



GLOBAL INSIGHT

Winners and Losers of Increased Renewable Fuel Mandates: Agricultural Producers and U.S. Consumers

Global Insight, Inc.

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Acknowledgements

- This study was produced at the request of API to assess the impact of increased renewable fuel (RF) mandate levels on agricultural producers, agricultural commodity markets, and U.S. consumers.
- Global Insight produced the forecast scenarios using its models of U.S. and world agriculture; the study was managed by Stewart Ramsey.
- Since the initiation of this project, commodity prices have continued to increase well beyond original forecast projections. The result of these higher prices is expected to be a U.S. corn planting level for 2007 above the level included in this report. However, this does not change the validity of the long-run estimates presented herein.

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Executive Summary: Study Conclusions

- This study examined the economic impacts of 16- and 20-billion-gallon renewable fuel (RF) mandate levels in 2016.
- Increases in RF mandate levels above the baseline (Energy Policy Act levels set in 2005) would result in rising food costs for U.S. consumers. As the mandate level moves incrementally higher, the marginal impacts on consumer food costs become more pronounced.
- While net farm income to the agriculture sector as a whole would increase, the impact on agricultural enterprises of higher RF mandates would be skewed. Livestock profits, particularly cattle and swine, would be reduced dramatically, while corn farmers would accrue large gains. Corn farmers are not representative of all farmers, geographically or otherwise.
- Agricultural export volumes would be significantly reduced relative to the baseline at the higher RF mandate levels.
- Increased RF mandate levels above the baseline would lead to significantly higher fertilizer use.
- Rising commodity price levels due to increased RF mandates would result in environmentally sensitive land being taken out of the Conservation Reserve Program and put into crop production.
- As evidenced in this study, the concerns over “fuel versus food” are valid and increased RF mandates would result in disproportionately large increases in U.S. food costs.
- While direct government payments to farmers are reduced by higher commodity prices, ethanol support costs of \$0.51 per gallon will cost the Federal treasury more than twice to three times the savings in farm programs - under the scenarios examined in this report.
- Though beyond the scope of this study, given the large impacts on U.S. agricultural markets, grain and livestock food costs on world markets, and in particular in the developing world, would also move higher. See for example, “How Biofuels Could Starve the Poor” in the May/June 2007 edition of *Foreign Affairs*.

Executive Summary: Introduction

- The Energy Policy Act of 2005 passed by Congress calls for a minimum of 7.5 billion gallons (bg) of Renewable Fuels (RF) to be consumed by 2012.
- Significant progress is being made toward the 7.5-bg mandate and policy makers are now considering future legislation with potentially higher RF mandates.
- Continued growth in domestic corn-based ethanol production and strong corn grain exports due to short crops in foreign production areas will likely lead to a significant reduction in U.S. corn inventories by the end of the 2006/07 market year, and relatively strong corn prices. The stock-to-use ratio for corn hovers around 5%, a historically low level.
- Increased RF mandates to the levels considered in this report would maintain pressure on the corn stock-to-use ratio, thereby increasing the likelihood of additional volatility in the agricultural commodity markets.
- Only in the past decade has the size of the RF industry been large enough to create significant disruptions to traditional food production channels.
- Today, many stakeholders, including livestock producers, food processors, environmental organizations, and international relief organizations, have expressed concern over the extent to which foodstuff is being combusted as transportation fuel, and the long-run sustainability of this activity.
- This study uses Global Insight's model of U.S. and world agriculture to assess the likely impacts of larger RF mandates on U.S. agricultural enterprises and consumer food prices. The RF mandate levels studied here call for 16 bg and 20 bg of renewable fuel consumption by 2016, met primarily through increased corn-based ethanol production.

Executive Summary: Study Premises

- The Global Insight's model of U.S. and world agriculture used in this analysis simultaneously solves for the equilibrium between supply and demand for all major agricultural commodities, including detailed responses in the domestic livestock sector and reduced-form responses in the export market.
- Two scenarios are studied in this report: a 16- and 20-billion-gallon renewable fuel level by 2016. These targets are met primarily through increased corn-based ethanol production.
- Baseline ethanol consumption satisfies the 2012 mandate specified in EPAAct2005, and grows ethanol consumption at the rate of gasoline demand growth from 2012 through 2016, as forecast by the EIA.
- The baseline used in this analysis was developed using Global Insight's model of U.S. agriculture and is very similar to and consistent with the USDA baseline with respect to yield assumptions for corn and soybeans.
- As well, both baselines assume similar productivity growth rates in ethanol, with USDA's level reaching 2.76 gallons of ethanol per bushel of corn in 2016, and Global Insight's rising to 2.81.
- Ethanol imports are assumed to reach 7% of total ethanol consumption in each of the scenarios.
- Cellulosic biofuel production has not been successfully demonstrated on a commercial scale and, according to many analysts, will not be commercially viable until the later part of the next decade, if not later. In this study, it is assumed to contribute 250 million gallons annually over the study period in all scenarios, similar to the Department of Energy's AEO 2007 forecast.
- Biodiesel is a much smaller contributor to the U.S. renewable fuels sector and struggles with high production costs, primarily the cost of the feedstock – vegetable oil. Its production is assumed to reach 300 million gallons by the 2008 calendar year, with the majority being derived from soybean oil. The biodiesel production path was held constant across all scenarios due to the uncertainty of future production levels.
- All farm program support levels were held constant at today's level throughout the projection period and across scenarios. These parameters included loan rates, target prices, and CRP rental rates.
- The \$0.51 Volumetric Ethanol Excise Tax Credit or VEETC and the \$0.54 per gallon tariff on ethanol imports above quota levels are assumed to remain in place throughout the study period and across all scenarios.
- Macroeconomic assumptions with respect to interest rates and consumer income are held constant across all scenarios as well as are energy and fertilizer prices.
- Results are presented as level or percentage change from baseline levels.

Executive Summary: Impacts on Land Use

- Even with continued growth in per-acre productivity for corn, significant increases in acreage devoted to corn would be needed to meet renewable fuel mandates above baseline levels.
- Acreage of other crops would decline as additional corn acres are brought into production.
- As well, environmentally sensitive Conservation Reserve Program land would decrease 7% under a 16-bg mandate and 11% under a 20-bg mandate relative to baseline levels as grain price increases draw these acres out of retirement.
- Increased commodity prices result in federal agricultural program savings of \$1.8 billion and \$2.1 billion annually for the 16 bg and 20 bg mandates, respectively, compared to baseline levels. These savings compare with an increase in federal budget liability of \$4.0 billion and \$6.1 billion, respectively, due to the \$0.51 per gallon volumetric ethanol excise tax credit (VEETC).

U.S. Planted Area Change

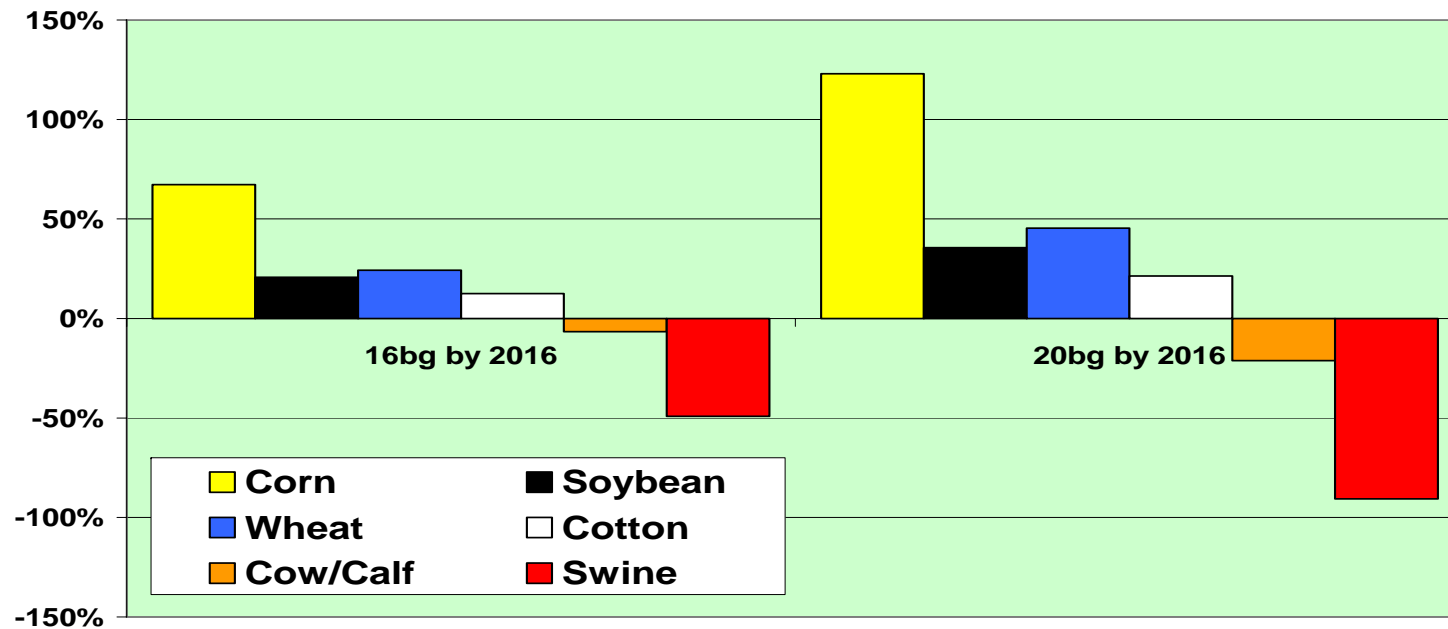
	Million Acres			Percent Change From Base	
	Base 2016 Level	16bg Change	20bg Change	16bg	20bg
Corn	83.3	10.5	16.5	12.6%	19.8%
Soybeans	71.8	-4.9	-6.6	-6.8%	-9.2%
Wheat	55.9	-0.7	-1.3	-1.2%	-2.4%
Cotton	13.8	-0.2	-0.4	-1.6%	-3.0%
Other Cropland	82.3	-2.4	-4.5	-3.0%	-5.5%
Conservation Reserve	32.3	-2.3	-3.6	-7.0%	-11.3%

Executive Summary: Impacts on Crop and Livestock Margins

- Corn farms benefit dramatically from increased U.S. renewable fuel mandates above baseline levels.
- Significant margin declines occur in the livestock sector due to rising costs of feed rations, particularly in swine and cow/calf operations.
- Corn farms are not representative of all U.S. crop farms – the top-ten corn states represent roughly 4/5 of all corn acreage, but represent less than 1/3 of the total value of all crop production. These same corn states represent less than 1/3 of the value of all livestock produced.
- Increasing renewable fuels mandate levels above baseline levels leads to a skewed shift in farm income.

Change in Margins Above Variable Costs

(Change from baseline)

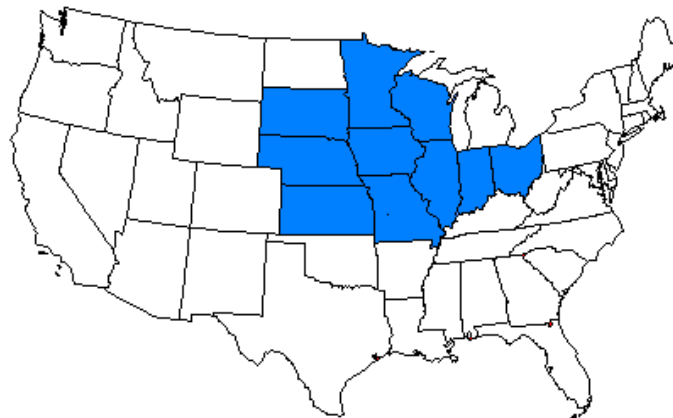


** Margin = total market revenue and government payments less all variable costs.

Executive Summary: Benefits to Corn Producing States

- Corn farms in top-producing states benefit dramatically from increased RF mandates as corn prices rise.
- The top-10 corn producing states, illustrated below, represent 79% of total corn area and these farms would conservatively reap 58% of all income benefit to U.S. agriculture from higher RF mandate levels.
- Increased RF mandates cause margins of other crops (e.g., wheat, soybeans) to rise due to lower acreage and lower production as additional corn competes for these acres, but changes in gross receipts of these crops are modest compared with corn. Under a 16-bg RF mandate, receipts from all crops except corn increase \$1.8 billion or 1.6%; while corn receipts increase \$11.2 billion or 45%, relative to the baseline. Under a 20-bg RF mandate receipts from all crops except corn increase \$3.7 billion or 3.3%; while corn receipts increase \$20.6 billion or 82%, relative to the baseline.
- According to the 2002 Census of Agriculture (the latest available), the number of farms producing crops for sale is 1.36 million; while the number producing corn for grain is 0.349 million.

