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Center for Agricultural Policy and Trade Studies
North Dakota State University

AGRICULTURAL POLICY BRIEF

No. 20 July 2011

The Impact of Alternative Blending Ratios of Ethanol on the U.S. and World Corn and Soybean Industries

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INTRODUCTION

World corn and soybean production is concentrated in a few countries unlike other major agricultural crops. The U.S. produces 41% of the world's corn and 28% of the world's soybeans. In contrast, the U.S. produces only 9% of the world's wheat. China is the next largest corn producer followed by Brazil and the European Union. These four countries produce over 60% of the world's corn. For soybean, Brazil produces 21% and Argentina produces 18% of the world soybeans compared to 28% for the U.S.

Increased ethanol production under the Energy Independence and Security Act of 2007 resulted in a significant increase in the price of corn which impacted soybeans along with most other commodities. The increased price of corn led to major structural changes in the corn industry in the U.S. as well as other corn producing and consuming countries. Corn production in the U.S. and other countries increased in response to higher prices in 2007. Prices and production returned to normal levels in 2008 and 2009, however prices increased again in late 2010 and early 2011. The main reason for the increase in corn price is due mainly to the small carry-over stocks in the United States. In 2010 U.S. corn production fell 4% while consumption increased 6% which resulted in a reduction of carry-over stocks by 60% from 1.7 billion bushels to 675 million bushels between 2009 and 2010. Changes in corn prices affect prices of other commodities, especially soybeans, mainly because they are close substitutes in production.

In addition to the corn's impact on soybean prices, Argentina had a small soybean crop in 2008. Argentine soybean production fell by 31% in 2008 compared to 2007, but soybean production returned to normal levels in 2009. Both Brazil and Argentina had smaller soybean corps in 2010 compared to 2009, but the U.S. soybean crop was slightly larger.

Industrial use of corn has increased dramatically during the past two decades. The most recent increases are due mainly to rising ethanol production, which is expected to continue growing at a significant pace. High fructose corn syrup (HFCS) production, used as a substitute for sugar in the soft drink industry, caused a major increase in demand for corn during the 1980s, utilizing 500 million bushels of corn per year. During the late 1990s and early in the 2000s, the corn required for ethanol production increased to approximately 5.0 billion bushels. These two non-traditional uses of corn account for almost 40% of the current U.S. corn crop. Ethanol production is likely to increase given recent federal legislation mandating increased ethanol use.

World soybean production has increased in recent years due mainly to the introduction of soybeans into Argentina and Brazil in the mid-1980s. Soybean production in those two countries reached 4.2 billion bushels in 2009, compared to 3.1 billion bushels in the U.S. Soybean consumption in China is the main reason for increased world soybean production. In 1995, China consumed 517 million bushels of soybeans and produced 640 million bushels. By 2009, China consumed 2.0 billion bushels and produced 631 million bushels. In 2009, China imported 60% of the soybeans traded in the world market.

Professor and Director, and Research Scientist, respectively, in the Center for Agricultural Policy and Trade Studies in Fargo, North Dakota

The objectives of this study are to estimate the impact on the U.S. corn industry of the EPAs decision to allow a change in the renewable fuels standard. Specific objectives are (1) to analyze the economic effect of E10, E15, and E20 on demand for corn and resulting price changes in the United States, (2) to evaluate the impact on soybean prices and production under the various scenarios, and (3) to evaluate the impact of the world corn and soybean markets of the various levels of EPAs renewable fuels standards.

WORLD CORN INDUSTRY

Figure 1 shows the world corn production in the major corn producing countries. U.S. corn production has increased by 67% between 1996 and 2010 with harvested acres increasing by 14%. China's corn production increased by 28% while Brazil and the EU increased production by 57% and 19%, respectively, during the same time period.

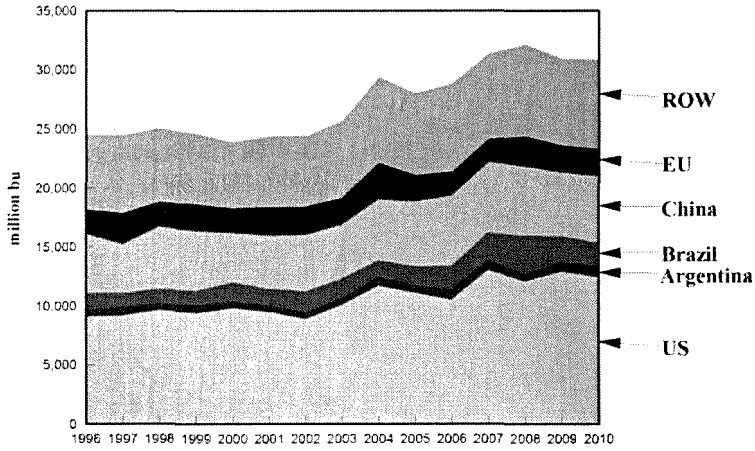

Figure 1. World Corn Production, 1996-2010

The U.S. is the main exporter of corn for the 1996-2010 period, although China, the EU, Argentina and Brazil exported corn during some years. During the past 15 years, corn exports in the U.S. have remained relatively flat, at about 2 billion bushels per year. The ROW region increased imports of corn from less than 1 billion bushels in 1996 to 2.5 billion bushels in 2010 (Figure 2).

Corn Production in the U.S.

