U.S. GRAIN ETHANOL INDUSTRY OUTLOOK

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OVERVIEW

• Current agriculture system
• Resource base
• Major use of cropland
• Major crops—coarse grains, wheat, soybeans, and all hay
• World’s current agricultural problems
• Conclusions
Current Agriculture System

• Large farm size
• Highly capital intensive
• High tech, hybrid and genetically modified seeds, precision farming and variable rate technology, yield mapping, center pivot irrigation systems, etc.
• High yield
• Provide food, fiber, and nonfood for domestic and export markets
• Creates excess production and declining prices
Agriculture Production Index, 1960-2004

Source: FAO/UN
Biomass Feedstocks

• Crops containing:
  Starch--grains, roots, etc.
  Sugar--sugar beets, sugar cane, sweet sorghum, etc.
  Oil--soybeans, rapeseed, peanuts oil, etc.

Energy crops

• Byproducts--molasses, cheese whey, etc.
• Animal fats--tallow, lard, etc.
• Agriculture and forestry residues
• Organic wastes--waste sugar and starch, sorted municipal solid waste, etc.
Resource Base

• **Total land:**
  – Forest
  – Pasture and range
  – Cropland
  – Others
Major Uses of Land, 1997

Million acres

- Miscellaneous land
- Special use
- Forest-use land
- Grassland pasture and Range
- Cropland
- Total

48 States
All States
Major Use of Land, United States, 1959-97

- Cropland
- Grassland pasture & range
- Forest use land
- Special-use areas
- Miscellaneous other land
Major Use of Croplands, 1949-97

- Harvested
- Failed
- Fallowed
- Idled cropland
- Cropland pasture
Major Crops: Area Harvested

Corn
Wheat
Soybeans
All hay
All Hay: Area Harvested and Yield

![Chart showing the area harvested and yield per acre for all hay from 1980 to 2005. The chart includes two lines: one for yield per acre and one for area harvested. The yield per acre line is represented by a purple bar chart, while the area harvested line is represented by a blue line.]
Coarse Grains Yield Per Acre, 1980-2005

Tons per acre
Corn Use, 2005

- Feed, residual: 52%
- Food, seed, industry: 13%
- Exports: 18%
Historical and Projected Ethanol Use

Million gallons

- RFS
- High growth scenario
Historical and Projected Corn Use for Ethanol as % of Total Production

![Graph showing historical and projected corn use for ethanol as a percentage of total production. The graph includes two lines: one for RFS and another for high growth scenario. The percentage values range from 0% to 45% over the years from 1980 to 2016. The graph shows an increase in corn use for ethanol, with the high growth scenario line increasing more rapidly than the RFS line.](image-url)
Corn Used in Ethanol as Share of Corn Production
Acre of Cropland Exported 2001/02-05/06 Average

- Wheat
- Corn
- Soybeans
- Cotton
- Total

Million acres
Project U.S. Trade Share, Major Commodities, 2004-2015

- Corn
- Sorghum
- Barley
- Wheat
- Soybeans
- Cotton
Net Returns Over Variable Costs

(includes marketing loan benefits)

Dollars per acre

2001  2002  2003  2004  2005

Wheat  Corn  Cotton  Soybeans  Rice
Net Returns Over Variable Costs, 2001/02-05/06 Average
(includes marketing loan benefits)
World’s Current Agricultural Problems

• Growing subsidy, increasing production incentives, and trade barriers
• Major R&DD breakthrough leading to excess production
• Exceptional production growth in developing countries adds pressure on production incentives
• Stagnated food demand in mature markets
• Aggressive competition in exports market
Agriculture Beyond Food

• **Food:**
  – Products differentiation
  – Boutique commodities
  – High-value products, organic food, and GM free food products

• **Nonfood:**
  – Biobased products, biofuels, solvents, adhesives, plastics, hydraulic fluid, pharmaceutical, panels, foam, light weight cement, nutraceutical, etc.
Conclusions

• Currently, corn is the lowest feedstock for production of ethanol in the U.S.
• Corn use for production of ethanol will continue to increase.
• Existing cropland and cropland idled by Government programs (CRP) could be used to grow corn and other feedstock for production of biofuels, biopower and biobased products.