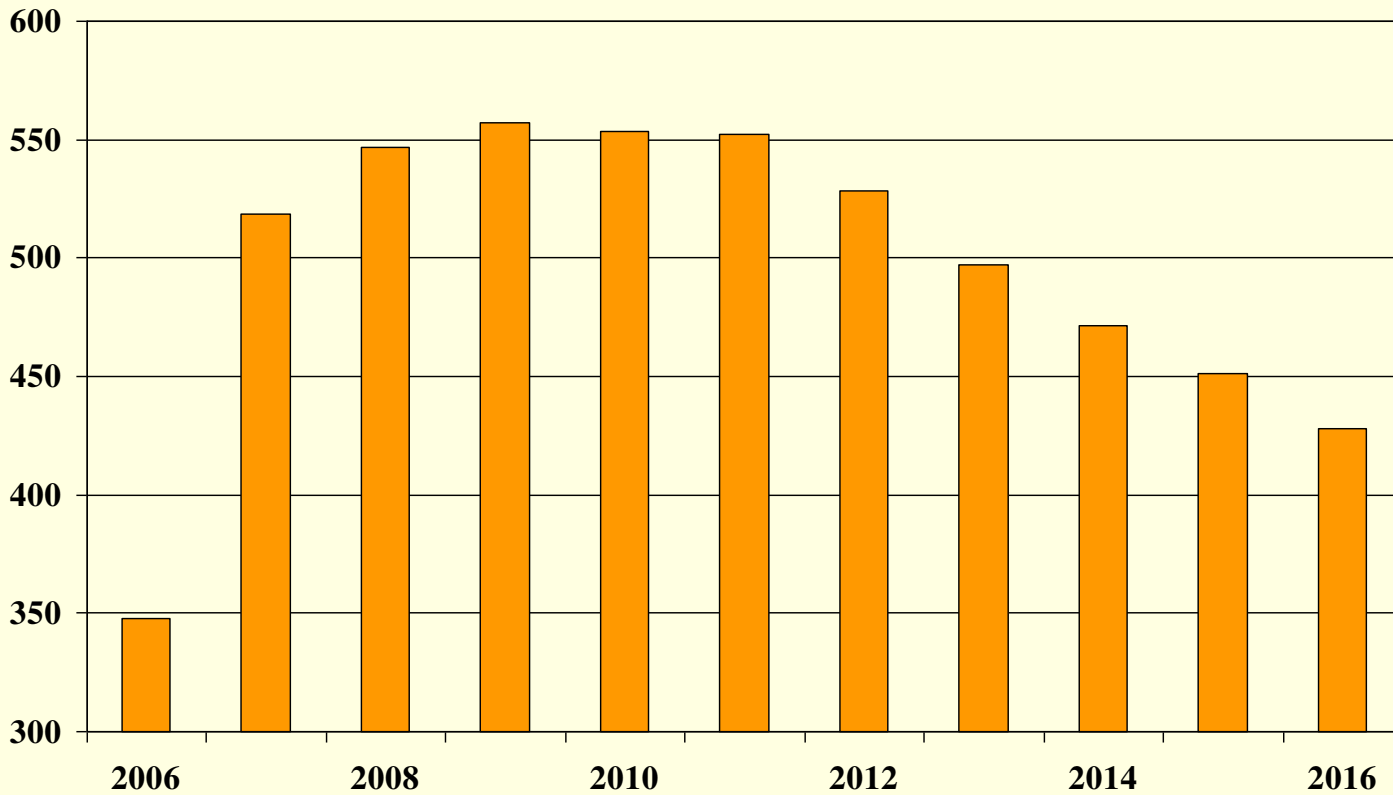
# Projected U.S. Soybean Planted Area

million acres



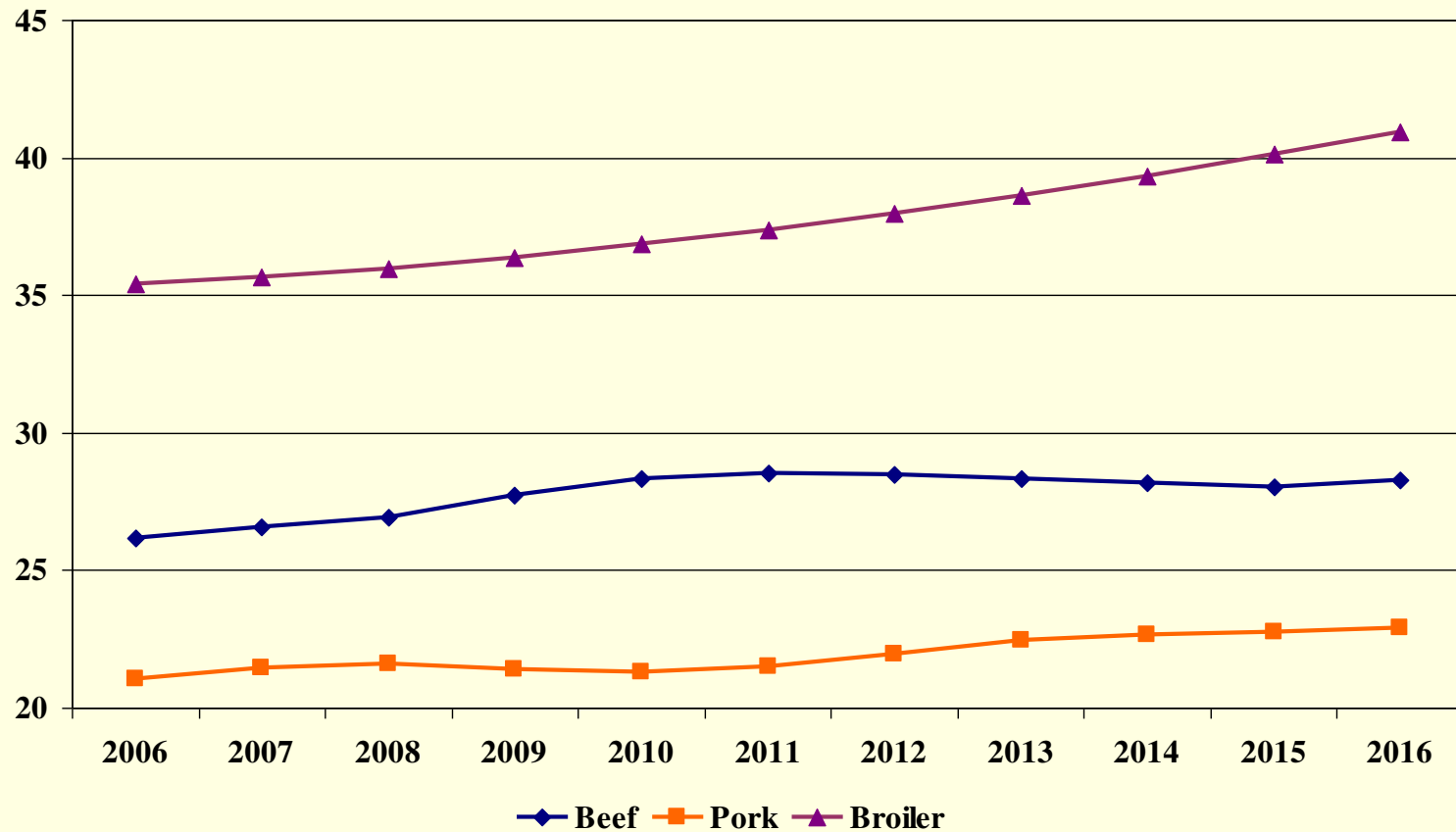
# Projected U.S. Biodiesel Production

million gallons



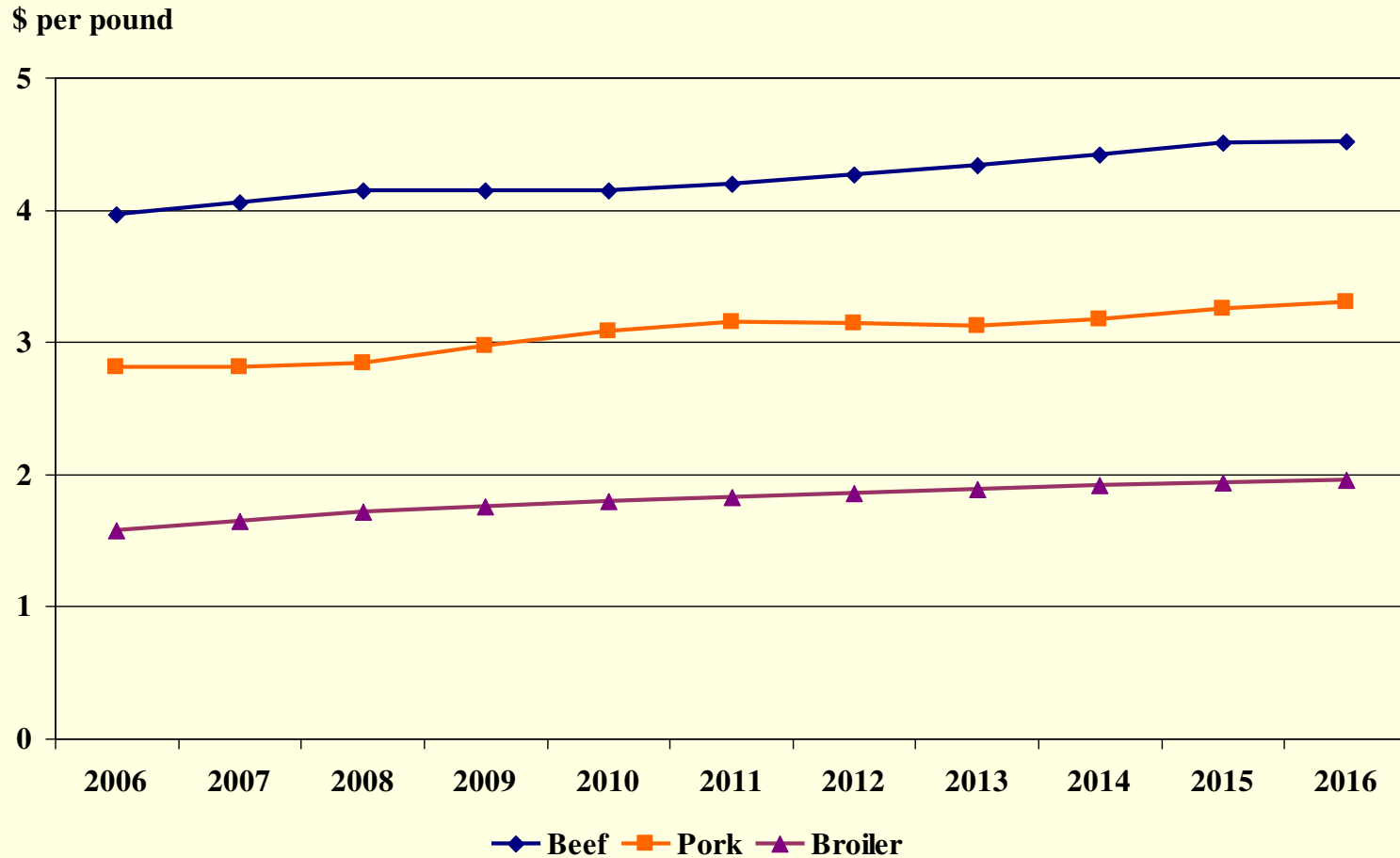