The five largest corn producing states in the U.S. are Iowa (2.2 billion bushels), Illinois (1.9 billion bushels), Nebraska (1.4 billion bushels), Minnesota (1.2 billion bushels), and Indiana (0.9 billion bushels). Those five states produce 62% of the total quantity of corn production in the U.S. Iowa increased corn production by 28% between 1996 and 2010, while Illinois and Indiana increased corn production by 32% and 31%, respectively, during the same time period. Minnesota and Nebraska increased corn production by 46% and 19%, respectively. The other regions of the country also increased corn production. The North East, South and West increased corn production by 43%, 9%, and 81%, respectively.

Table 1 shows the states that are included in the three corn growing regions of the U.S. Several states have no corn production and are not listed in the table. Area harvested for corn increased in most regions/states between 1996 and 2010. Corn acres increased by 35% in the West region because of profit incentive and the 1996 Farm Bill which did not require planting wheat and barley program acres. Illinois and Iowa increased corn acres by 14% and 7%, respectively, while Nebraska and Indiana increased corn acres by 2% and 3%. The South region and the North East region reduced corn acres by 16% and 12%, respectively.

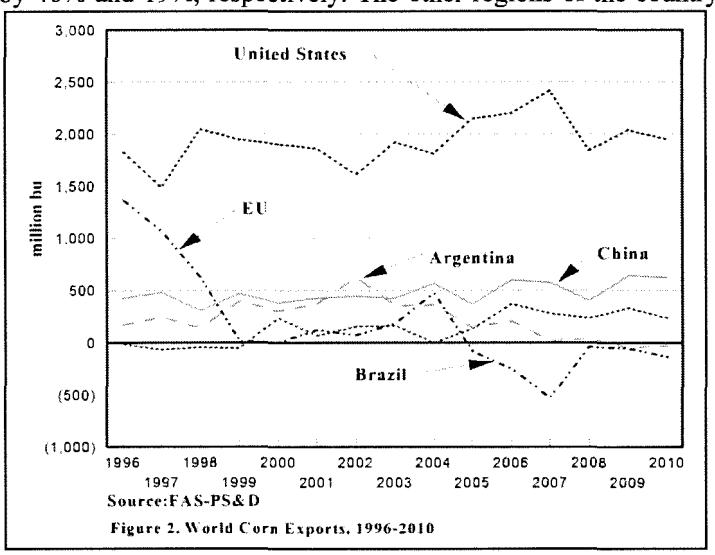

Figure 2. World Corn Exports, 1996-2010

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Table 1. Corn Producing States Divisions by Regions

Major	North East	South	West
Iowa	Delaware	Alabama	Arizona
Illinois	Maryland	Arkansas	California
Indiana	Michigan	Florida	Colorado
Minnesota	New Jersey	Georgia	Idaho
Nebraska	New York	Kentucky	Kansas
	Ohio	Louisiana	Montana
	Pennsylvania	Missouri	North Dakota
	Virginia	Mississippi	New Mexico
	Wisconsin	North Carolina	Oklahoma
	West Virginia	South Carolina	Oregon
		Tennessee	South Dakota
			Texas
			Utah
			Washington
			Wyoming

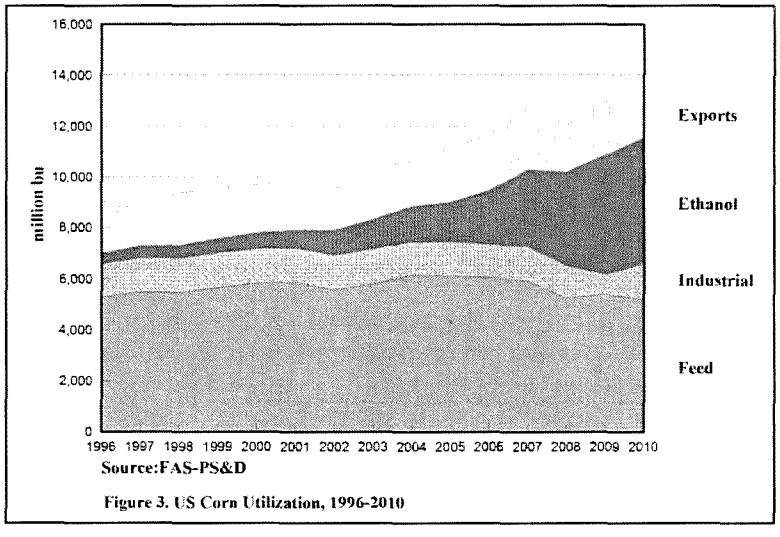

Figure 3. US Corn Utilization, 1996-2010

Figure 3 shows the U.S. utilization of corn for the years 1996 through 2010. The largest increase was for corn used for ethanol production, an increase of 1054%, from 429 million bushels in 1996 to 5.0 billion bushels for 2010. Feed use decreased by 1%, other industrial uses increased by 9% and exports increased by 6%. Total utilization increased by 65% during the time period.

WORLD SOYBEAN INDUSTRY

Figure 4 shows the world soybean production by country/region. World soybean production has increased by 106% from 4.5 billion bushels in 1996 to 9.3 billion bushels in 2010. Argentina and Brazil increased soybean production by 351% and 147%, respectively, during the same period. The U.S. increased soybean production by 40% during the same period 1996 and 2010. Soybean production also increased by 98% in the ROW region. Most of that increase took place in other South American countries.

World soybean consumption increased by 79% between 1996 and 2010 (Figure 5). Soybean consumption in China increased from 526 million bushels in 1996 to 2.5 billion bushels in 2010. In 2008 China became the largest soybean consumer in the world, passing the United States. Soybean consumption increased by 73% in Brazil and 250% in Argentina for the 1996-2010 period. U.S. consumption increased by 14% from 1.6 million bushels in 1996 to 1.8 million bushels in 2010.