Top 10 Corn Producing States

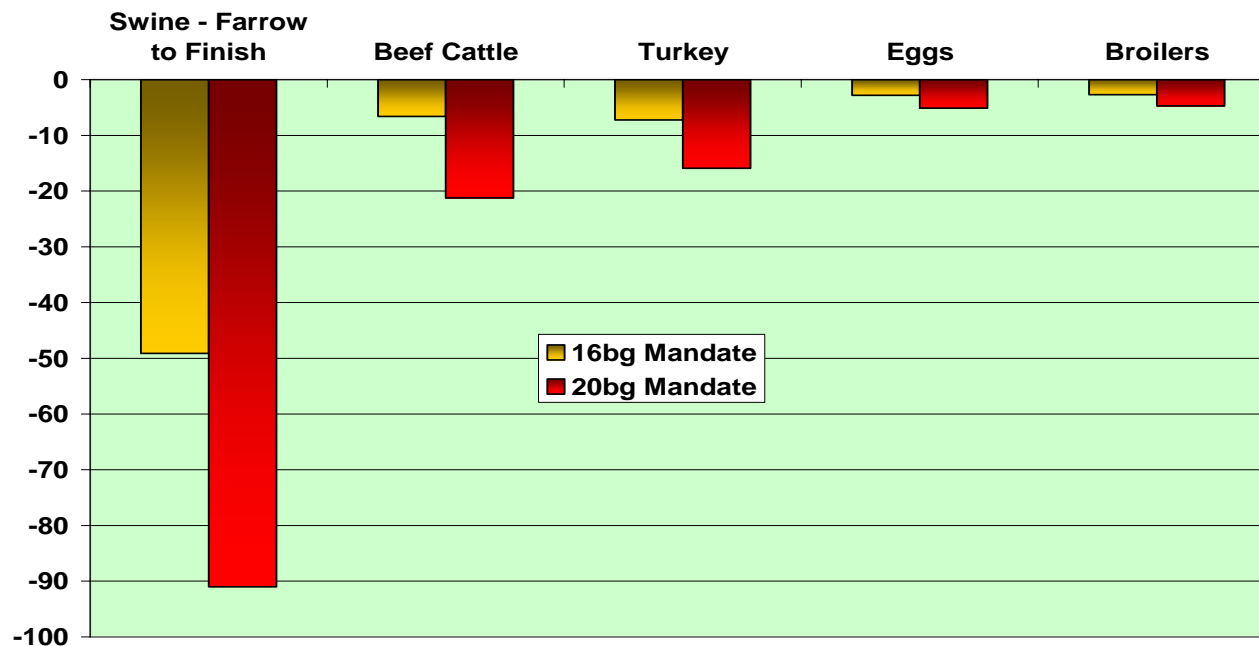


Executive Summary: Impacts on the Livestock Sector

- Livestock margins are negatively impacted as renewable fuel mandates are increased above baseline levels.
- The swine sector has significant challenges adapting diets to accommodate sizable increases in ethanol by-product feeds. Hence, feed costs in the swine sector rise significantly and margins fall due to higher corn costs.

Impact of Higher Renewable Fuel Mandates on Livestock Margins

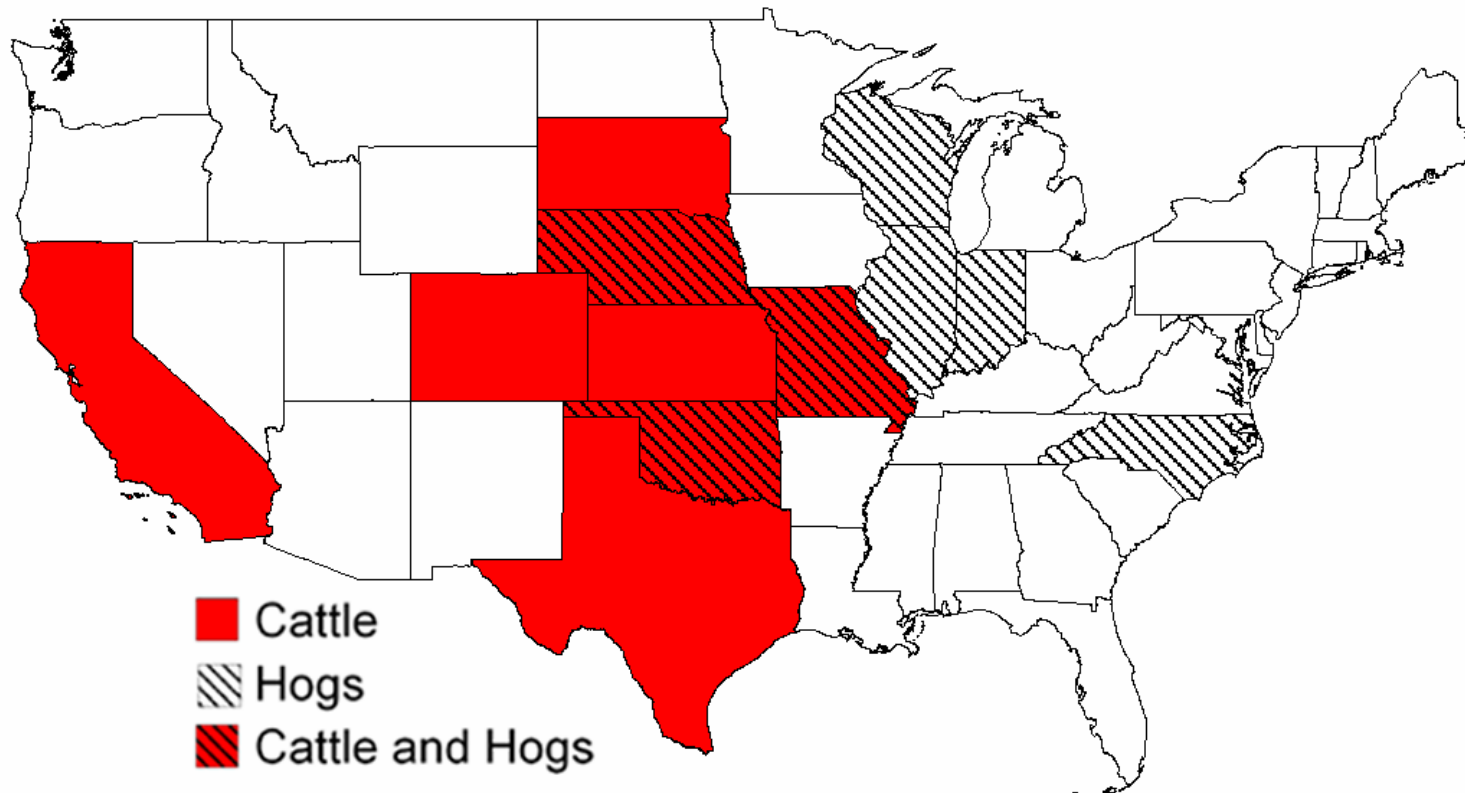
(Percent Change from base in 2016)



** Margin = total market revenue and government payments less all variable costs.

Executive Summary: Costs to Livestock States

- Increased renewable fuels mandates above baseline levels will cause cattle and hog producers in top-producing states to realize lower margins as feed costs rise. Major impacted states are illustrated below.

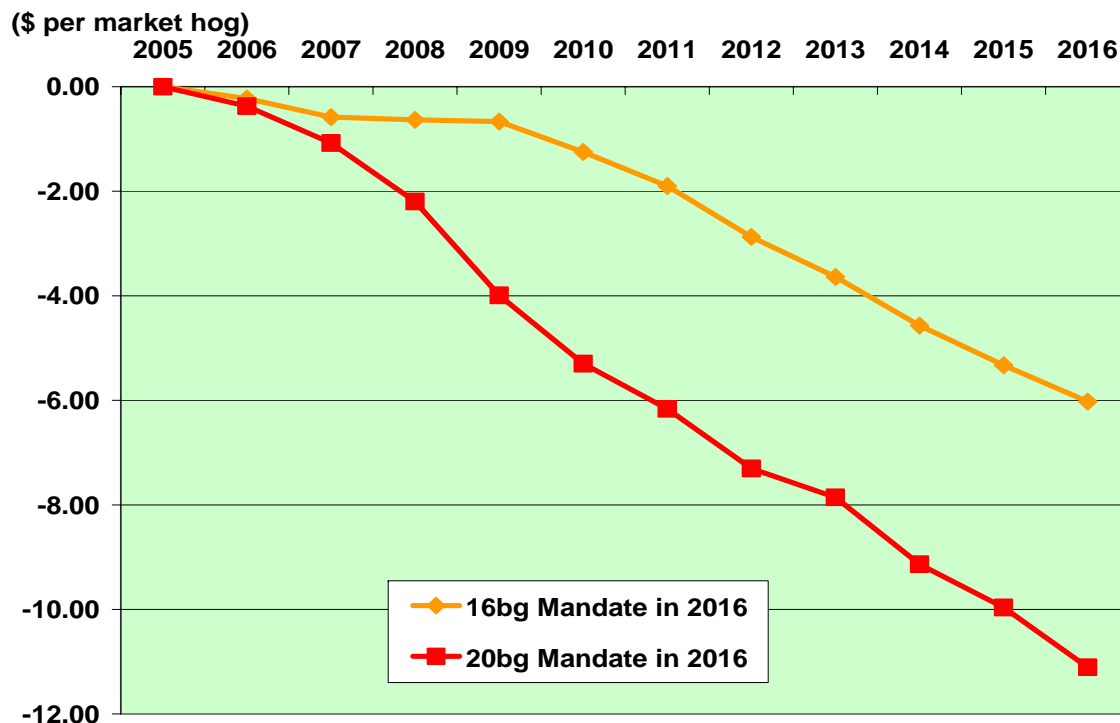


** Margin = total market revenue and government payments less all variable costs.

Executive Summary: Impacts on Margins of Pork Producers

- Increases in the renewable fuel mandate reduce the return to pork producers relative to baseline levels.
- The rising feed cost associated with increased renewable fuel mandates above baseline levels are the cause of reduced margins. Species specific limits on distillers dried grain use in feed rations causes pork producers to pay more for feed than other livestock types.
- Poor margins cause increased consolidation among pork producers throughout the forecast horizon, not allowing for a recovery in margins.

Losses Incurred by Pork Producers Relative to Base Case

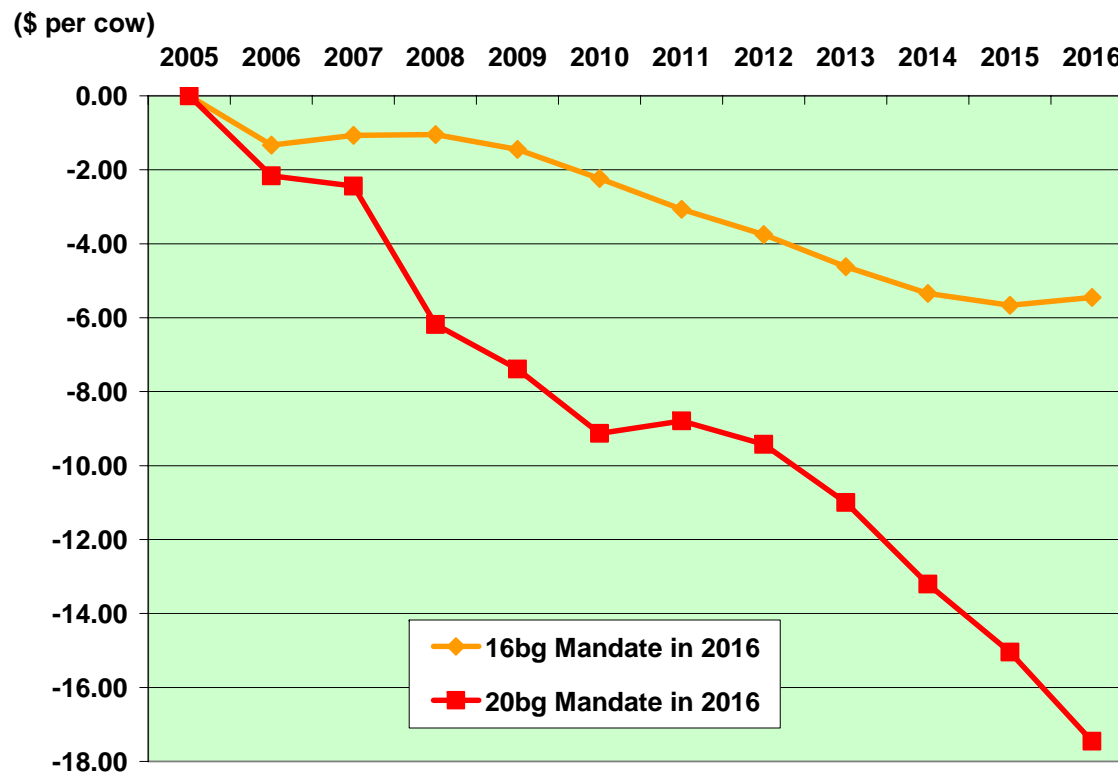


** Margin = total market revenue and government payments less all variable costs.

Executive Summary: Impacts on Margins of Cow/Calf Operations

- Increases in the renewable fuel mandate reduce the return to beef cattle producers relative to baseline levels.
- The long biological cycle and large fixed cost in breeding inventories will compound cow/calf losses associated with increased renewable fuel mandates above baseline levels.