# Projected U.S. Meat Production

billion pounds

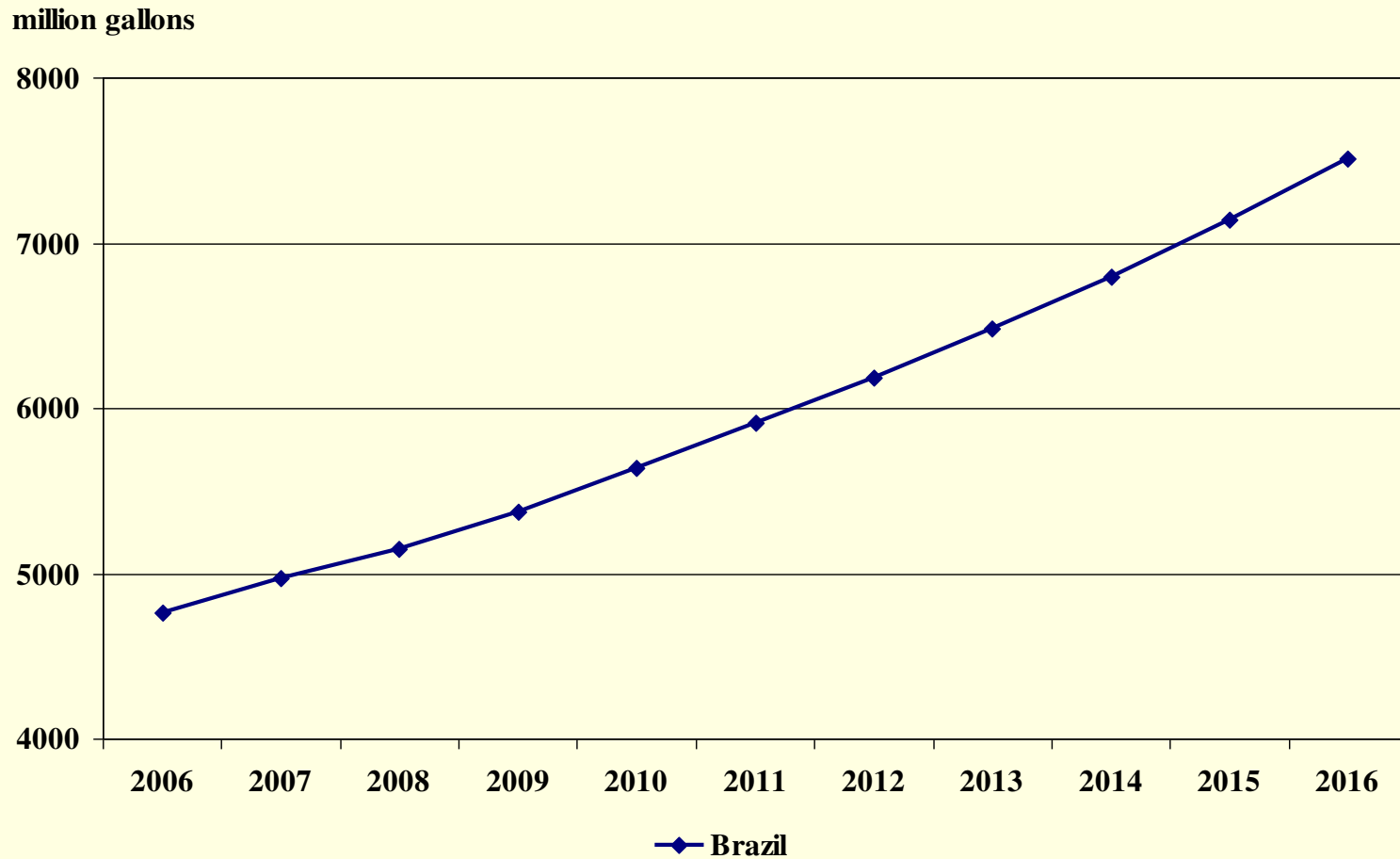




# Projected U.S. Retail Meat Prices

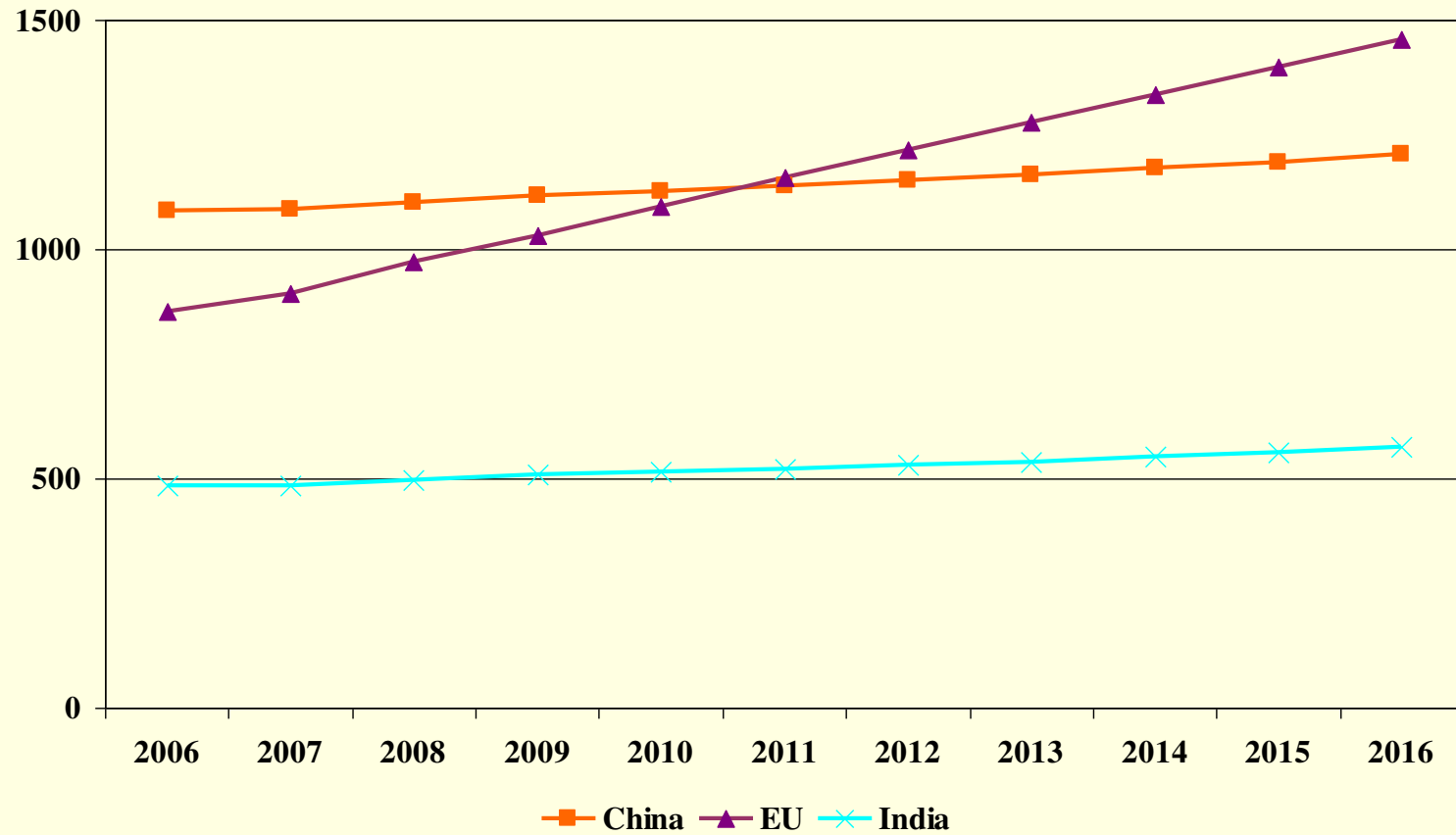


# Projected Brazilian Ethanol Production



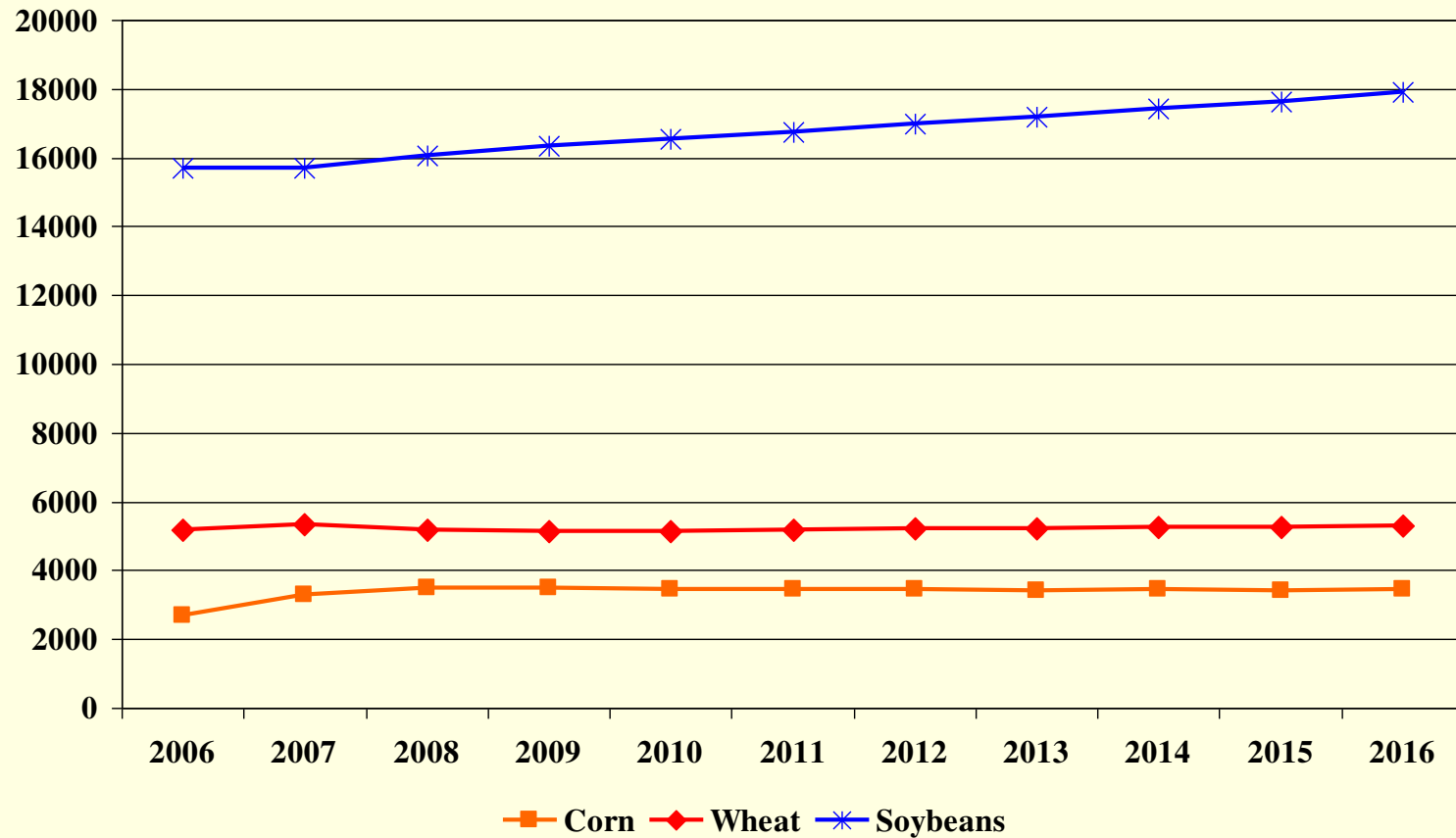