The U.S., Brazil and Argentina export over 90% of the soybeans traded in the world market (Figure 6). China imports about 65% of the world's exportable supplies of soybeans. Currently the U.S. is the largest exporter of soybeans (52%), followed by Brazil (35%), and Argentina (14%). In 1995, by contrast, the U.S. exported 84% of the soybeans traded in the world market.

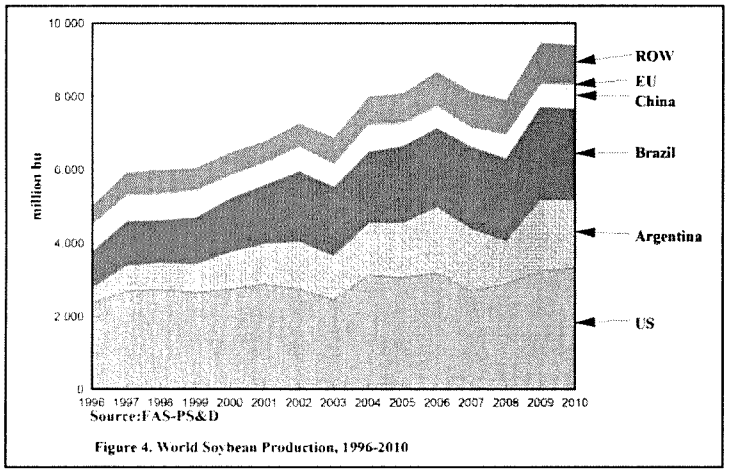

Figure 4. World Soybean Production, 1996-2010

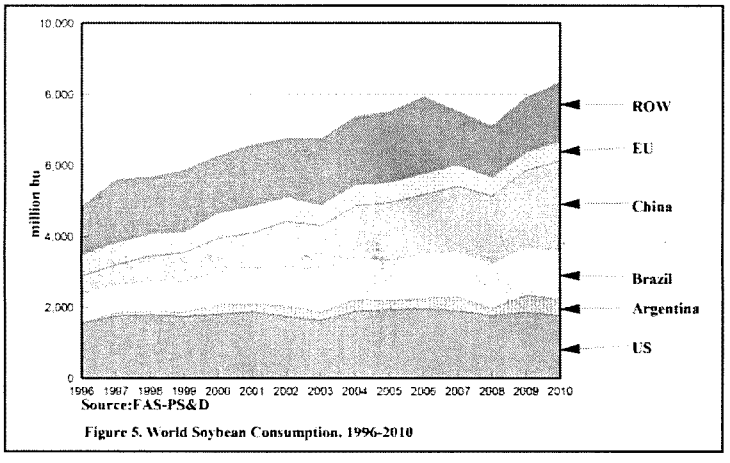

Figure 5. World Soybean Consumption, 1996-2010

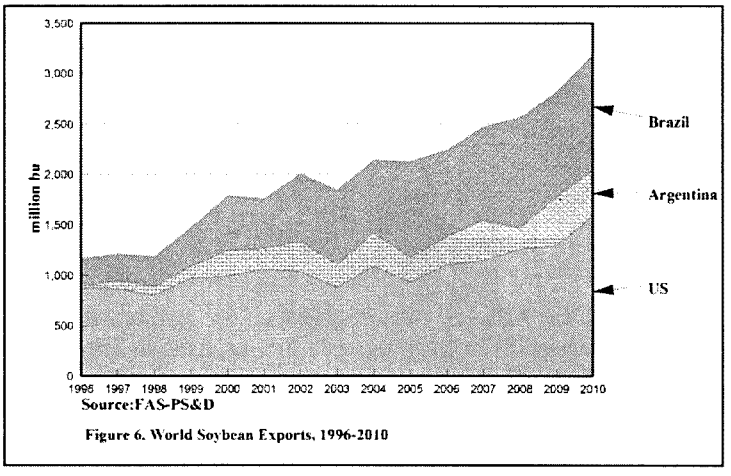

Figure 6. World Soybean Exports, 1996-2010

U.S. Soybeans

Iowa is the largest producer of soybeans (482 million bushels), followed by Illinois (466 million bushels), and Minnesota (335 million bushels). The fastest growth has been in Nebraska (84%), followed by the West (69%) and South (58%) regions.

In spite of the increased production of soybeans in Argentina and Brazil, U.S. exports of soybeans have increased by 81% between 1996 and 2010, compared to a 6% increase in corn exports. The bio-fuel use of soybeans has not been a

major factor compared to corn used for ethanol. Biodiesel makes up a very small percentage of diesel use in the U.S. Domestic crush of soybeans has increased by 15% and feed, seed, and waste have decreased 6% between 1996 and 2010 (Figure 7).