Losses Incurred by Cow/Calf Operators Relative to Base Case



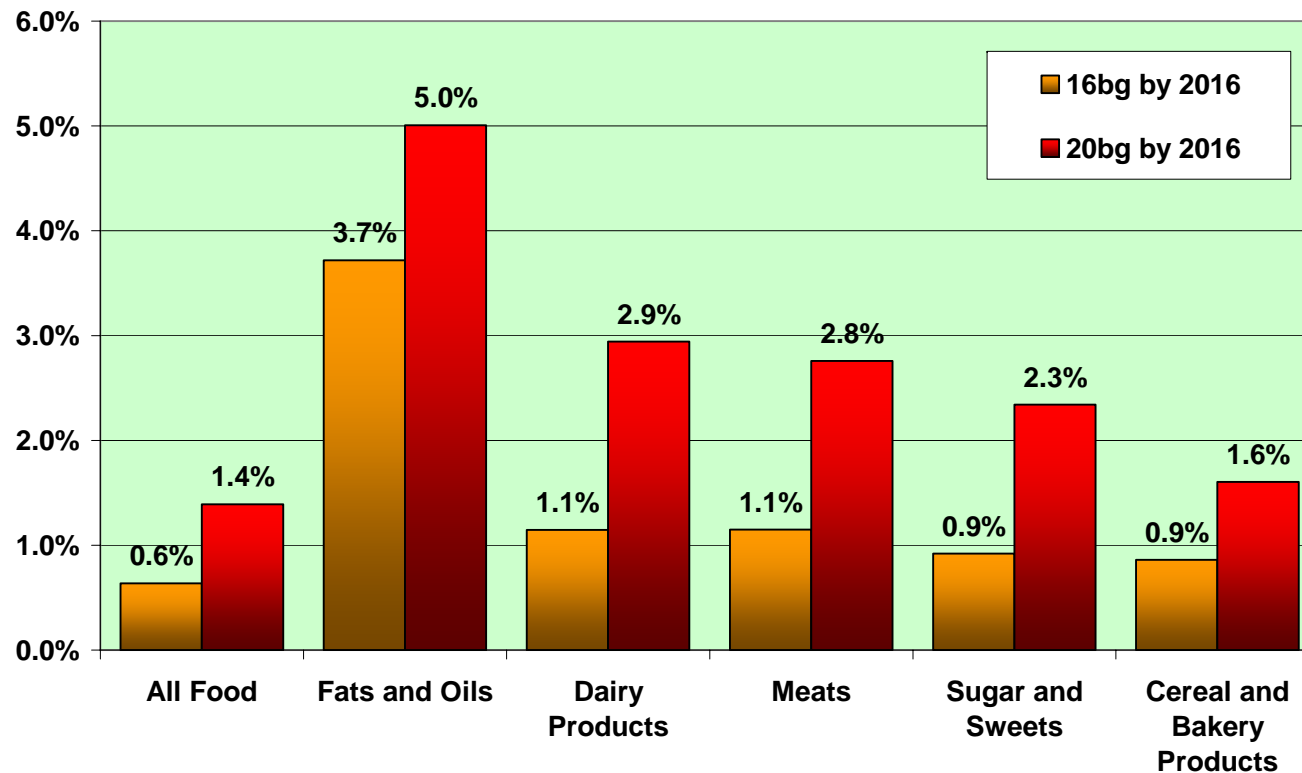
** Margin = total market revenue and government payments less all variable costs.

Executive Summary: Impacts on Consumer Food Costs

- An increase in the renewable fuels target above baseline levels will result in higher consumer food costs.
- The impacts on vegetable oils, livestock products, and dairy food categories are the most pronounced.

Consumer Price Impact of Larger Renewable Fuel Mandates

(CPI Change from base in 2016)

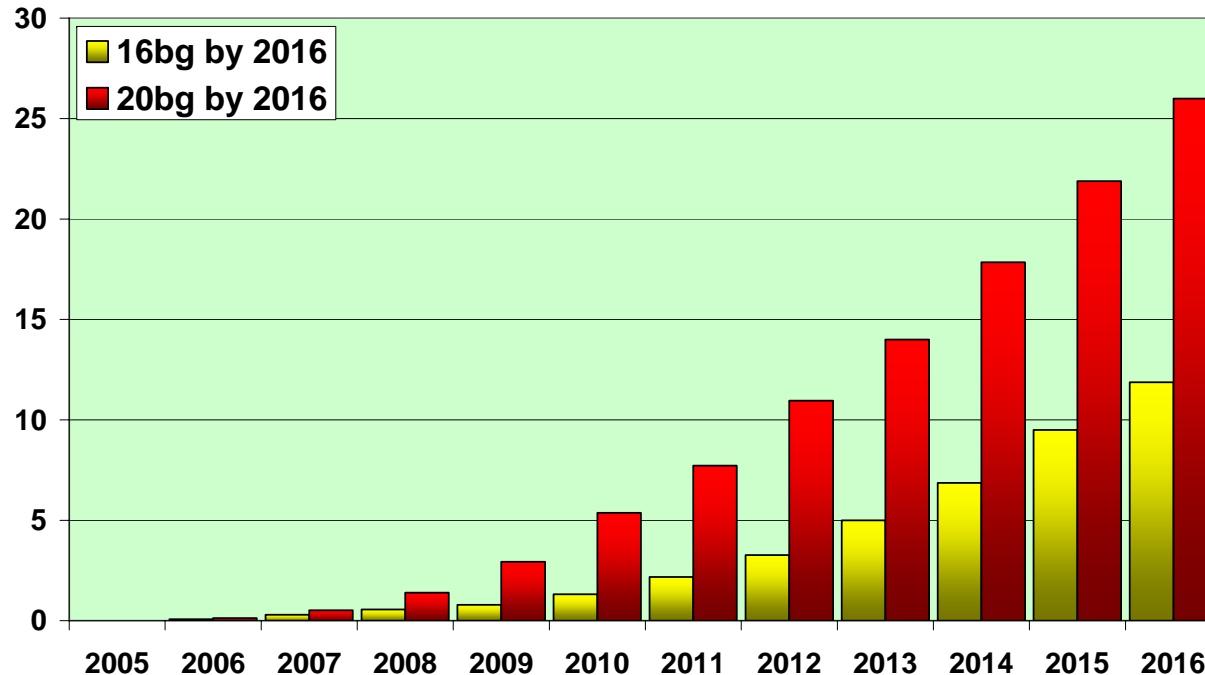


Executive Summary: Impacts on Consumer Food Expenditures

- Increasing renewable fuel mandates above baseline levels result in higher consumer food expenditures. In 2016, under a 16-bg RF mandate, consumer food expenses are estimated to rise \$11.9 billion above the baseline level. Under a 20-bg RF mandate, by 2016, consumer food expenses would rise \$26.0 billion above the baseline.
- The marginal impact on consumer food expenditures rises as the RF mandate is increased.

Increase in U.S. Consumer Food Expenditures Associated with Larger Renewable Fuel Mandates

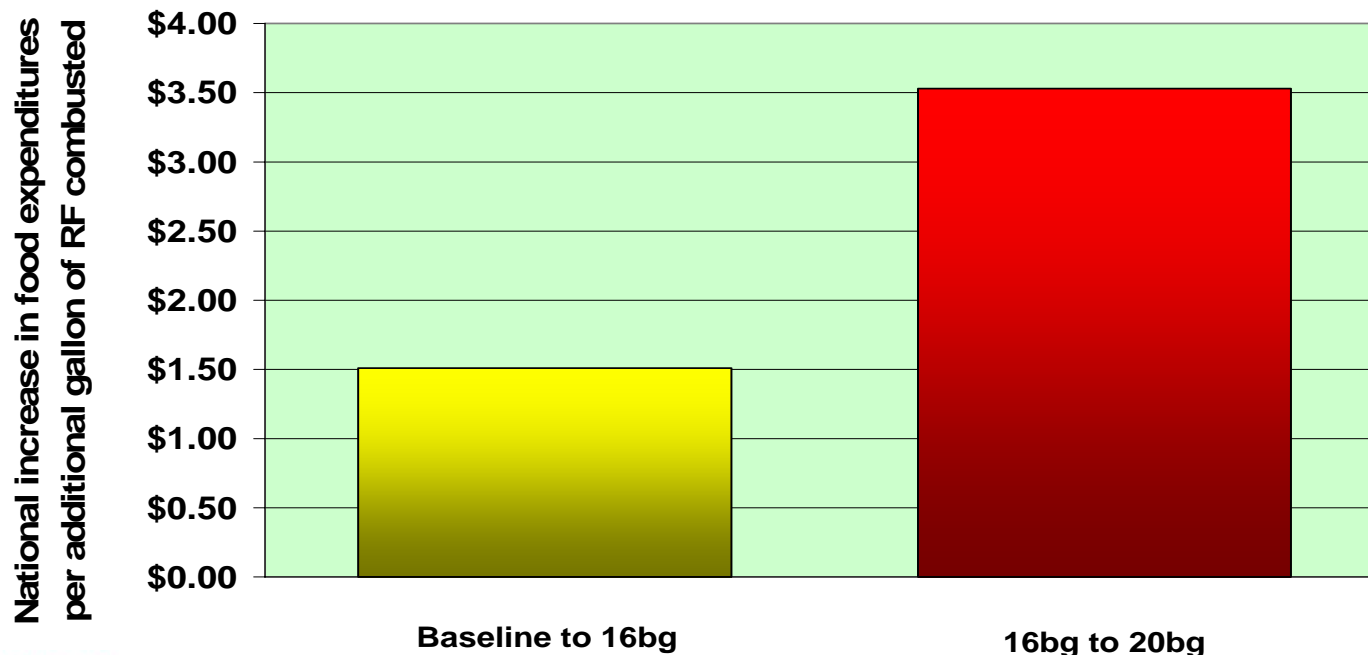
(Billion dollar - change from base)



Executive Summary: Marginal Impacts on Consumer Food Expenditures of Higher RF Mandates

- Incremental increases in the RF mandate above the baseline level result in disproportionate increases in consumer food expenditures.
- In 2016, under a 16-bg RF mandate, consumer food expenses would rise by \$11.9 billion above the baseline level (per previous slide). This translates, on average, into a \$1.52 rise in the nation's food expenditure for every additional gallon of renewable fuel combusted between baseline and 16-bg RF levels.
- Under a 20-bg mandate, by 2016, consumer food expenses would rise by \$26.0 billion above the baseline. In moving from a 16-bg to 20-bg RF mandate, consumer food expenditures would rise by \$14.1 billion (i.e., 26.0-11.9 billion). This translates, on average, into a \$3.52 rise in the nation's food expenditures for every additional gallon of RF combusted between the 16-bg and 20-bg RF levels.