# Projected Ethanol Production

million gallons



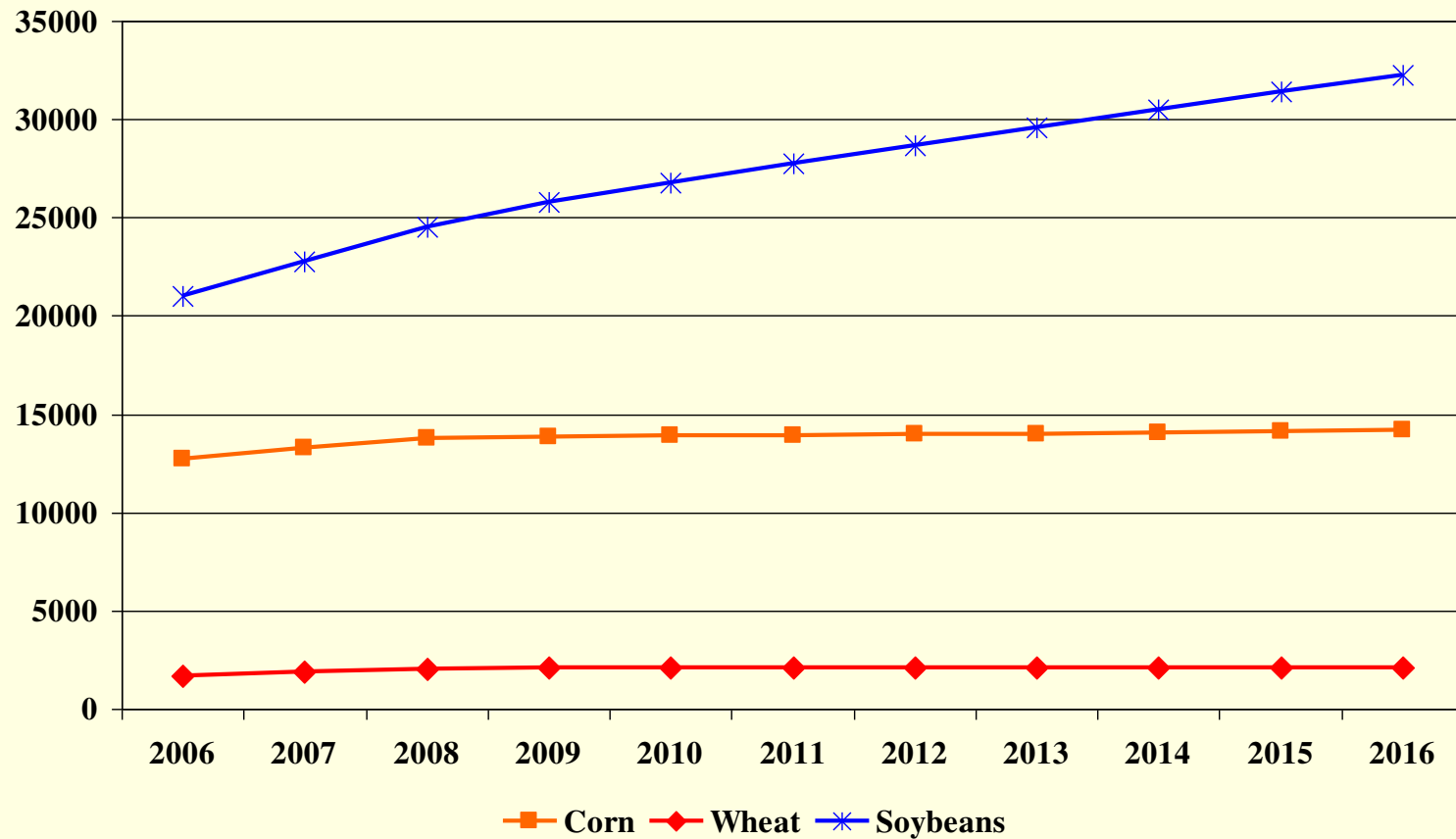
# Projected Argentine Area Harvested

thousand hectares



# Projected Brazilian Area Harvested

thousand hectares