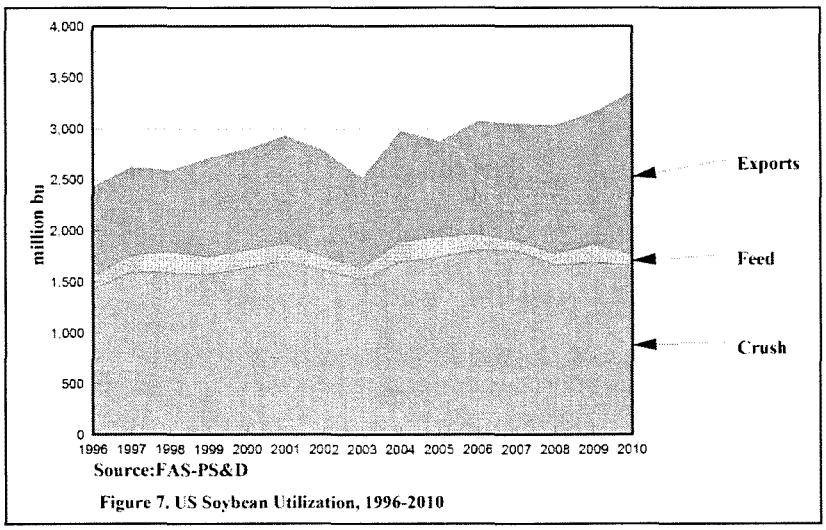

Figure 7. US Soybean Utilization, 1996-2010

ECONOMIC IMPACT OF THE MANDATED BLENDING RATIO AND THE BLENDER TAX CREDIT

Increased ethanol production under the Energy Independence and Security Act of 2007 resulted in a significant increase in the price of corn which impacted soybeans along with most other commodities. The increased price of corn led to major structural changes in the corn industry in the U.S. as well as other corn producing and consuming countries. Corn production in the U.S. and other countries increased in response to higher prices in 2007. However, prices and production returned to normal levels in 2008 and 2009. Changes in corn prices affect prices of other commodities, especially soybeans, mainly because they are close substitutes in production.

During the summer of 2008, discussions concerning the "fuel vs food" controversy strengthened because corn prices increased near $6.00 per bushel. The concern, however, lessened because the recession of 2008 lowered all commodity prices.

Ethanol is traded in the world market. The United States imports as well as exports ethanol. In 2009/2010 the United States exported 87 million gallons more than it imported. During the last 5 years, 2006-2010, the United States imported 321 million gallons of ethanol per year. The average for the last 10 years was 217 million gallons per year. Each gallon of imported ethanol is taxed $0.54 per gallon import tariff. The purpose of the tariff is to increase the cost of foreign ethanol to a level where the U.S. manufactured ethanol is competitive in the domestic market. In addition, a $0.45 blenders credit is applied to all ethanol mixed with gasoline. The purpose of the blender tax credit is to lower the cost of ethanol to a level that is near the cost of regular gasoline. The import tariff impacts the supply side of the market and the blender tax credit impacts the demand side of the market.

During late 2009 and early 2010, ethanol consumption reached a level which was called 'the Blender Wall". The Blender Wall is important because in the United States only limited blends of ethanol (E10 and E85) are generally available and E85 is available only in a limited number of states. According to the ethanol industry, this restriction has prevented the further increase in demand for ethanol. Currently, about 38% of total U.S. corn production is used for the production of ethanol.

Recently, the ethanol industry requested the Environmental Protection Agency (EPA) to increase the renewable fuel standard from E10 (10% ethanol) to E15 (15% ethanol). That change would allow the ethanol industry to continue to expand above the current Blender Wall. The EPA decided on October 13, 2010 to allow automobiles built during 2007 and later to use gasoline combined with 15% ethanol. The EPA included automobiles built after 2001. That decision to increase the allowable ethanol in gasoline will not remove the Blender Wall, it will only move it to a higher level.

The changes in renewable fuels standard will not be implemented immediately. They will be implemented over a number of years. For example, in table 2 the 15% standard will be fully implemented between 2012 and 2016 while the 20% standard will be implemented between 2012 and 2020.

Table 2. Corn Used for Ethanol Production Under Base and Alternative Scenarios

	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
	----------million bu----------									
Base	4,699	4,730	4,828	4,886	4,958	4,985	5,241	5,496	5,741	5,982
15%	4,699	5,008	5,318	5,627	5,936	6,246	6,555	6,865	7,174	7,483
% growth		5.9	10.1	15.2	19.7	25.3	25.1	24.9	25.0	25.1
20%	4,699	5,175	5,651	6,127	6,604	7,080	7,556	8,033	8,509	8,985
% growth		9.4	17.0	25.4	33.2	42.0	44.2	46.2	48.2	50.2

Corn and Soybean Production Under the Base and Alternative Scenarios

The Global Corn and Soybean Policy Simulation Model is used to estimate the impact of increasing the renewable fuels standard from 10% to 15% and 20%. The model is developed and operational in the Center for Agricultural Policy and Trade Studies, NDSU.

Figure 8 shows the production response for U.S. corn under the various scenarios. In 2020, under the 15% scenario, U.S. corn production is predicted to be 15.9 billion bushels compared to 15.0 billion under the Base scenario. Under the 20% scenario production would be 16.8 billion bushels or a 12% increase over the Base scenario's production level.