Rising Marginal Consumer Food Expenditures with Higher RF Levels

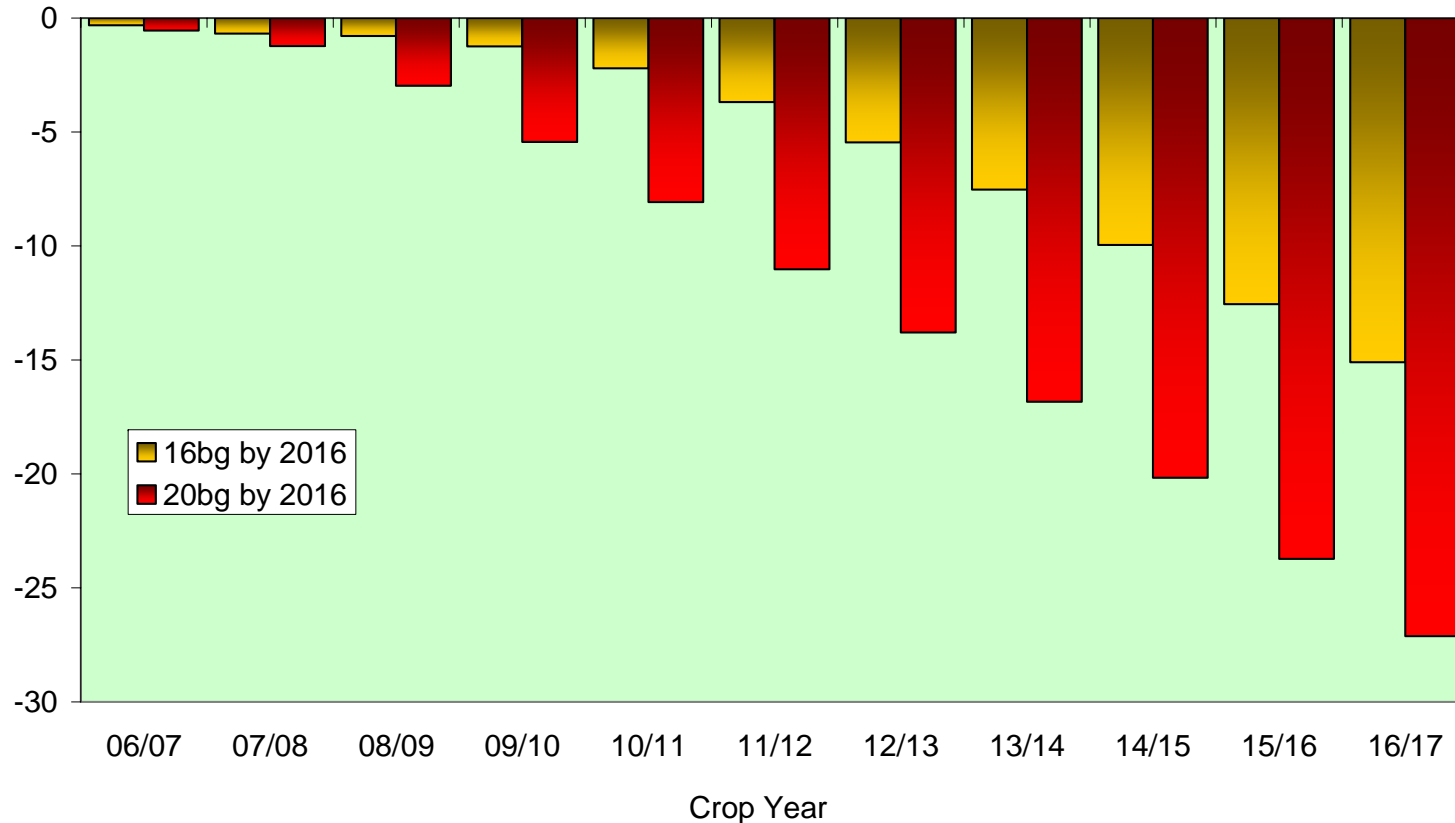


Executive Summary: Impacts on Grain Exports

- U.S. grain export volume is estimated to decrease by 15- and 27-million metric tons (11% and 19% decreases) from the baseline, respectively, in 2016 for 16-bg and 20-bg RF mandates.

Decrease in U.S. Grain Exports Associated with Larger RF Mandates

(Million metric tons decrease from baseline)



Executive Summary: Impacts on Fertilizer Use

- Increased corn acreage will lead to significant increases in fertilizer application.
- With a conservative assumption of unchanging application rates per acre, total U.S. nitrogen use would increase 6.5% and 10.1%, respectively, for the 16-bg and 20-bg RF mandates compared with base levels.
- Total phosphate and potash use also would increase significantly.
- By 2016, total NPK fertilizer consumption is estimated to increase 1.3- and 2.0-million-nutrient tons, respectively, under 16-bg and 20-bg RF mandates.
- The additional nitrogen needed for corn production will likely be met by imported fertilizer from energy-rich countries and regions including countries in the Middle East, Trinidad, Canada, Russia, and the Ukraine.
- Note that this study did not examine the impacts of increased renewable fuels standards on water requirements as it was outside the scope of study, but it should be noted that this is an area of concern given the 3-5 gallons of water required per gallon of ethanol produced.

Net Change in Fertilizer Consumption from Base in 2016

(1,000 nutrient tons and percent change from base)

	Nitrogen (N)		Phosphate (P)		Potash (K)		Total NPK	
	1,000 nutrient tons	Percent change from base	1,000 nutrient tons	Percent change from base	1,000 nutrient tons	Percent change from base	1,000 nutrient tons	Percent change from base
16bg RF Mandate	801	6.5%	221	4.9%	236	4.5%	1,259	5.7%
20bg RF Mandate	1,232	10.1%	353	7.9%	383	7.3%	1,968	9.0%



Introduction

- Background
- Objectives
- Approach

Introduction: Background

- The U.S. Congress passed the Energy Policy Act of 2005 that calls for a minimum of 7.5 billion gallons (bg) of renewable fuel (RF) to be consumed by 2012.
- Policy makers are currently considering potentially higher RF mandates as significant progress has been made towards achieving the 7.5-billion-gallon RF mandate.
- This study uses Global Insight's model of U.S. and world agriculture to assess the likely impacts of larger RF mandates on U.S. agricultural producers and markets, and consumer food prices. The RF mandate levels studied here call for 16 and 20 billion gallons of renewable fuel consumption by 2016, met primarily through increased corn-based ethanol production.
- Consistent with Global Insight's view of the U.S. renewable fuels industry, consensus among experts exists that at least over the short to medium run, potential expansion of RF mandates would primarily be met through additional corn-based ethanol production. Consistent with this view, the scenarios examining higher RF levels in this report assume them to be met almost exclusively from corn processed in dry-mill ethanol plants.
- Only in the past decade has the size of the RF industry been large enough to create significant disruption to traditional food production channels.
- Today, many stakeholders, including livestock producers, food processors, environmental organizations, and international relief organizations, have expressed concern over the extent to which foodstuff is being combusted as transportation fuel, and the long-run sustainability of this activity.
- As evidenced in this study, the concerns over "fuel versus food" are valid, and increased RF mandates will result in disproportionately large increases in U.S. food costs.
- Though beyond the scope of this study, given the large impacts on U.S. agricultural markets, grain and livestock food costs on world markets, and in particular in the developing world, will also move higher. See, for example, "How Biofuels Could Starve the Poor" in the May/June 2007 edition of *Foreign Affairs*.

Introduction: Objectives

- Identify the impacts on agricultural producers of grains and livestock of increases in RF mandates above baseline levels.
- Identify the impacts of increased RF mandate levels on consumer food costs and expenditures.
- Identify impacts on agricultural export markets, the Federal Budget, and environmental impacts as a result of RF mandate levels increased above baseline levels.
- Identify any unexpected consequences associated with increased RF mandate levels.

Introduction: Approach

- Develop a baseline forecast using Global Insight's model of U.S. and world agriculture.
- Include in the baseline mainstream assumptions concerning crop yields, government support programs, and other exogenous factors.
- Starting from the baseline, develop scenarios for increased RF mandate levels.
- Compare the scenario results back to the baseline to assess the impacts on agricultural producers and commodity markets, and U.S. consumers of increased RF mandate levels.



Methodology

- Developing a Baseline
- Developing Renewable Fuels Mandate Scenarios
- The Global Insight U.S. and World Agricultural Model
- Overview of the Baseline

Methodology: Developing a Baseline

- The baseline of this study was developed to be consistent with RF levels mandated by the Energy Policy Act of 2005. It includes a target RF level of 7.5 billion gallons from all sources in 2012, and growth equal to the growth of gasoline demand thereafter, as forecast by the EIA.
- In 2012, total baseline ethanol production is roughly 7.2 billion gallons with 0.25 billion gallons originating from cellulose. This cellulosic production level is consistent with the Annual Energy Outlook 2007 forecast of the Energy Information Administration (EIA) of the Department of Energy.
- Biodiesel is a much smaller contributor to the U.S. renewable fuels sector and struggles with high production costs, primarily the cost of the feedstock – vegetable oil. Its production is assumed to reach 300 million gallons by the 2008 calendar year, with the majority being derived from soybean oil. The biodiesel production path was held constant across all scenarios due to the uncertainty of future production levels.
- By 2016, baseline U.S. biofuel production is estimated to reach 8.1 billion gallons with nearly 7.4 billion gallons of ethanol derived from corn.
- The Global Insight baseline used in this analysis is very similar to and consistent with the USDA baseline with respect to yield assumptions and productivity changes for corn and soybeans. Both baselines have corn yields growing at 1.9 bushels per acre per year, but due to different starting values, USDA's 2016 level is 170.2 bushels per acre compared with Global Insight's baseline of 167.2 bushels per acre. Soybean yields grow 0.4 bushels per acre per year in both baselines. Due to differences in starting values, USDA's soybean yield reaches 45.6 bushel per acre, and Global Insight's comes in at 44.4 bushels per acre. Both projections assume productivity growth in ethanol, with USDA's level reaching 2.76 gallons of ethanol per bushel of corn in 2016, and Global Insight's rising to 2.81.
- The baseline developed in this analysis assumes grain exports reach 141 million metric tons in 2016 compared with 123 million metric tons in the USDA baseline. This is a reflection of the differing renewable fuels consumption and commodity price levels in the respective baselines.

Methodology: Developing RF Mandates Scenarios

- Two scenarios are developed in this report, a 16- and 20-billion-gallon renewable fuel level by 2016. These targets are met primarily through increased corn-based ethanol production.
- U.S. farm policy is assumed to remain constant at current levels through 2016 in the baseline and in all scenarios. The farm policy includes commodity loan rates, target prices, and current rental rates for the Conservation Reserve Program (CRP).
- The \$0.51-per-gallon volumetric ethanol excise tax credit (VEETC) is assumed to remain in place in the base case and in all scenarios in this analysis.
- The existing tariffs on imported ethanol are also assumed to remain in place in the base case and across all scenarios.
- Renewable fuel imports reach 7% of the RF mandate level in each scenario by 2012, and maintain a 7% share through 2016. This equates to 0.55 billion gallons of RF imports in the baseline, and 1.12 and 1.40 billion gallons for the 16-billion-gallon and 20-billion-gallon mandate scenarios, respectively.
- Distiller's Dried Grain (DDG) export levels are assumed to increase in proportion to the increases in dry mill ethanol production. This represents a large increase from existing export levels. It should be noted that while the industry is working constantly to develop foreign markets for this by-product, as a whole DDGs continue to face transportation and market-acceptance challenges in foreign markets.
- DDG consumption by livestock species is expected to increase gradually with the greatest challenges in swine and poultry diets. DDG feeding continues to be dominated by beef and dairy animals.
- While it is likely that the strong incentive to plant additional corn will have some influence on fruit, vegetable, and ornamental crop areas, these impacts are expected to be fragmented and minimal given the high value of these alternative crops. Our model, and this analysis, assumes this impact is zero.
- Macroeconomic assumptions with respect to interest rates and consumer income are held constant across all scenarios, as well as are energy and fertilizer prices.
- Results are presented as level or percentage change from baseline levels.

Methodology: The Global Insight U.S. and World Agricultural Model

- The Global Insight model used in this analysis is a simultaneous partial equilibrium net trade model that includes the major U.S. crops, livestock, and dairy sectors. The model included detailed supply and demand equations for each commodity including detailed modules on dry and wet corn milling processes including by-product impacts. Reduced form equations within the U.S. model were used to simulate the responsiveness of international trade to changes in U.S. prices. Recursive satellite models were used calculate the impacts on consumer prices, government cost, and net farm income based upon the results from the simultaneous models.

Methodology: Overview of the Baseline

Corn Sector Baseline Outlook

- Corn yields are expected to continue their relatively strong historic growth trend of 1.9 bushels per acre per year or about 1.4% annual growth. Strong yield growth and increased variety adaptability has allowed corn to capture an increased share of total land area in the United States. This expansion has come from several sources. For example, sorghum acreage has seen a significant shift over to corn as corn seed varieties continue to be better suited for production in dryer-hotter regions of the country.
- Continued growth in domestic corn based ethanol production and strong corn grain exports due to short crops in foreign production areas will likely lead to a significant reduction in U.S. corn inventories by the end of the 2006/07 market year, and relatively strong corn prices. The stock-to-use ratio for corn hovers around 5%, a historically low level.
- The current strong corn price environment will cause a significant shift out of soybeans into corn. Corn planted area is expected to rise by 3 million acres in 2007.
- By 2016, corn exports are expected to increase gradually to a level of 2.5 billion bushels per year and corn ethanol production is expected to consume in excess of 2.6 billion bushels.
- The baseline foresees strong productivity gains allowing corn prices to subside to about \$2.22 per bushel, and land area devoted to corn being stable at 83 million acres during the last few years of the period ending in 2016.