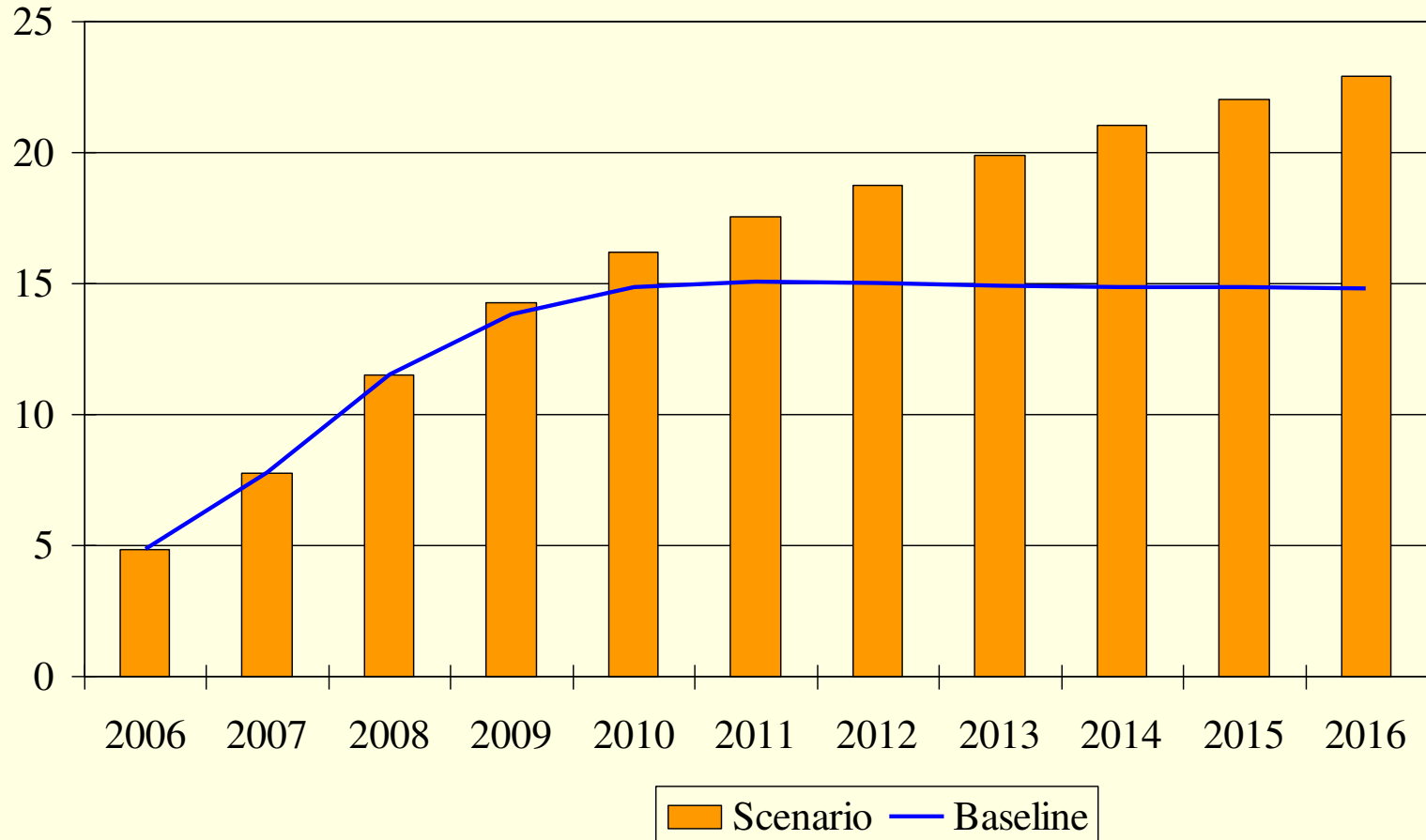
# Impact of Higher Crude Oil Price

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- 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 will eventually encourage increase in demand for the flex-fuel cars