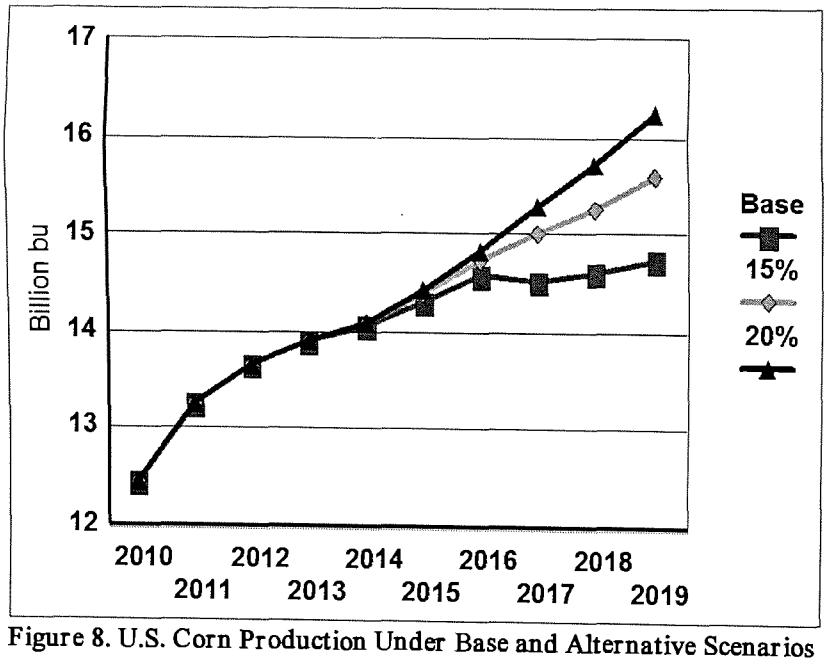

Figure 8. U.S. Corn Production Under Base and Alternative Scenarios

The production response for soybeans is shown in figure 9. Under the 15% scenario, U.S. soybean production will drop 3.6% from 3.66 billion bushels to 3.53 billion bushels compared to the Base scenario. Under the 20% scenario, soybean production will drop 7.7% from the Base scenario. Farmers will switch from soybean to corn because of higher demand from the ethanol industry.

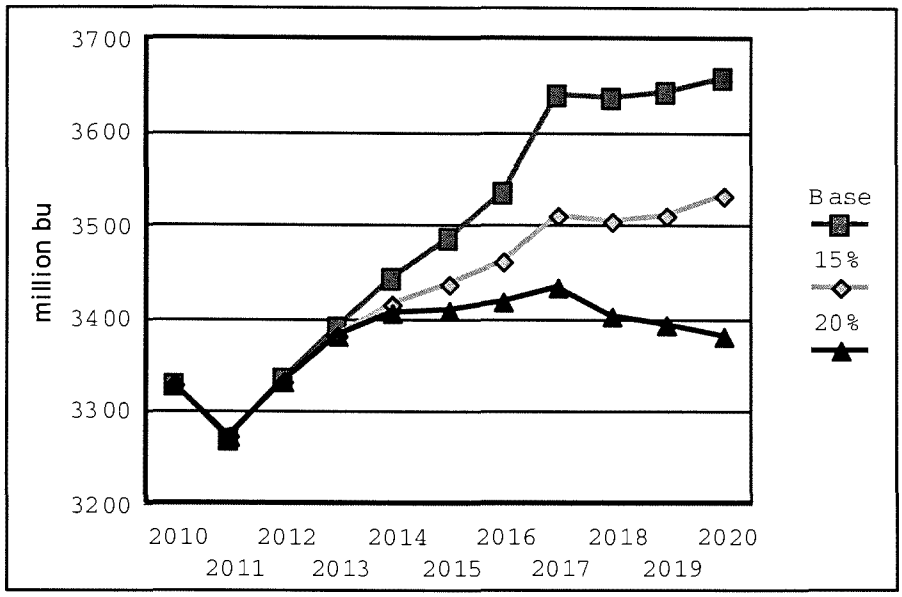

Figure 9. U.S. Soybean Production Under Base and Alternative Scenarios

Corn and Soybean Prices Under the Base and Alternative Scenarios

Figure 10 shows the effect of different blending ratios on corn price. In 2016 corn price is expected to be $0.87 higher under the 15% scenario and $1.45 higher under the 20% scenario compare to the Base scenario. In 2020 under the Base scenario, corn price is expected to be $5.35 per bushel. Corn price is expected to be $6.07 per bushel under the 15% scenario and $6.72 per bushel under the 20% scenario. Generally increasing the blending ratio from 10% to15% will increase the price of corn by 13% to 18%. The 20% scenario will increase the corn price by 26% to 31% from the Base scenario.