Methodology: Overview of the Baseline

Soybean Sector Baseline Outlook

- Soybean yields have seen recent improvements, but their productivity growth rate is less robust than corn at about 1% annually or roughly 0.4 bushel per acre per year.
- Yield improvement through genetically modified seeds has been much less for soybeans than corn. The benefits to soybean farmers have been through reduced herbicide costs and weed control flexibility.
- U.S. soybean exports are expected to be around 1 billion bushels during the forecast period, but a gradual decline is expected as competition from South America continues.
- Domestic demand for soybeans is supported by growth in livestock protein demand and to a lesser extent soybean oil-based biodiesel. The portion of soybean oil used for biodiesel is expected to increase from 8% of domestic production in 2006 to 11% in 2016.
- Soybean prices are expected to average about \$5.30 per bushel by 2016. Long-run soybean price increases are somewhat restricted by the availability of new land in South America.
- U.S. soybean planted area declines considerably in the early years of the forecast period (2007-10) and stabilizes at roughly 72 million acres during the end years (2015-16).

Methodology: Overview of the Baseline

Wheat Sector Baseline Outlook

- The U.S wheat sector suffered a considerable production loss in 2006 and consequently exportable supplies of wheat have been reduced and U.S. stock levels are also on the decline.
- Stable-to-improving wheat prices in the short run will halt the long-run decline in planted area for 2007 and a small acreage increase may result.
- Over the long run, slow growth in wheat yields and limited price strength have made corn, oil seeds, and other crops more profitable for farmers, and acreage devoted to wheat is expected to continue its decline: falling to 56 million acres by 2016.

Cotton Sector Baseline Outlook

- Cotton planted area is expected to range between 13.5 and 14.3 million acres during the projection period.
- Exports have been very strong in recent years, but the loss of Step-2 export subsidies in 2006 will cause a downward correction at the start of the baseline forecast. Farther out, exports are expected to set new record-high levels at 17.6 million bales in 2016.
- Domestic milling in the United States is expected to continue its decline, falling from about 6 million bales to just over 4 million bales by 2016.

Methodology: Overview of the Baseline

Conservation Reserve Program (CRP)

- Enrollment in the long-term Conservation Reserve Program (CRP) is expected to slowly decline from a current high of about 35.6 million acres to about 32.3 million acres in 2016.

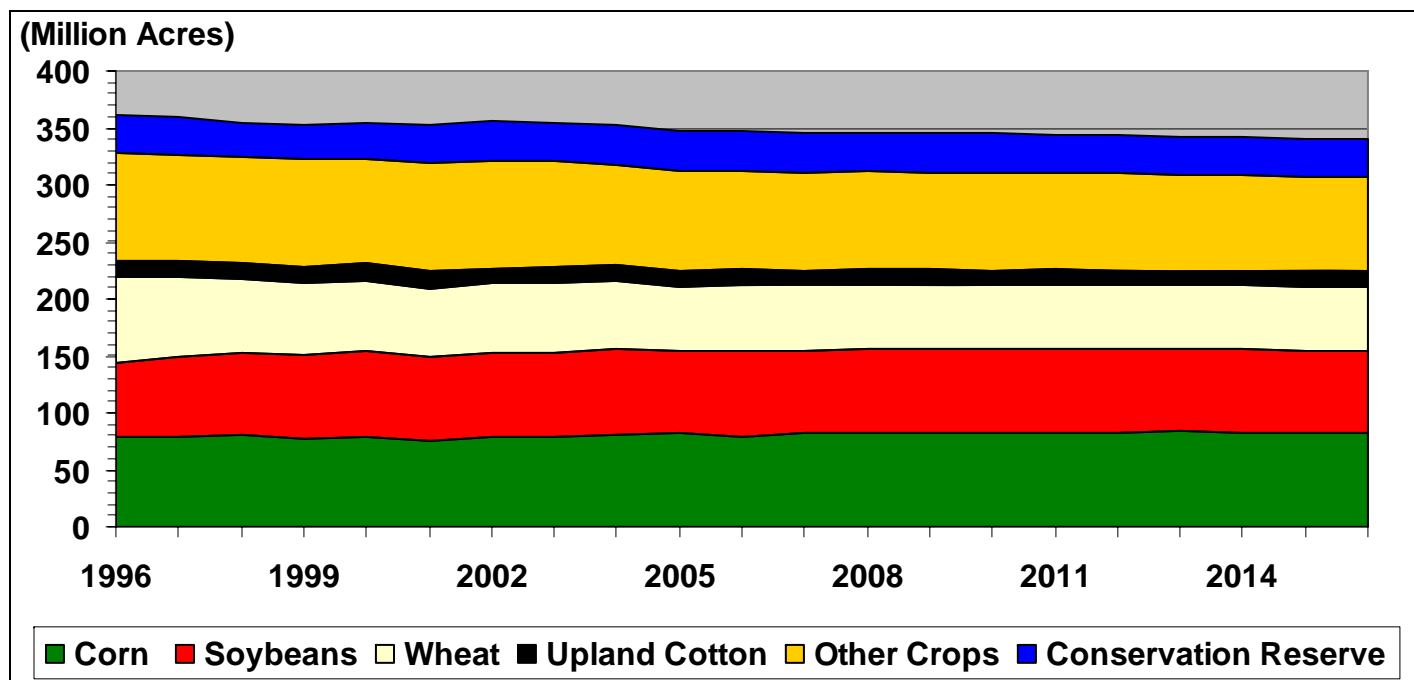
Total Land Area

- Total land allocated to all major field crops is expected to continue its slow decline, falling from about 347 million acres currently to just below 340 million acres in 2016.

Methodology: Overview of the Baseline

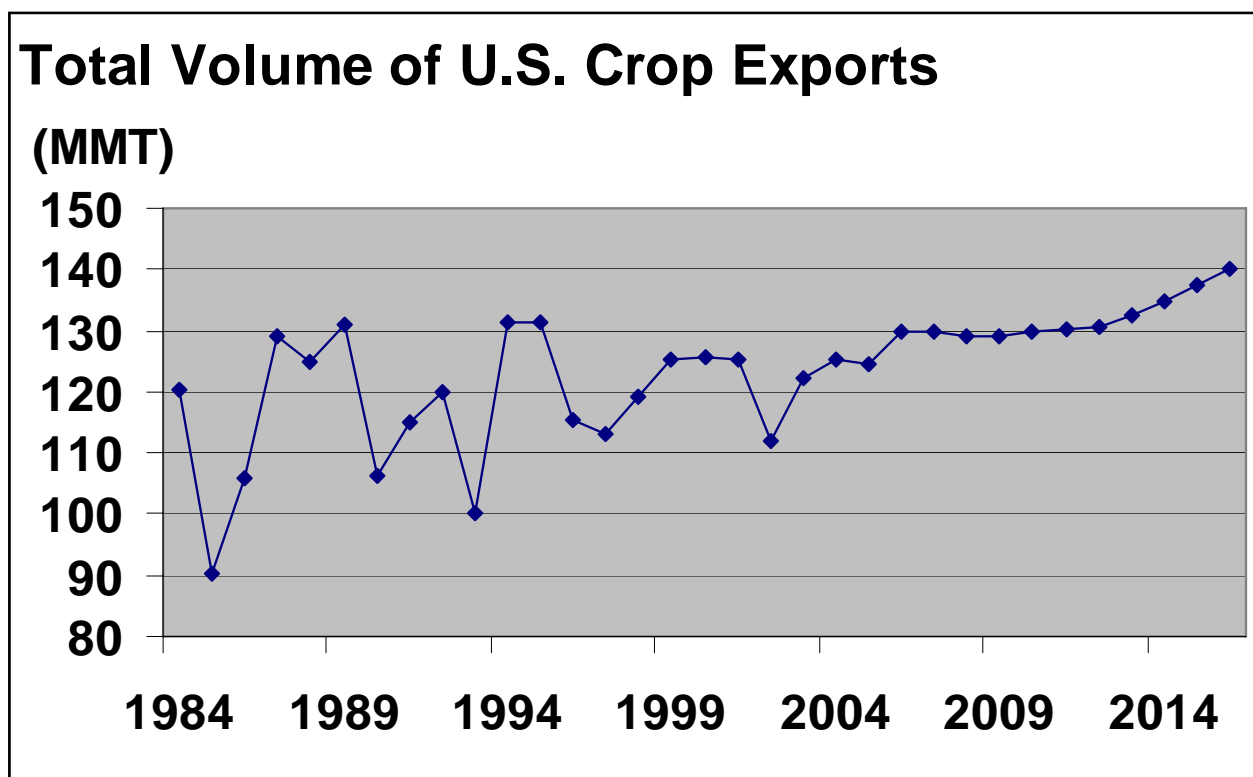
- Over the past 10 years, U.S. crop area has declined gradually, with wheat declining the most. During the baseline projection period, wheat, conservation reserve, and soybeans all lose acreage, while corn increases slightly.

U.S. Acreage by Crop Type



Methodology: Overview of the Baseline

- Baseline crop export levels are expected to remain at their current level until about 2012 and increase gradually through the end of the forecast. Crop yield growth is expected to allow for increased exports after 2012. Prior to 2012, the strong growth in biofuel production is expected to limit U.S. exportable grain supplies.



Methodology: Overview of the Baseline

Livestock Sector Baseline Outlook

- Since 2003, the U.S. beef sector has been dealing with the fallout from BSE or “Mad Cow Disease” and the related export bans. At present, the export markets have begun to recover and this recovery is expected to continue for the next several years.
- U.S. beef availability has been relatively low during the BSE period, as imports of live cattle from Canada were also limited. The reduction in imports lead to relatively high prices in the United States, despite the ban on our exports.
- A serious drought in Texas, Oklahoma, and Kansas during the winter of 2005/06 delayed the timing of the cattle industries expansion plans until farther out into the projection period.
- The U.S. cattle sector is expected to be entering a period of significant expansion leading to increased production and lower prices for most of the baseline projection period. Beef production is expected to increase from nearly 25 billion pounds to nearly 30 billion pounds from 2005 to 2016, respectively.

Methodology: Overview of the Baseline

Livestock Sector Baseline Outlook

- The U.S. pork industry has consolidated considerably in terms of the number of farms over the past 20 years. This consolidation has made the industry much more cost effective and better able to compete internationally.
- U.S. pork production is expected to continue relatively strong growth in the baseline forecast with an increasing share of production being exported. Production is expected to increase from 21 billion pounds in 2006 to 23 billion pounds in 2016.
- The U.S. poultry sector is concentrated and large producers control most stages of production, down to owning the birds on the farm. This, plus the relatively short cycle time to increase flock size and feed out birds for meat, allows this sector to respond most quickly to changes in market conditions.
- Poultry production is expected to continue strong growth during the forecast allowing for increased per-capita consumption domestically and greater exports as well. Production is expected to rise from 36 billion to 45 billion pounds between 2006 and 2016.

Methodology: Overview of the Baseline

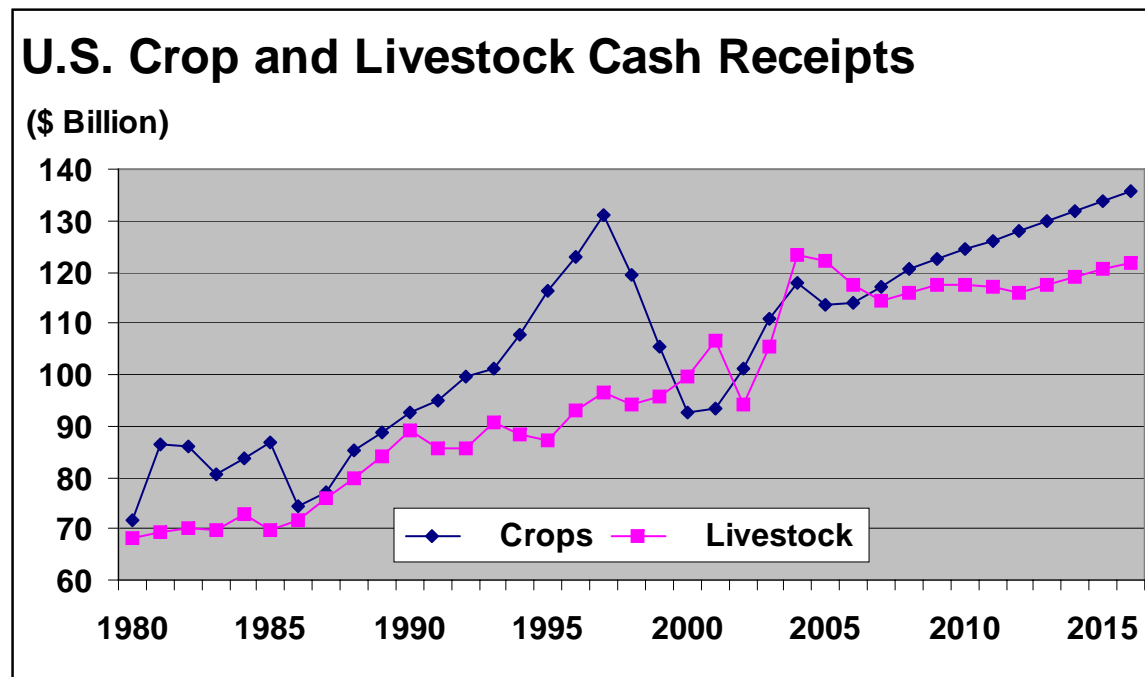
Livestock Sector Baseline Outlook

- The U.S. dairy industry sees most of the changes in its profitability from variation in milk prices. Small decreases in production or even increases less than consumption cause a relatively quick and volatile movement upward in price. These production changes are often caused by widespread weather problems impacting cattle and/or their feed supply and quality.
- As we enter the forecast period, the U.S. dairy sector is experiencing low prices and is making a slow adjustment in production by reducing cattle numbers to get the over supply of milk under control. The dairy industry is comprised of many relatively small farms.
- The dairy sector is relatively large in its contribution to the farm economy, but its producers largely produce crops for on farm consumption and, consequently, buy and sell relatively limited amount of grain or feed on the open market.