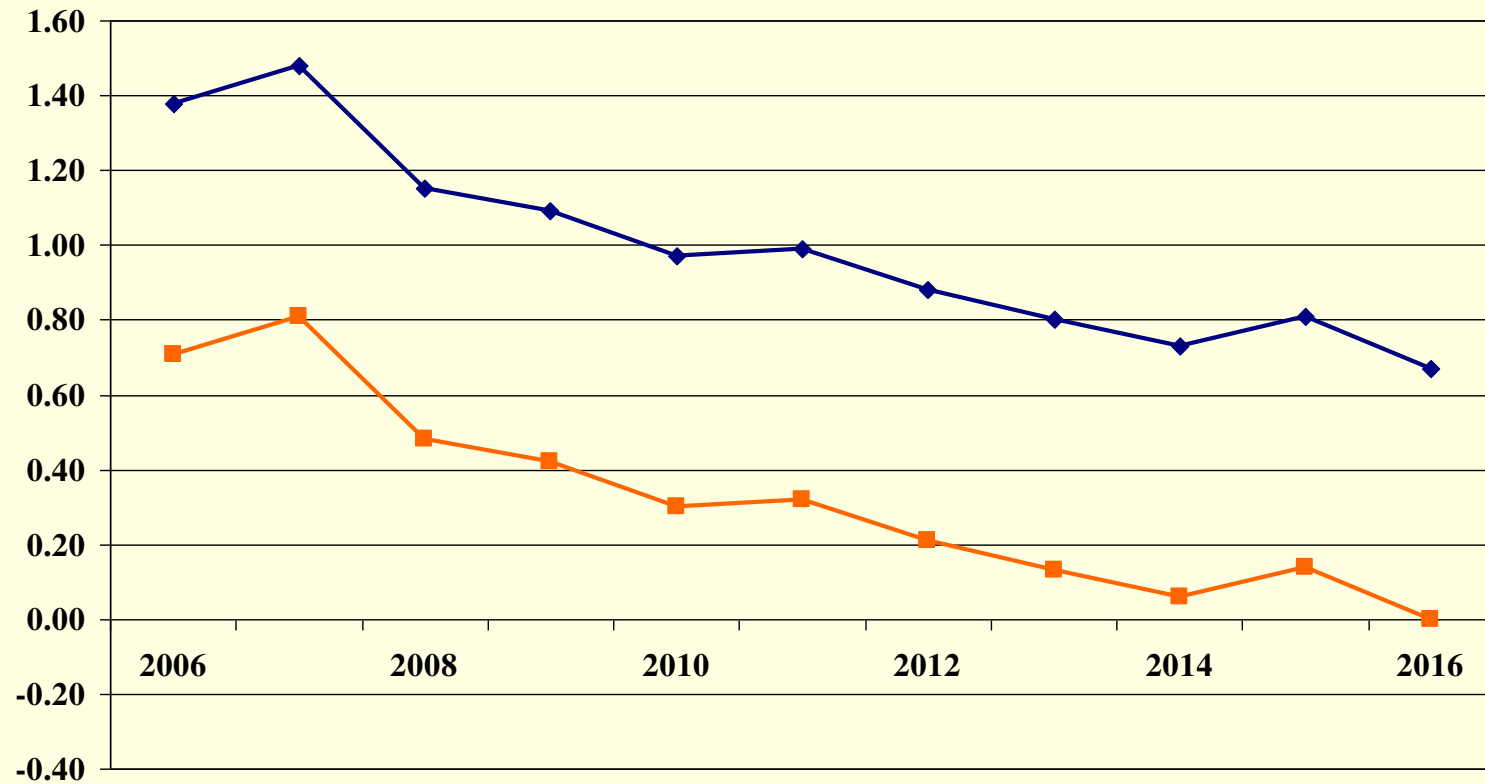
# Projected U.S. Ethanol Production

billion gallons



# Projected U.S. Dry Mill Margins

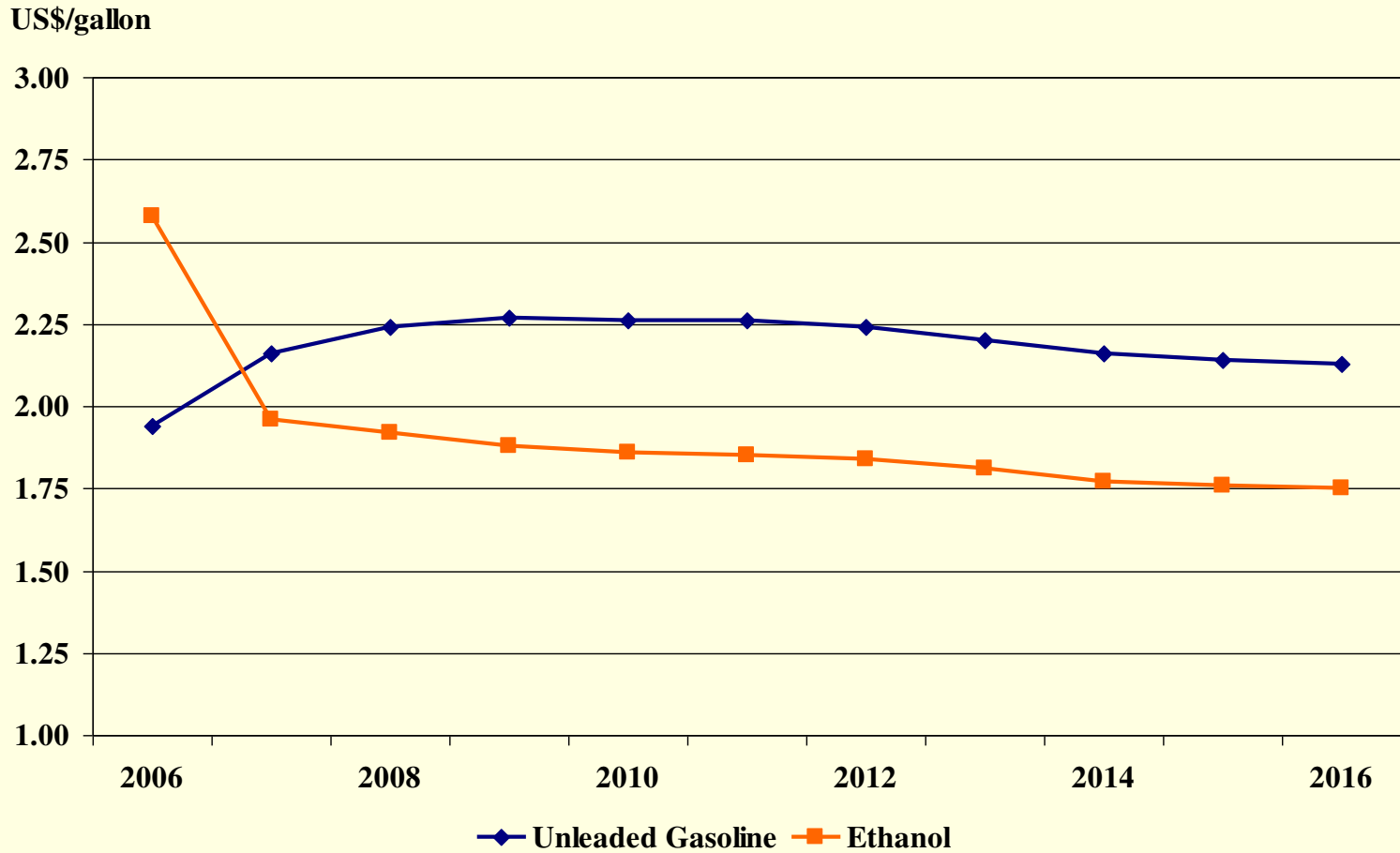
US\$/bushel



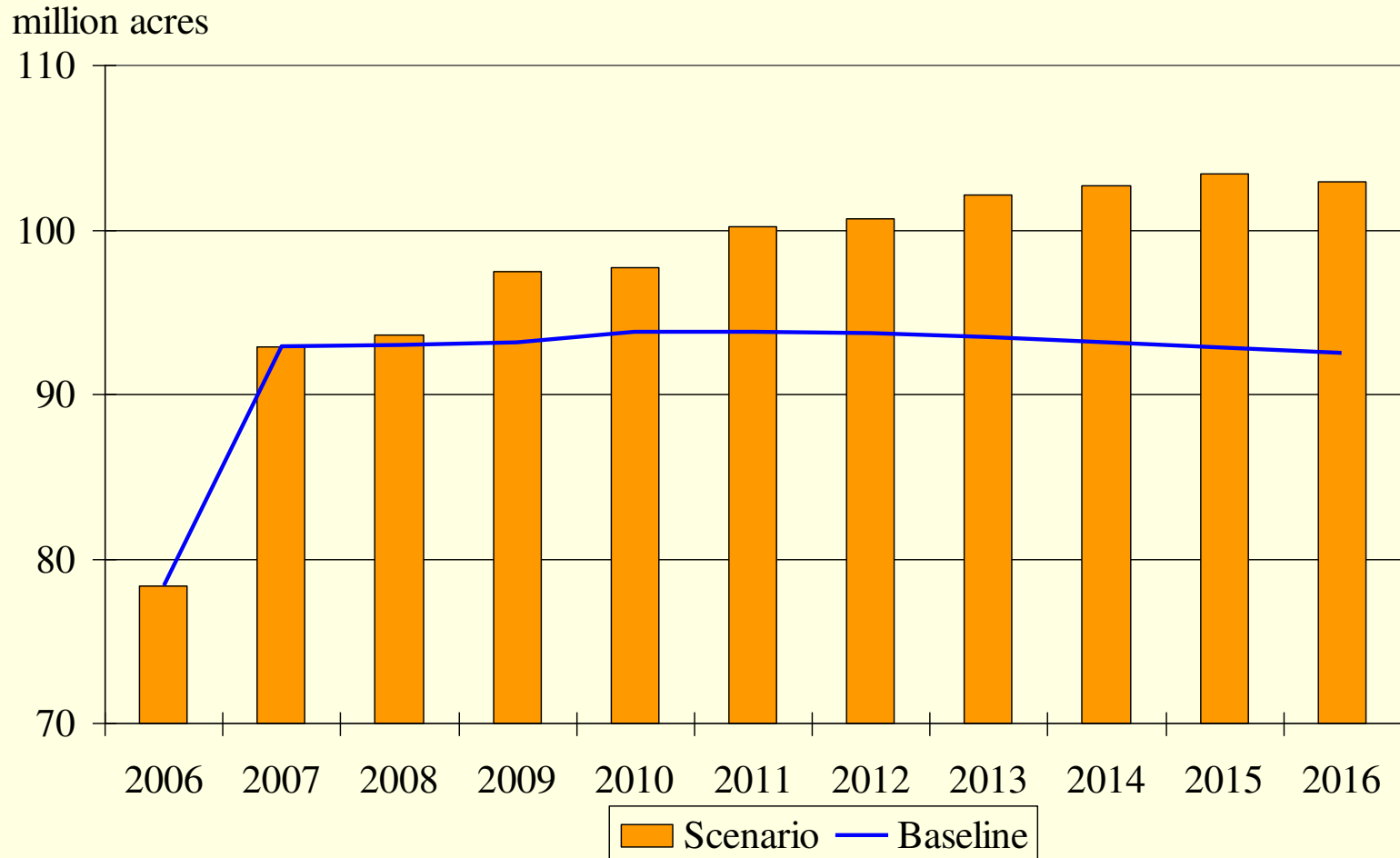
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# Wholesale Gasoline and Ethanol Prices