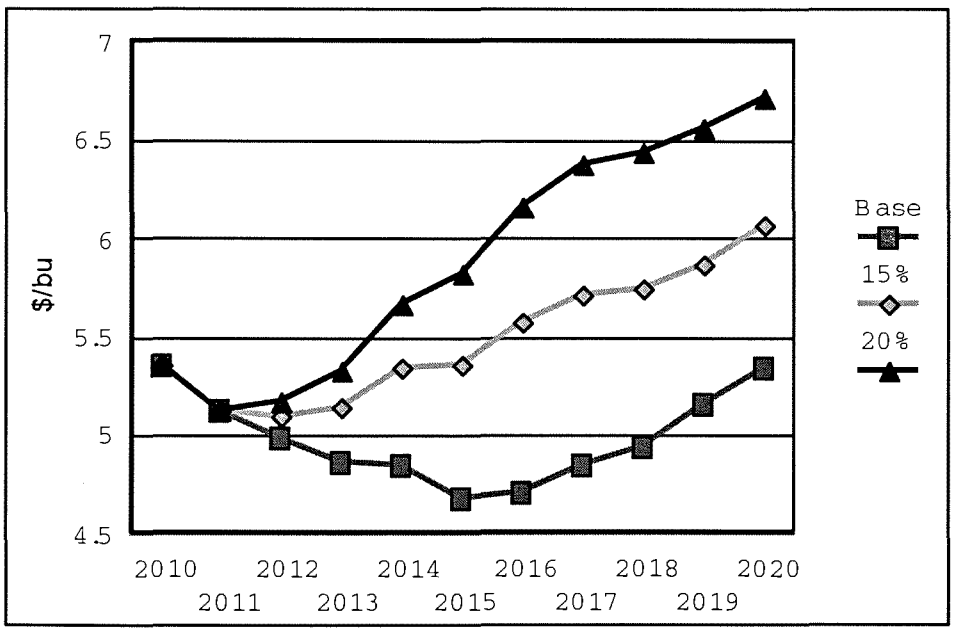

Figure 10. Corn Price Under Base and Alternative Scenarios

The increased use of corn for ethanol production also increases the price of soybeans as corn and soybean production compete for the same acres. Figure 11 shows the increases in soybean price due to increasing the ethanol blender ratio. Under the Base scenario, the soybean price is expected to decrease from $11.00 per bushel in 2011 to $9.61 per bushel in 2016 and $9.22 per bushel in 2020. Soybean price is expected to be $0.68 higher under the 15% scenario and $1.09 higher under the 20% than the Base scenario in 2020.

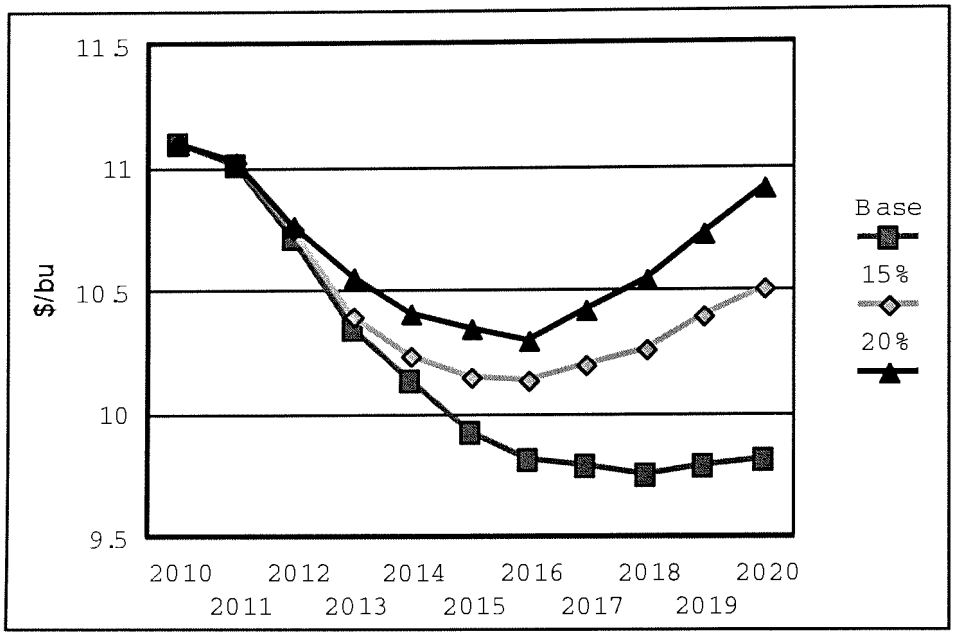

Figure 11. Soybean Price Under Base and Alternative Scenarios

Exports of Corn and Soybeans Under the Base and Alternative Scenarios

The increased blender ratio affects the exports of both corn and soybeans. With the addition use of corn for ethanol, the United States does not have the supplies available for exports. Corn exports, under the 15% scenario, are expected to decrease from 1.93 billion bushels in 2011 to 1.62 billion bushels in 2016 and 1.1 billion bushels by 2020 (Figure 12). Under the 20% scenario, exports will drop to 971 million bushels in 2016 and 444 million bushels in 2020.

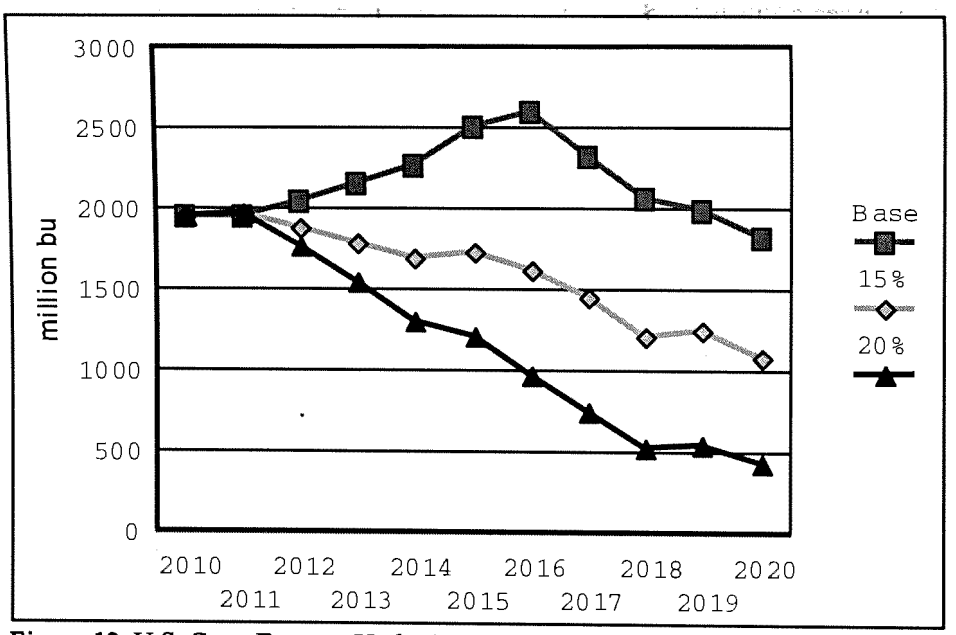

Figure 12. U.S. Corn Exports Under Base and Alternative Scenarios

Soybean exports also decreases under the alternative scenarios (Figure 13). Under the Base scenario soybean exports are expected to stay in the 1.45 billion bushel range per year, but under the 15% scenario, soybean exports will drop to 1.4 billion bushels in 2016 and 1.34 billion bushels in 2020. Under the 20% scenario, exports will drop to 1.36 billion bushels in 2016 and 1.21 billion bushels in 2020.