Methodology: Overview of the Baseline

U.S. Farm Income Baseline Outlook

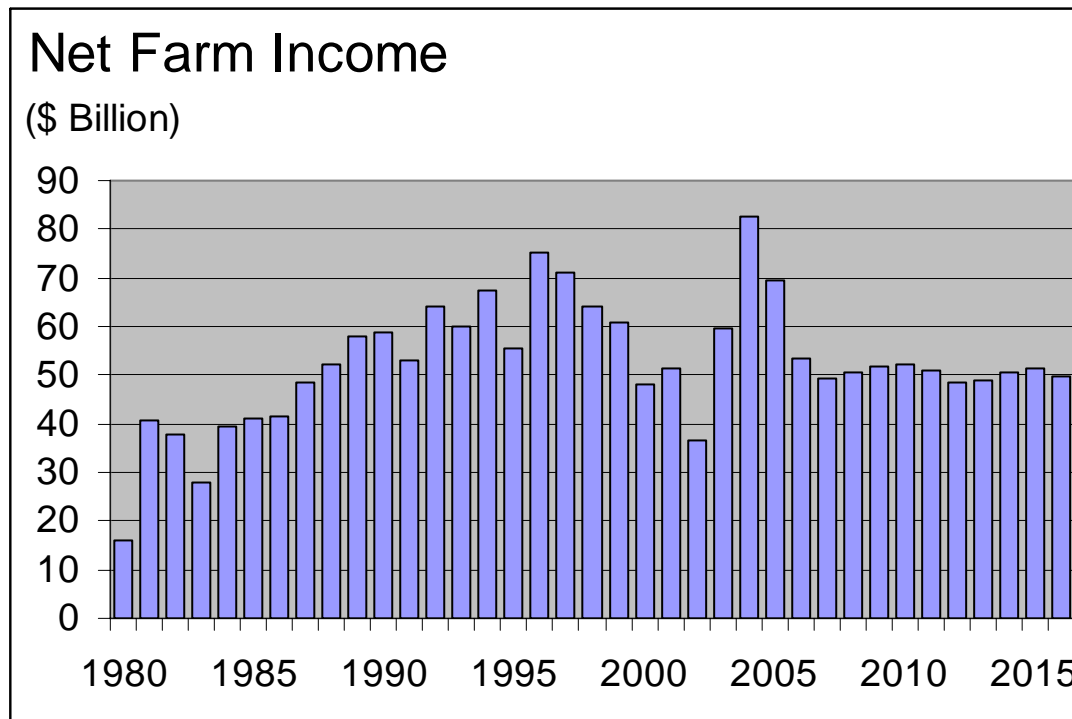
- U.S. agriculture has recently experienced a time of strong livestock receipts and moderate crop prices and receipts. Weaker prices for milk and beef are expected to slow growth in livestock receipts, while improving crop prices will add strength to crop receipts.



Methodology: Overview of the Baseline

U.S. Farm Income Baseline Outlook

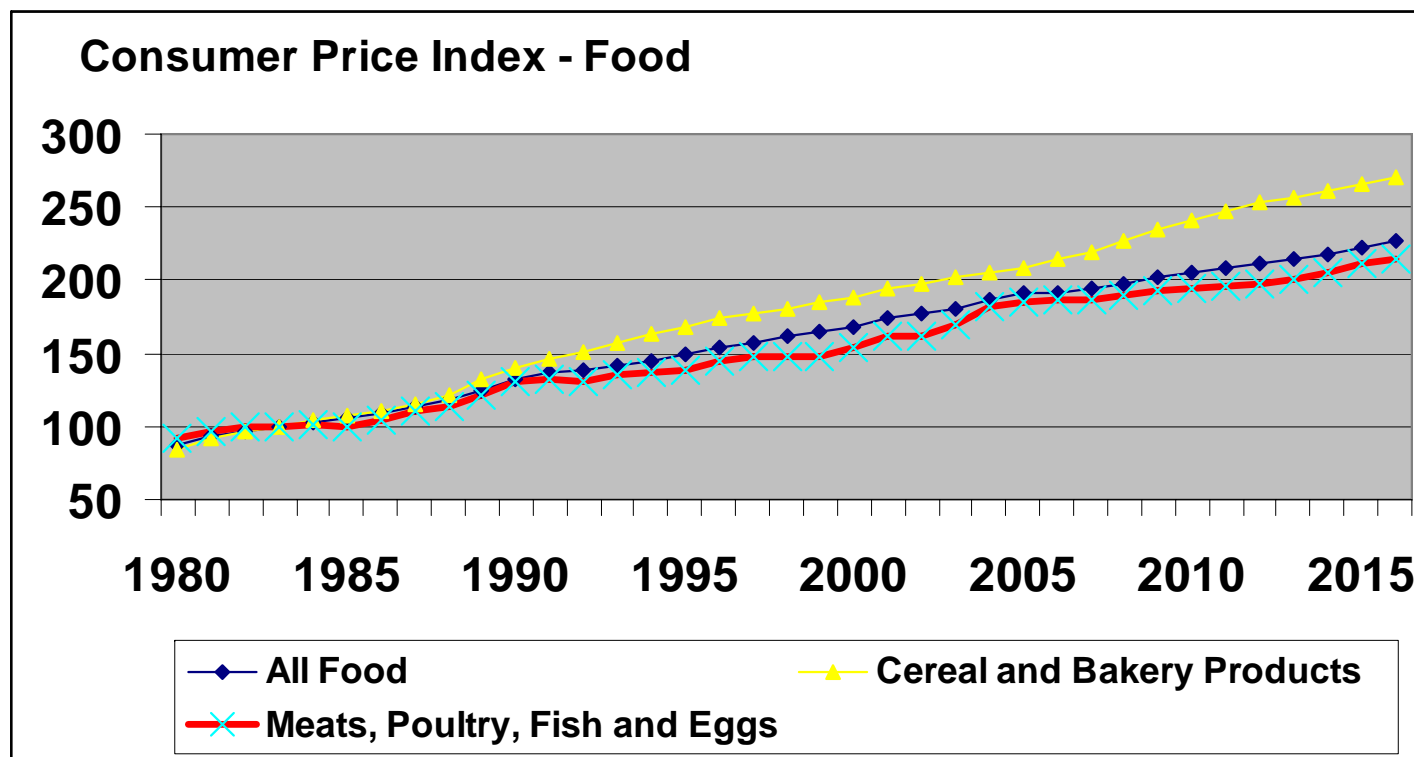
- U.S. agriculture saw a strong spike up in farm income in 2004 and 2005, as livestock prices and receipts hit record levels. More moderate receipts combined with rising expenses for feed, fertilizer, fuel, and other manufactured inputs will reduce net income in the projection period.



Methodology: Overview of the Baseline

Consumer Food Sector Baseline Outlook

- Food price inflation is expected to remain in line with historic growth rates at about 1.8% annually with increases in the meat sector being somewhat less than those in the crops sector during the forecast period .



Study Results

- Impacts of Increased Renewable Fuel Mandates on Agricultural Sectors
 - ✓ Crops
 - ✓ Livestock
 - ✓ Farm Income
- Impacts of Increased Renewable Fuel Mandates on Consumer Food Expenditures

Scenario Results: Impacts of Increased RF Mandates on Feed Ingredient Costs in the Livestock Sector

- The response of the livestock sector is very dynamic and heavily dependent on changes in feed cost. Actual implementation of the scenarios of RF mandates examined in this report would move the livestock industry into uncharted territory. Today's feed rations have limits on DDG feeding and their ability to displace corn and soybean meal. These limits are specific by species and can be impacted by grower size and management abilities.
- It can be seen in the table below that as DDGs production increases its relative feed value drops. This relationship is already true in today's market, but the scenarios developed herein take DDG production to levels well beyond the magnitudes experienced to date. It is expected that under the 20-billion-gallon RF scenario, the value of DDGs will fall to its value for fuel combustion.
- Between the 16-bg and 20-bg scenarios, the substitution of DDGs for soybean meal reaches the saturation level for swine and poultry diets. In effect, soybean meal demand strengthens relative to the supply of soybean meal and soybeans. Prior to hitting the saturation point, the soybean processing industry is being driven by vegetable oil demand for food. Once the saturation point is hit, the industry sees a shift in value back toward meal, hence stronger prices.

Estimated Impacts on Feed Ingredient Prices of Higher RF Mandates

	Baseline		16 bg - 2016		20 bg - 2016	
	2006	2016	Level Chg	% Chg	Level Chg	% Chg
Corn, \$/ton	\$80.46	\$79.13	\$24.74	31.3%	\$44.47	56.2%
Distillers Dried Grains, \$/ton	\$80.23	\$89.44	-\$26.06	-29.1%	-\$34.44	-38.5%
Soybean Meal, \$/ton	\$165.80	\$183.02	-\$7.74	-4.2%	\$1.10	0.6%

Scenario Results: Estimated Impact of Higher RF Mandates on Feed Ration Costs to the Livestock Sector

- The model results indicate that increased renewable fuels mandates would cause feed rations to move toward maximum inclusion levels for DDGs by species, and results in a buffering of feed cost increases for those species that can utilize DDGs. However, those livestock enterprises located farther from ethanol production areas would see significantly higher feed costs. This feed cost differential could also cause changes in the location of future expansion. Cattle feeding close to ethanol plants has already been stimulated by DDGs availability. Due to the cow's 4-chamber stomach, they are much better able to consume DDGs without adverse health or carcass impacts relative to swine and poultry.

Impacts on Livestock Ration Costs - \$/ton	Baseline		16 bg - 2016		20 bg - 2016	
	2006	2016	Level Chg	% Chg	Level Chg	% Chg
Broiler Grower Feed	\$244	\$255	\$19.10	7.5%	\$41.14	16.2%
Turkey Grower Feed	\$288	\$295	\$11.80	4.0%	\$26.81	9.1%
Hog Feed	\$228	\$202	\$10.54	5.2%	\$22.18	11.0%
Steer & Heifer Feed, 11% Protein Excluding Forage	\$92	\$100	\$5.34	5.4%	\$12.63	12.7%

Scenario Results: Estimated Impacts of Increased RF Mandates on Livestock Sector Margins

- Margins in the swine sector are projected to fall precipitously, as feed costs rise and output price adjustments fail to cover the higher feed costs.
- Cattle margins are also projected to be significantly impacted due to rising feed costs and the sectors large investment in breeding inventory. The cattle sector has the longest response time to changes in economic conditions due to its long gestation period relative to other species.
- Impact in the poultry sector are projected to be more modest as it has in recent years demonstrated an ability to manage its production to offset higher input costs such as feed.

Impacts on Livestock Margins	Baseline		16 bg - 2016		20 bg - 2016	
	2006	2016	Level Chg	% Chg	Level Chg	% Chg
Beef -Cow/Calf (\$/Head)	\$82	-\$82	-\$5.46	-6.6%	-\$17.45	-21.2%
Swine (\$/cwt.)	\$7	\$5	-\$2.32	-49.1%	-\$4.27	-90.6%
Broiler (\$/cwt.)	\$16	\$10	-\$0.26	-2.7%	-\$0.45	-4.7%
Turkey (\$/cwt.)	\$8	\$3	-\$0.19	-7.2%	-\$0.41	-15.9%

** Margin = total market revenue and government payments less all variable costs.

Scenario Results: Estimated Impacts of Increased RF Mandates on Livestock Sector Operations

- Meat production levels are reduced as RF mandates are increased, with swine and poultry declining the most. Dairy and beef production are relatively unaffected.
- The responses of poultry and swine prices to supply changes are the most significant of any livestock group. The model results also indicate a significant impact on milk prices.