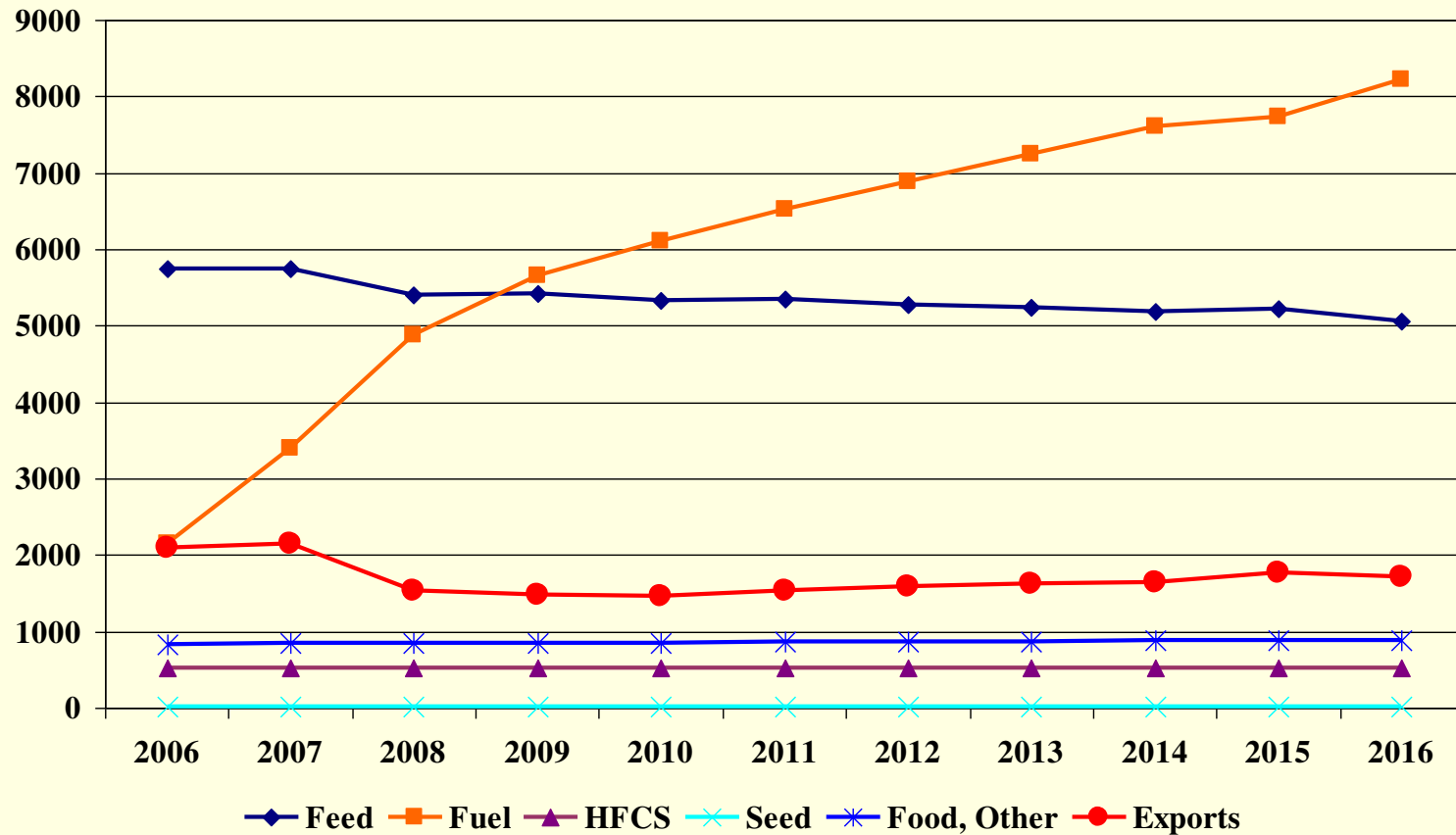


# Projected U.S. Corn Planted Area

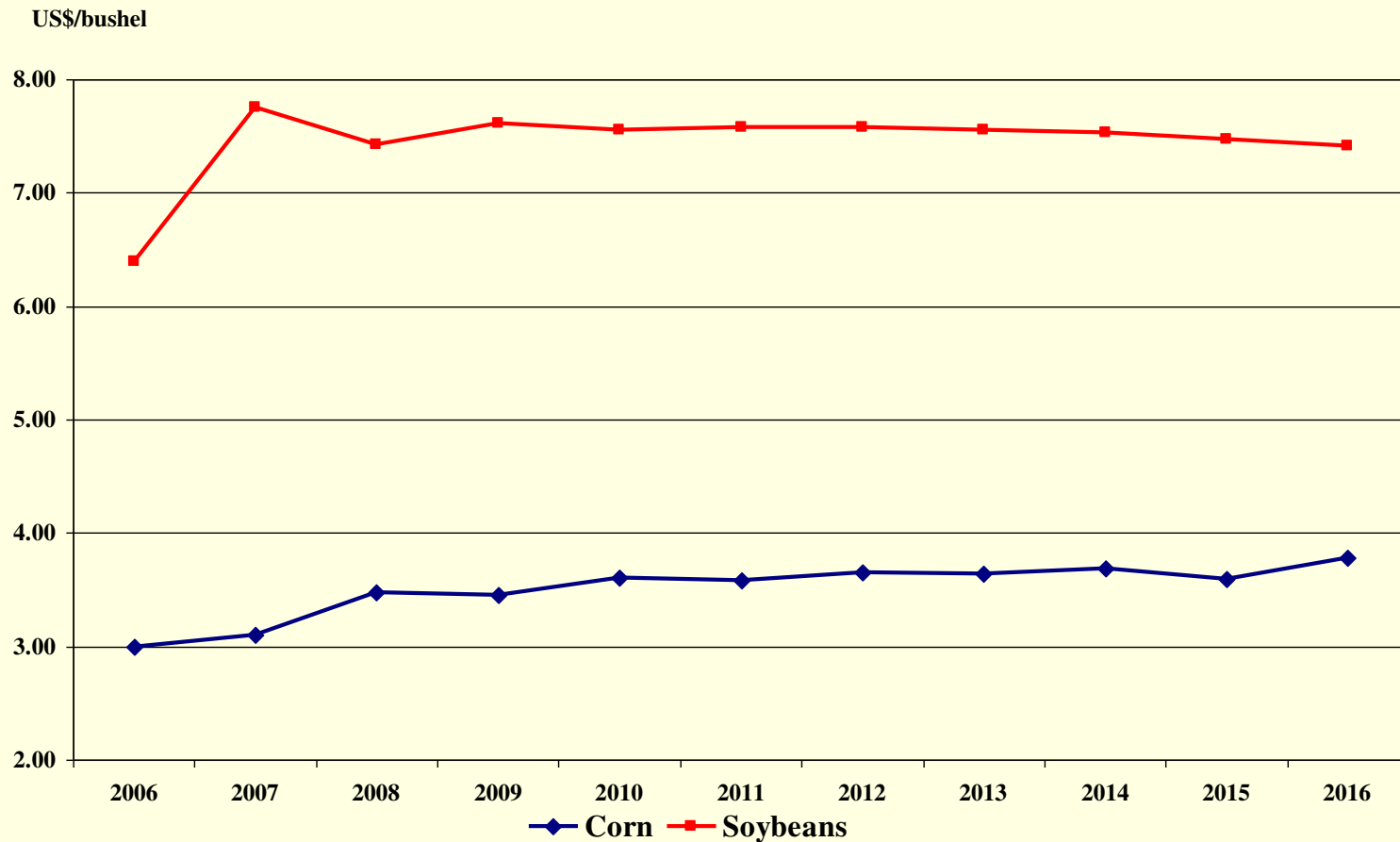


# Projected Utilization of U.S. Corn

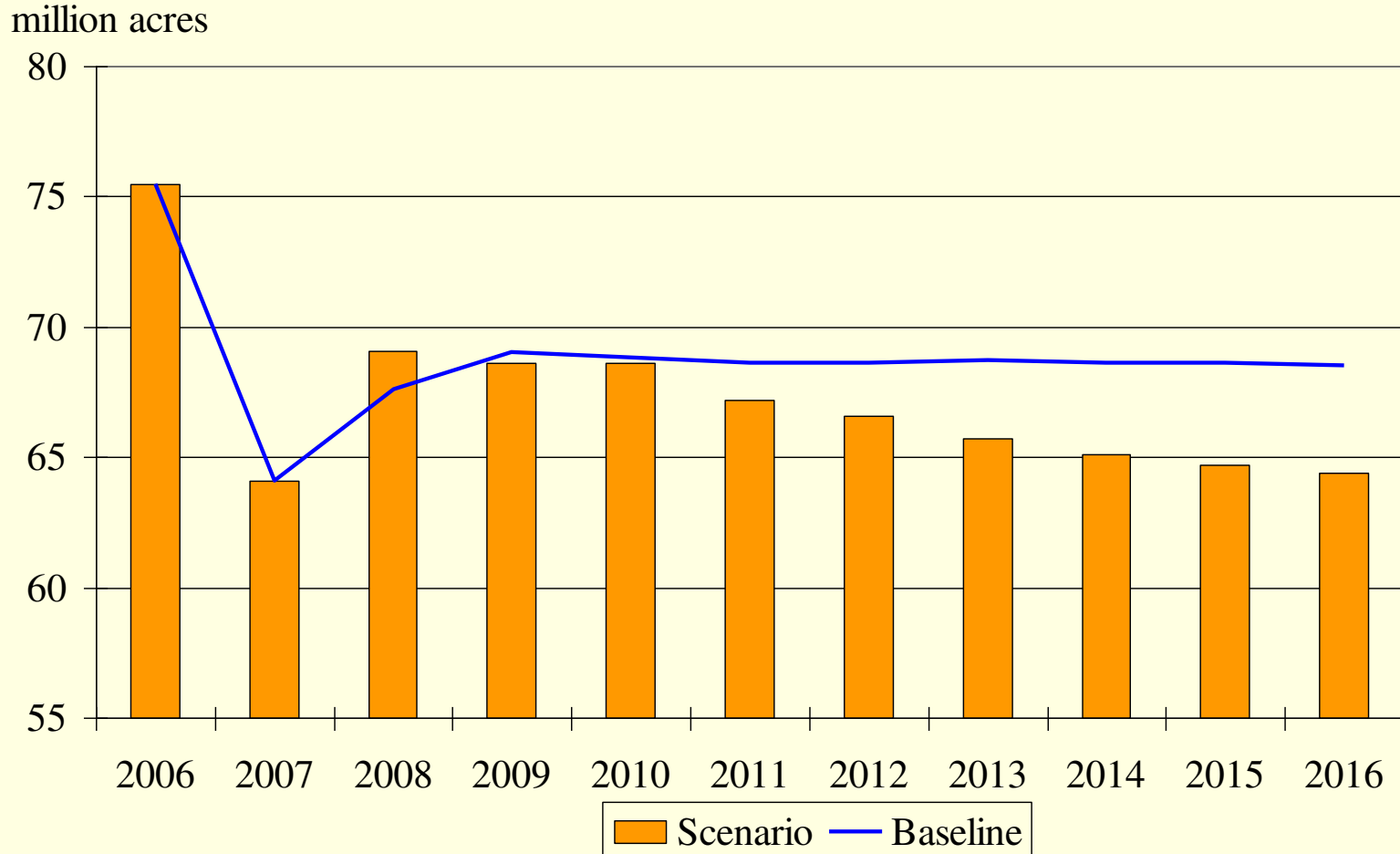
million bushels



# Projected U.S. Corn and Soybean Prices

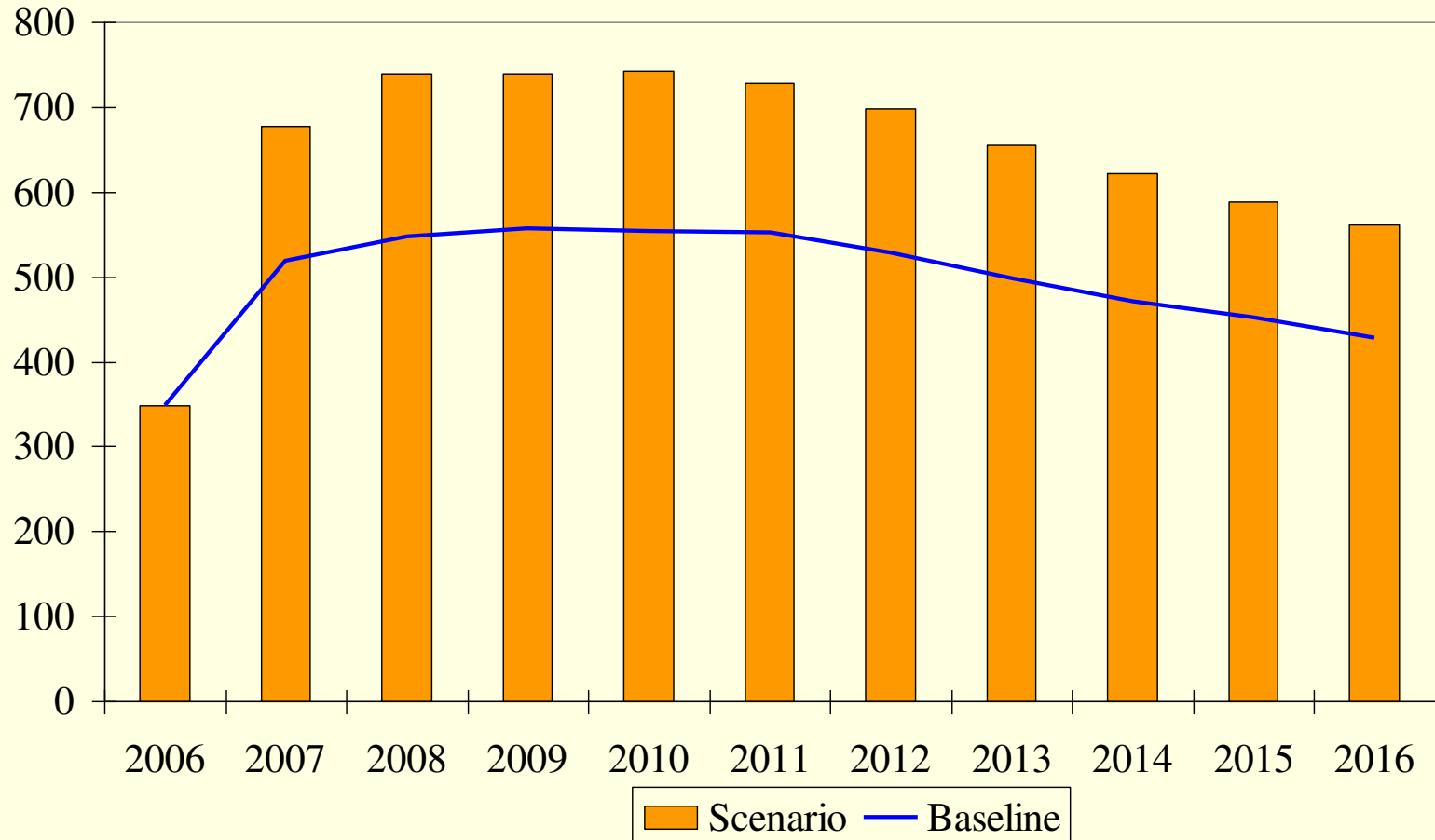


# Projected U.S. Soybean Planted Area



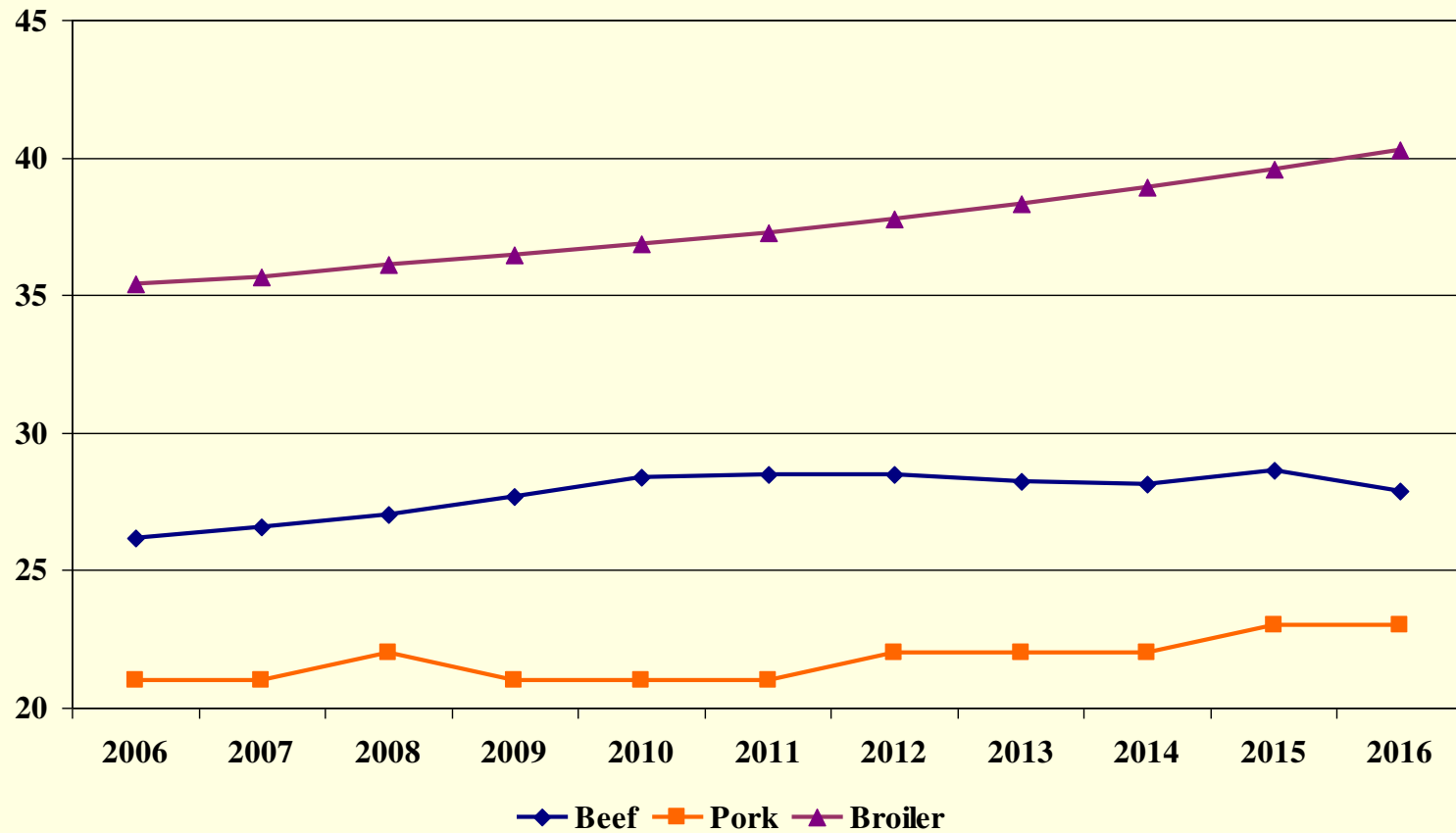
# Projected U.S. Biodiesel Production

million gallons

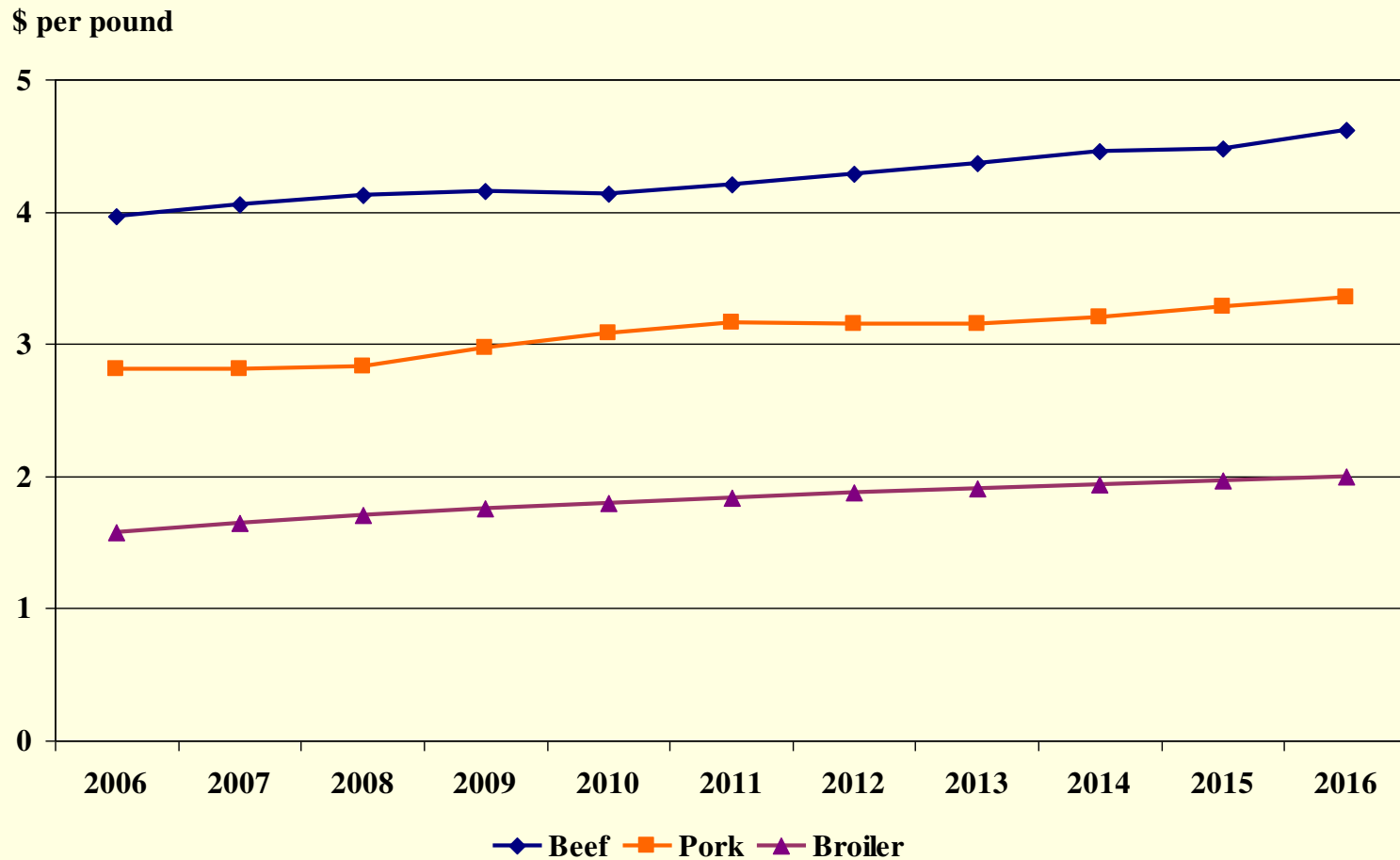


# Projected U.S. Meat Production

billion pounds



# Projected U.S. Retail Meat Prices





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

|                                    | Baseline | Scenario | Percentage Change |
|------------------------------------|----------|----------|-------------------|
| Beef Retail Price<br>(\$/pound)    | 4.52     | 4.62     | 2.2%              |
| Pork Retail Price<br>(\$/pound)    | 3.30     | 3.35     | 1.5%              |
| Broiler Retail Price<br>(\$/pound) | 1.96     | 2.00     | 2.0%              |
| Turkey Retail Price<br>(\$/pound)  | 1.26     | 1.30     | 3.2%              |
| Egg Retail Price<br>(\$/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

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- 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

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- 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 Corn Production Deviations



# Corn, Soybean and Ethanol Markets

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- 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

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- 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%



Thank You