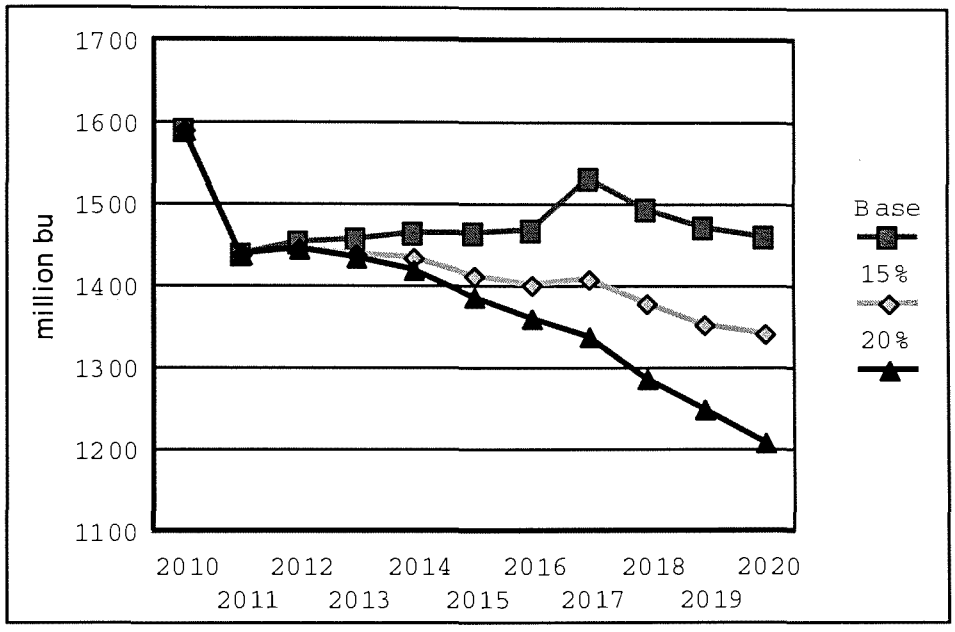

Figure 13. U.S. Soybean Exports Under Base and Alternative Scenarios

Impacts on the World's Production, Consumption and Trade of Corn and Soybeans Under the Various Scenarios

Policy changes in the United States impact world commodity markets in the same way as the production or consumption shocks in the United States. Increasing the renewable fuels standard from 10% to 15% impacts the world corn and soybean markets because when additional U.S. corn is converted to ethanol, less U.S. corn is available for export. In addition, soybean production which is transferred to corn production reduces the availability of U.S. soybeans for world trade. The increase is commodity prices also increases world production and decreases world consumption.

Table 3 show the world corn and soybean production under various scenarios for selected years. The only significant impact on soybean production is in Brazil for the year 2020. It is expected that Brazilian soybean production increases by 2.3% in 2020 under the 20% scenario and by 0.9% under the 15% scenario. All other soybean production increases are quite small. The impacts of world corn production are more pronounced and widespread. Corn production in Argentina and Brazil is expected to be 3 to 3.5% higher under both the 15% and 20% scenarios in 2016 than under the Base scenario and 5.5 to 6.0% higher in 2020. Corn production in 2016 for the EU is expected to increase over the Base scenario between 2.8% and 4.6% under the various scenarios and increase by 4.3% to 7.8% over the Base scenario in 2020. Corn production in the Rest-of-world region, not shown in Table 3, is expected to increase by 1.9% under the 15% scenario and 3.6% under the 20% scenario in 2020.

Table 4 shows the world corn and soybean consumption under the various scenarios. Unlike the production side, higher prices and smaller supplies from the United States reduces corn and soybean consumption around the world. Argentina and Brazil are expected to reduce soybean consumption between 0.3% and 6.1% compared to the Base scenario. The impacts on corn are larger. Argentina can be expected to consume less corn, between 2.1% and 4.2 less under the various scenarios. China's consumption is expected to be 1% to 2.7% less under the various scenarios. The largest impact will be felt in the EU where consumption could be almost 12% under the higher EPA renewable fuels standard. Corn consumption in the rest-of world region is expected to be 2% less than the Base scenario in 2020 for both alternative scenarios.

Table 5 shows the world corn and soybean export/import under the various scenarios. The impacts on trade are much larger than the impacts on production or consumption. For example, in the United States under the 20% scenario, corn production (consumption) is expected to be 12% higher (24% higher) than under the Base scenario while soybean production (consumption) is expected to 8% lower (1% lower) under the same scenario. U.S. exports of corn and soybeans are expected to decrease by 76% for corn and decrease by 17% for soybeans in 2020 under the 20% scenario. Argentine soybean exports are expected to increase between 4.9% and 12.1% under the various scenarios while Brazilian exports are expected to increase by 2.2% to 5.7% in 2020 under the various scenarios. Corn exports from

Argentina and Brazil are expected to increase 11% and 15% under the 20%, respectively. The export of corn from the EU is expected to increase substantially. Under the 15% scenario, corn exports will increase 81% in 2020 and under the 20% scenario corn exports should increase 150%. China will lower corn imports due to higher corn prices. Under the 20% scenario, Chinese corn exports could be 25% lower than under the Base scenario.