Impacts on Livestock Sector Operations								
	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	2006	2016	2016	2016	2016	2016	2016	2016
Production	(Billion Pounds)							
Beef	25.9	29.9	29.9	29.8	0.0	-0.1	-0.1%	-0.4%
Pork	21.3	23.2	22.7	22.1	-0.5	-1.1	-2.0%	-4.7%
Broiler	36.1	45.1	44.6	43.9	-0.5	-1.1	-1.1%	-2.5%
Turkey	5.6	6.2	6.2	6.2	0.0	0.0	-0.4%	-0.8%
Total	88.8	104.4	103.4	102.0	-1.0	-2.4	-1.0%	-2.3%
Prices	(Dollars per Hundredweight)							
Beef - 1100 - 1300 #, NB Direct	85.5	70.3	71.2	72.3	0.8	2.0	1.2%	2.8%
Hogs - Barrows & Gilts, .								
IA - S. Minn 51-52% lean	44.4	47.7	49.3	51.4	1.6	3.7	3.4%	7.7%
Broiler, 12 City, Whlsle	66.2	61.1	62.6	64.4	1.5	3.3	2.4%	5.4%
Turkey, E. Region, Whlsle	71.0	66.2	67.2	68.5	1.0	2.3	1.5%	3.5%
Milk, Farm Price	12.2	12.9	13.2	13.6	0.3	0.7	2.1%	5.4%

Scenario Results: Estimated Impacts of Increased RF Mandates on Crop Acreage

- Increased RF mandates would cause a dramatic shift in acreage into corn. Soybeans and conservation reserve acreage would see the greatest acreage loss. Increased continuous corn planting (lack of crop rotation) of the magnitude implied by the scenarios below could result in reduced corn yields and/or added cost of crop protection products.

Impact on Planted Area								
Marketing Year	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17
Planted Area	(Million Acres)							
Corn	81.8	83.3	93.8	99.8	10.5	16.5	12.6%	19.8%
Soybeans	72.1	71.8	66.9	65.2	-4.9	-6.6	-6.8%	-9.2%
Wheat	57.2	55.9	55.2	54.6	-0.7	-1.3	-1.2%	-2.4%
Upland Cotton	13.9	13.8	13.6	13.4	-0.2	-0.4	-1.6%	-3.0%
Sorghum	6.5	6.1	6.2	6.2	0.0	0.1	0.8%	2.3%
Barley	3.9	3.3	3.4	3.5	0.1	0.3	4.2%	8.3%
Oats	4.2	4.0	4.1	4.0	0.0	0.0	0.1%	-0.1%
Rice	3.4	3.3	3.3	3.2	-0.1	-0.1	-1.9%	-3.5%
Sunflowers	2.7	1.9	2.0	1.9	0.1	0.0	2.8%	1.4%
Peanuts	1.7	1.5	1.5	1.5	0.0	0.0	0.4%	0.1%
Sugar Beets	1.3	1.2	1.2	1.2	0.0	0.0	-1.3%	-0.8%
Sugar Cane (Harvested)	0.9	0.9	0.9	0.9	0.0	0.0	1.1%	2.2%
Canola	1.2	1.1	1.2	1.2	0.0	0.0	2.2%	2.4%
Hay Area Harvested	61.6	58.9	58.8	59.0	-0.1	0.1	-0.2%	0.1%
Conservation Reserve	35.6	32.3	30.0	28.7	-2.3	-3.6	-7.0%	-11.3%
13 Crops + Hay + CRP	347.9	339.4	341.9	344.3	2.5	4.9	0.8%	1.5%

Scenario Results: Estimated Impacts of Increased RF Mandates on Crop Prices

- The impact of increased RF mandates results in significant increases in corn prices, due to growth in corn demand, and lesser increases in competing crops. The relative high cost of biodiesel does not provide much opportunity for soybean demand growth.
- Dramatic increases in the production of distillers dried grains (DDGs) reduce the corn and soybean meal demand in livestock diets. Cattle are best suited to consume significant quantities of DDGs displacing significant amounts of corn in their diet.
- The substitution of DDGs for soybean meal up to the point of saturation in the respective animals diet causes the impact of the increased RF mandates on soybean prices to be less than otherwise would be the case. The reduction in soybean meal demand also causes the soybean processing industry to shift from soybean meal (for feed) to soybean oil (for food).

Impacts on Crop Prices	Baseline		16 bg - 2016		20 bg - 2016	
	2006	2016	Level Chg	% Chg	Level Chg	% Chg
Wheat -\$/Bushel	\$3.42	\$3.49	\$0.36	10.4%	\$0.67	19.1%
Corn - \$/Bushel	\$2.25	\$2.22	\$0.69	31.3%	\$1.25	56.2%
Soybean - \$/Bushel	\$5.01	\$5.25	\$0.64	12.3%	\$1.05	19.9%
Cotton - \$/cwt.	\$0.48	\$0.57	\$0.01	1.3%	\$0.01	2.4%

Scenario Results: Impacts of Increased RF Mandates on Crop Gross Receipts

- The disproportionate increase in corn prices are projected to cause gross receipts and ultimately income from corn production to increase the most. Other crops receipt categories see some increase but the impact is more modest. Government payments, primarily paid in the form of price supports for crops, would decrease due to higher market prices.

Impact on Crop Sector Gross Receipt and Government Payments to Farmers

	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	2006	2016	2016	2016	2016	2016	2016	2016
	(Billion Dollars - Gross Receipts)							
Cash Receipts	231.1	257.7	271.9	284.7	14.2	27.0	5.5%	10.5%
Crops	113.8	135.6	148.6	159.9	13.0	24.3	9.6%	17.9%
Feed Grains	26.3	32.4	43.9	53.8	11.5	21.4	35.5%	66.1%
Food Grains	7.8	9.0	9.6	10.1	0.6	1.1	6.6%	11.8%
Oilseeds	16.7	17.4	18.0	18.8	0.7	1.4	4.0%	8.1%
Cotton	6.0	6.8	6.9	6.9	0.1	0.2	1.6%	2.4%
Other Crops	57.0	70.1	70.2	70.3	0.1	0.3	0.2%	0.4%
Government Payments	16.9	12.0	10.2	9.9	-1.8	-2.1	-15.3%	-17.4%

Scenario Results: Estimated Impacts of Increased RF Mandates on Livestock Gross Receipts

- Livestock categories are projected to experience higher market gross receipts as price increases out-weigh declines in production. However, increased feed costs are projected to more than offset the increase in receipts leading to significant losses in income for the livestock sector.

Impact on Livestock Sector Gross Receipts								
	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	2006	2016	2016	2016	2016	2016	2016	2016
	(Billion Dollars - Gross Receipts)							
Livestock & Products	117.3	122.1	123.3	124.9	1.2	2.7	1.0%	2.2%
Red Meats	62.6	59.5	59.7	60.0	0.2	0.5	0.4%	0.9%
Dairy Products	22.6	26.2	26.7	27.5	0.5	1.2	1.8%	4.7%
Poultry, Eggs	27.5	31.2	31.7	32.1	0.4	0.9	1.4%	2.9%
Other Livestock	4.6	5.2	5.2	5.3	0.0	0.1	0.5%	1.1%

Scenario Results: Estimated Impacts of Increased RF Mandates on Farm Income

- Net Farm Income is projected to increase by 10% and 20% compared to the baseline as RF mandates are increased from the base level to 16 billion and 20 billion gallons, respectively. The vast majority of the increase is captured by corn producers.

Impact on Farm Income								
	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	2006	2016	2016	2016	2016	2016	2016	2016
	(Billion Dollars)							
1. Farm Receipts	248.9	278.3	292.5	305.3	14.2	27.0	5.1%	9.7%
2. Government Payments	16.9	12.0	10.2	9.9	-1.8	-2.1	-15.3%	-17.4%
3. Gross Cash Income	265.8	290.3	302.7	315.2	12.4	24.9	4.3%	8.6%
4. Nonmoney Income	15.1	16.2	16.5	17.1	0.3	0.9	2.1%	5.4%
5. Value of Inventory Change	-0.8	0.1	0.3	0.4	0.1	0.3	95.0%	208.6%
6. Gross Farm Income (3 + 4 + 5)	280.0	306.6	319.4	332.6	12.8	26.1	4.2%	8.5%
7. Cash Expenses	201.5	228.9	236.6	244.3	7.7	15.5	3.4%	6.8%
8. Total Expenses	226.7	257.1	265.2	273.5	8.1	16.4	3.1%	6.4%
9. Net Cash Income (3 - 7)	64.2	61.4	66.1	70.9	4.7	9.4	7.6%	15.4%
10. Realized Net Farm Inc (3 + 4 - 8)	54.1	49.4	54.0	58.7	4.6	9.4	9.4%	19.0%
11. Net Farm Income (6 - 8)	53.3	49.5	54.3	59.1	4.8	9.7	9.6%	19.5%

Scenario Results: Estimated Impacts of Increased RF Mandates on Crop Exports

- Crop export volumes are projected to decrease considerably, as RF mandate levels increase. The increase in domestic corn demand due to higher ethanol fuel production would eliminate 15 million metric tons (MMT) and 27 MMT of agricultural crop exports, respectively, for 16-bg and 20-bg RF mandate levels.
- Corn exports experience the greatest absolute decrease, 9 MMT and 17 MMT for the 16-bg and 20-bg RF mandates, respectively. Soybeans also experience considerable export losses of 2.8 MMT and 4.1 MMT, respectively for the 16-bg and 20-bg RF scenarios. Due to the negative impact of DDGs feeding on domestic demand for soybean meal and soybean oil, exports of these products are less affected.

Impact on U.S. Crop Exports								
	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17
	(Million Metric Tons)							
Total Volume of Exports	124.4	140.5	125.4	113.4	-15.1	-27.1	-10.8%	-19.3%
Wheat	27.2	27.6	25.8	24.0	-1.8	-3.6	-6.5%	-13.0%
Feed Grains	57.1	67.5	57.4	49.0	-10.1	-18.5	-14.9%	-27.4%
Corn	51.4	62.5	53.2	45.6	-9.2	-16.9	-14.8%	-27.0%
Sorghum	5.0	4.7	3.5	2.6	-1.1	-2.1	-24.5%	-44.4%
Barley	0.7	0.3	0.6	0.8	0.3	0.5	87.6%	139.3%
Oats	0.0	0.0	0.0	0.0	0.0	0.0	0.0%	0.0%
Soybean Sector	31.3	35.6	32.7	31.1	-3.0	-4.5	-8.3%	-12.8%
Soybeans	24.5	26.8	24.0	22.6	-2.8	-4.1	-10.5%	-15.4%
Soybean Meal	6.3	7.8	7.9	7.8	0.1	-0.1	1.3%	-1.0%
Soybean Oil	0.5	1.0	0.8	0.7	-0.3	-0.3	-25.5%	-33.3%
Cotton	3.6	3.8	3.8	3.7	-0.1	-0.1	-1.7%	-3.3%
Rice	5.3	6.0	5.8	5.6	-0.2	-0.4	-3.4%	-6.3%

Scenario Results: Estimated Impacts of Increase RF Scenarios on Food Costs to Consumers

- Increased RF mandates are projected to increase the cost of food ingredients resulting in increased costs to consumers. Food products that see less value-added processing will see the greatest percentage impacts. Meats, sweeteners, and fats and oil categories will see larger increases than bakery products. Vegetable and fruit categories are estimated to be relatively unaffected by the increased RF scenarios.

Impact on Consumer Food Costs									
		Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
		2006	2016	2016	2016	2016	2016	2016	2016
		(1982 - 1984 = 100)			Level change from bas		Percent change from base		
CPI	Cereal and Bakery Products	214	270	272	274	2.3	4.3	0.9%	1.6%
CPI	Meats	186	216	218	221	2.5	5.9	1.1%	2.8%
CPI	Dairy Products	160	202	204	208	2.3	5.9	1.1%	2.9%
CPI	Sugar and Sweets (2)	181	171	173	175	1.6	4.0	0.9%	2.3%
CPI	Fats and Oils	160	176	182	185	6.5	8.8	3.7%	5.0%

Scenario Results: Estimated Impacts of Increased RF Mandates on Agricultural Fertilizer Use

- The increase in area devoted to corn would result in a significant increase in total nitrogen applied for crop production as corn is much more nitrogen intensive than are the crops it would replace. For each additional corn acre, an increase of 120 pounds of nitrogen would be required. This would ultimately result in a 1.3- and 2.0-billion-pound increase in total fertilizer applied annually by 2016 for the 16-billion-gallon and 20-billion-gallon scenarios, respectively. The need to offset organic nitrogen from the lost soybean area would result in an additional 200 to 300 million pounds of nitrogen being applied to corn.

Net Change in Fertilizer Consumption from Base in 2016

(1,000 nutrient tons and percent change from base)

	Nitrogen (N)		Phosphate (P)		Potash (K)		Total NPK	
16bg RF Mandate	801	6.5%	221	4.9%	236	4.5%	1,259	5.7%
20bg RF Mandate	1,232	10.1%	353	7.9%	383	7.3%	1,968	9.0%

Conclusions and Implications

- This study examined the economic impacts of 16- and 20-billion-gallon renewable fuel (RF) mandate levels in 2016.
- Increases in RF mandate levels above the baseline (Energy Policy Act levels set in 2005) would result in rising food costs for U.S. consumers. As the mandate level moves incrementally higher, the marginal impacts on consumer food costs become more pronounced.
- While net farm income to the agriculture sector as a whole would increase, the impact on agricultural enterprises of higher RF mandates would be skewed. Livestock margins, particularly cattle and swine, would be reduced dramatically, while corn farmers would accrue large gains. Corn farmers are not representative of all farmers, geographically or otherwise.
- Agricultural export volumes would be significantly reduced relative to the baseline at the higher RF mandate levels.
- Increased RF mandate levels above the baseline would lead to significantly higher fertilizer use.
- Rising commodity price levels due to increased RF mandates would result in environmentally sensitive land being taken out of the Conservation Reserve Program and put into crop production.
- As evidenced in this study, the concerns over “fuel versus food” are valid and increased RF mandates would result in disproportionately large increases in U.S. food costs.
- While direct government payments to farmers are reduced by higher commodity prices, ethanol support costs of \$0.51 per gallon will cost the Federal treasury more than twice to three times the savings in farm programs - under the scenarios examined in this report.
- Though beyond the scope of this study, given the large impacts on U.S. agricultural markets, grain and livestock food costs on world markets, and in particular in the developing world, would also move higher. See for example, “How Biofuels Could Starve the Poor” in the May/June 2007 edition of *Foreign Affairs*.

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Appendix

Table 1: U.S. Wheat Supply and Utilization

	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
Marketing Year	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17
Area	(Million Acres)							
Planted Area	57.2	55.9	55.2	54.6	-0.7	-1.3	-1.2%	-2.4%
Harvested Area	50.1	47.4	46.8	46.2	-0.6	-1.3	-1.4%	-2.7%
Yield	(Bushels per Acre)							
Actual	42.0	45.4	45.4	45.4	0.0	0.0	0.0%	0.0%
Supply	(Million Bushels)							
Production	2,725	2,728	2,621	2,528	-106	-199	-3.9%	-7.3%
Imports	80	95	95	95	0	0	0.0%	0.0%
Domestic Use	1,178	1,233	1,285	1,327	52	94	4.2%	7.6%
Feed, Residual	190	200	260	308	60	108	30.3%	54.2%
Seed	78	79	78	77	-1	-2	-1.6%	-2.7%
Food, Other	910	954	947	942	-7	-12	-0.7%	-1.3%
Ethanol Use	5	5	5	5	0	0	0.0%	0.0%
Exports	1,000	1,014	948	882	-66	-132	-6.5%	-13.0%
Total Use	2,178	2,247	2,233	2,208	-14	-38	-0.6%	-1.7%
Ending Stocks	547	481	388	320	-93	-161	-19.3%	-33.5%
Prices and Returns	(Dollars)							
Farm Price/bu.	3.42	3.49	3.9	4.2	0.4	0.7	10.4%	19.1%
Gross Market Revenue/a.	144	159	175	189	17	30	10.4%	19.1%
Variable Expenses/a.	82	93	93	93	0	0	0.0%	0.0%
Mkt+LDP Net Returns/a.	62	66	82	96	17	30	25.2%	45.9%

Appendix

Table 2: U.S. Corn Supply and Utilization

Marketing Year	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17
Area	(Million Acres)							
Planted Area	81.8	83.3	93.8	99.8	10.5	16.5	12.6%	19.8%
Harvested Area	75.1	76.1	86.3	92.0	10.2	15.8	13.3%	20.8%
Yield	(Bushels per Acre)							
Actual	147.9	167.4	167.5	167.2	0.2	-0.1	0.1%	-0.1%
Supply	(Million Bushels)							
Production	11,112	12,740	14,453	15,376	1,713	2,636	13.4%	20.7%
Imports	10	10	10	10	0	0	0.0%	0.0%
Domestic Use	8,985	10,215	12,394	13,602	2,180	3,387	21.3%	33.2%
Feed, Residual	6,000	6,114	5,553	5,310	-561	-804	-9.2%	-13.2%
Fuel Alcohol	1,600	2,642	5,415	6,892	2,773	4,251	105.0%	160.9%
Food, Seed, Other	830	888	874	863	-14	-24	-1.5%	-2.7%
Exports	2,025	2,460	2,096	1,796	-364	-664	-14.8%	-27.0%
Total Use	11,010	12,675	14,491	15,398	1,816	2,723	14.3%	21.5%
Ending Stocks	2,226	1,554	1,182	1,071	-372	-482	-23.9%	-31.0%
Prices and Returns	(Dollars)							
Farm Price/bu.	2.00	2.22	2.9	3.5	0.7	1.2	31.3%	56.2%
Gross Market Revenue/a.	\$296	\$371	\$487	\$579	\$116	\$208	31.4%	56.1%
Variable Expenses/a.	\$198	\$211	\$211	\$211	\$0	\$0	0.0%	0.0%
Mkt+LDP Net Returns/a.	\$146	\$165	\$276	\$368	\$111	\$202	67.0%	122.3%

Appendix

Table 3: U.S. Soybean Supply and Utilization

	Baseline		16bg - Level		20bg - Level		16bg Chg		20bg Chg		16bg % Chg		20bg % Chg	
Marketing Year	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17	16/17	16/17	16/17	16/17	16/17	16/17
Area	(Million Acres)													
Planted Area	72.1	71.8	66.9	65.2	-4.9	-6.6	-6.8%	-9.2%						
Harvested Area	71.4	70.6	65.8	64.1	-4.9	-6.6	-6.9%	-9.3%						
Yield	(Bushels per Acre)													
Actual	43.3	44.8	44.5	44.4	-0.3	-0.4	-0.7%	-0.9%						
Supply	(Million Bushels)													
Production	3,346	3,468	3,187	3,078	-281	-390	-8.1%	-11.3%						
Imports	3,086	3,163	2,925	2,842	-238	-320	-7.5%	-10.1%						
	4	5	5	5	0	0	0.0%	0.0%						
Domestic Use	1,881	2,176	2,049	2,012	-128	-164	-5.9%	-7.5%						
Crush	1,720	1,995	1,884	1,855	-111	-140	-5.6%	-7.0%						
Seed, Residual	161	182	165	158	-17	-24	-9.4%	-13.1%						
Exports	900	983	880	832	-103	-152	-10.5%	-15.4%						
Total Use	2,781	3,160	2,929	2,844	-231	-316	-7.3%	-10.0%						
Ending Stocks	565	309	258	234	-50	-75	-16.3%	-24.2%						
Prices and Returns	(Dollars)													
Farm Price/bu.	5.65	5.25	5.89	6.29	0.64	1.05	12.3%	19.9%						
Gross Market Revenue/a.	244.37	235.07	262.08	279.33	27.02	44.26	11.5%	18.8%						
Variable Expenses/a.	93.31	115.80	115.80	115.80	0.00	0.00	0.0%	0.0%						
Mkt+LDP Net Returns/a.	151.06	121.41	146.28	163.53	24.87	42.11	20.5%	34.7%						

Appendix

Table 4: U.S. Soybean Oil Supply and Utilization

Marketing Year	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17
	(Million Pounds)							
Supply	21,874	24,732	23,277	22,891	-1,455	-1,842	-5.9%	-7.4%
Beginning Stocks	1,699	2,140	1,937	1,884	-203	-256	-9.5%	-12.0%
Production	20,125	22,542	21,290	20,956	-1,252	-1,586	-5.6%	-7.0%
Imports	50	50	50	50	0	0	0.0%	0.0%
Domestic Use	18,000	20,315	19,682	19,524	-633	-791	-3.1%	-3.9%
Food Use	17,211	18,428	17,795	17,636	-633	-791	-3.4%	-4.3%
Biodiesel Use	789	1,887	1,887	1,887	0	0	0.0%	0.0%
Exports	1,125	2,266	1,688	1,511	-578	-755	-25.5%	-33.3%
Total Use	19,125	22,581	21,370	21,035	-1,211	-1,547	-5.4%	-6.8%
Ending Stocks	2,749	2,151	1,907	1,856	-244	-295	-11.3%	-13.7%
Prices								
Decatur/cwt	23.00	21.40	27.0	28.5	5.6	7.1	26.0%	33.2%

Appendix

Table 5: U.S. Soybean Meal Supply and Utilization

Marketing Year	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	05/06	16/17	16/17	16/17	16/17	16/17	16/17	16/17
	(Thousand Tons)							
Supply	40,850	47,946	45,311	44,600	-2,636	-3,346	-5.5%	-7.0%
Beginning Stocks	172	263	266	260	3	-3	1.3%	-1.0%
Production	40,513	47,519	44,880	44,175	-2,639	-3,343	-5.6%	-7.0%
Imports	165	165	165	165	0	0	0.0%	0.0%
Domestic Use	33,650	39,036	36,285	35,774	-2,751	-3,261	-7.0%	-8.4%
Exports	6,950	8,647	8,757	8,563	110	-84	1.3%	-1.0%
Total Use	40,600	47,682	45,042	44,337	-2,640	-3,345	-5.5%	-7.0%
Ending Stocks	250	264	268	263	4.5	-0.6	1.7%	-0.2%
Prices, 48% Protein	(Dollars)							
Decatur/ton	175	183	175	184	-7.7	1.1	-4.2%	0.6%

Appendix

Table 6: U.S. Farm Cash Receipts and Government Payments

	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	2006	2016	2016	2016	2016	2016	2016	2016
(Billion Dollars - Gross Receipts)								
Cash Receipts	231.1	257.7	271.9	284.7	14.2	27.0	5.5%	10.5%
Crops	113.8	135.6	148.6	159.9	13.0	24.3	9.6%	17.9%
Feed Grains	26.3	32.4	43.9	53.8	11.5	21.4	35.5%	66.1%
Food Grains	7.8	9.0	9.6	10.1	0.6	1.1	6.6%	11.8%
Oilseeds	16.7	17.4	18.0	18.8	0.7	1.4	4.0%	8.1%
Cotton	6.0	6.8	6.9	6.9	0.1	0.2	1.6%	2.4%
Other Crops	57.0	70.1	70.2	70.3	0.1	0.3	0.2%	0.4%
Livestock & Products	117.3	122.1	123.3	124.9	1.2	2.7	1.0%	2.2%
Red Meats	62.6	59.5	59.7	60.0	0.2	0.5	0.4%	0.9%
Dairy Products	22.6	26.2	26.7	27.5	0.5	1.2	1.8%	4.7%
Poultry, Eggs	27.5	31.2	31.7	32.1	0.4	0.9	1.4%	2.9%
Other Livestock	4.6	5.2	5.2	5.3	0.0	0.1	0.5%	1.1%
Government Payments	16.9	12.0	10.2	9.9	-1.8	-2.1	-15.3%	-17.4%
Cash Receipts + Payments	248.0	269.7	282.1	294.6	12.4	24.9	4.6%	9.2%

Appendix

Table 7: U.S. Consumer Price Indexes For Food (1982 - 1984 = 100)

	Baseline		16bg - Level	20bg - Level	16bg Chg	20bg Chg	16bg % Chg	20bg % Chg
	2006	2016	2016	2016	2016	2016	2016	2016
	(1982 - 1984 = 100)				Level change from base		Percent change from base	
CPI All Food	192	229	230	232	1.5	3.2	0.6%	1.4%
CPI Food at Home	190	226	228	230	1.5	3.3	0.7%	1.5%
CPI Cereal and Bakery Products	214	270	272	274	2.3	4.3	0.9%	1.6%
CPI Meats, Poultry, Fish and Eggs	186	216	218	221	2.1	5.0	1.0%	2.3%
CPI Meats, Poultry, and Fish	188	218	220	223	2.1	5.0	1.0%	2.3%
CPI Meats	186	216	218	221	2.5	5.9	1.1%	2.8%
CPI Beef and Veal	200	212	213	215	1.4	3.5	0.7%	1.7%
CPI Pork	177	223	228	235	5.0	12.0	2.3%	5.4%
CPI Other Meats	176	204	206	210	2.3	5.6	1.1%	2.8%
CPI Poultry	188	232	233	235	1.5	3.6	0.7%	1.5%
CPI Fish	204	236	236	236	0.0	0.0	0.0%	0.0%
CPI Eggs	158	171	172	175	1.8	4.0	1.1%	2.4%
CPI Dairy Products	160	202	204	208	2.3	5.9	1.1%	2.9%
CPI Fruits and Vegetables	247	295	295	295	0.0	0.0	0.0%	0.0%
CPI Sugar and Sweets (2)	181	171	173	175	1.6	4.0	0.9%	2.3%
CPI Fats and Oils	160	176	182	185	6.5	8.8	3.7%	5.0%