Table 3. World Corn and Soybeans Production Under the Various Scenarios

		Soybeans			Corn		
	Year	Base	15%	20%	Base	15%	20%
		1,000 metric tons					
Argentina	2011	1,984.1	1,984.2	1,984.2	965.6	965.6	965.6
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	2,200.9	2,201.2	2,201.9	1,006.2	1,041.7	1,065.8
			(0.0)	(0.0)		(3.5)	(5.9)
	2020	2,413.6	2,419.5	2,429.2	1,102.4	1,136.8	1,168.3
			(0.2)	(0.6)		(3.1)	(6.0)
Brazil	2011	2,591.7	2,592.4	2,592.4	2,266.7	2,266.7	2,266.7
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	2,871.8	2,872.7	2,873.5	2,470.0	2,558.6	2,610.4
			(0.0)	(0.0)		(3.6)	(5.7)
	2020	3,159.9	3,188.5	3231.5	2,731.4	2,814.9	2,881.5
			(0.9)	(2.3)		(3.1)	(5.5)
China	2011	646.6	646.6	646.6	5,616.2	5,616.2	5,616.2
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	745.6	747.6	748.7	5,984.0	5,994.2	5,999.2
			(0.3)	(0.4)		(0.2)	(0.3)
	2020	826.3	827.7	828.5	6,285.5	6,292.4	6,298.7
			(0.2)	(0.3)		(0.1)	(0.2)
EU	2011	45.8	45.8	45.8	2,340.1	2,340.1	2,340.1
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	51.6	51.7	52.2	2,778.3	2,855.3	2,906.3
			(0.3)	(1.3)		(2.8)	(4.6)
	2020	59.5	60.6	62.0	3,358.4	3,502.5	3,621.2
			(1.8)	(4.2)		(4.3)	(7.8)

Percentage change in Parenthesis

Table 4. World Corn and Soybeans Consumption Under the Various Scenarios							
		Soybeans			Corn		
	Year	Base	15%	20%	Base	15%	20%
		----------1,000 metric tons----------					
Argentina	2011	1,433.6	1,433.6	1,433.6	285.8	285.8	285.8
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	1,472.7	1,415.5	1,382.9	297.9	290.5	285.4
			(-3.9)	(-6.1)		(-2.5)	(-4.2)
	2020	1,430.2	1,388.5	1,355.8	298.2	292.0	286.4
			(-2.9)	(-5.2)		(-2.1)	(-4.0)
Brazil	2011	1,352.3	1,352.3	1,352.3	1,909.0	1,909.0	1,909.0
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	1,437.4	1,433.0	1,430.3	2,030.9	2,020.2	2,012.4
			(-0.3)	(-0.5)		(-0.5)	(-0.9)
	2020	1,491.5	1,485.0	1,466.8	2,164.9	2,156.0	2,151.8
			(-0.4)	(-1.7)		(-0.4)	(-0.6)
China	2011	2,776.9	2,776.9	2,776.9	6,437.7	6,437.7	6,437.7
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	3,187.7	3,187.3	3,187.0	7,083.7	6,968.0	6,889.7
			(-0.0)	(-0.0)		(-1.6)	(-2.7)
	2020	3,633.5	3,632.9	3,631.4	7,448.9	7,361.9	7,282.9
			(-0.0)	(-0.1)		(-1.2)	(-2.2)
EU	2011	505.8	505.8	505.8	2,352.3	2,352.3	2,352.3
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	543.1	543.1	543.1	2,824.9	2,625.8	2,491.2
			(-0.0)	(-0.0)		(-7.0)	(-11.8)
	2020	571.5	571.4	571.3	2,979.8	2,817.4	2,669.8
			(-0.0)	(-0.0)		(-5.4)	(-10.4)

Percentage change in Parenthesis

Table 5. World Corn and Soybean Export/Import Under the Various Scenarios							
		Soybeans			Corn		
	Year	Base	15%	20%	Base	15%	20%
		----------1,000 metric tons----------					
Argentina Export	2011	754.8	754.8	754.8	516.7	516.7	516.7
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	731.8	787.4	820.2	771.3	822.0	856.3
			(7.6)	(12.1)		(6.6)	(11.0)
	2020	984.0	1,032.5	1,073.7	864.3	912.9	957.4
			(4.9)	(9.1)		(5.6)	(10.8)
Brazil Export	2011	1,242.8	1,243.8	1,243.8	356.5	356.5	356.5
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	1,437.4	1,438.4	1,443.0	446.7	471.9	480.8
			(0.1)	(0.4)		(5.6)	(7.6)
	2020	1,667.9	1,704.0	1,763.8	553.6	601.9	636.6
			(2.2)	(5.7)		(8.7)	(15.0)
China Import	2011	2,129.3	2,128.9	2,128.9	640.8	640.8	640.8
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	2,455.3	2,450.8	2,449.2	1,083.6	921.2	811.0
			(-0.2)	(-0.3)		(-15.0)	(-25.2)
	2020	2,808.6	2,808.9	2,805.2	1,090.2	1,013.1	940.5
			(-0.0)	(-0.1)		(-7.1)	(-13.7)
EU Import	2011	464.6	464.6	464.6	11.4	11.4	11.4
			(0.0)	(0.0)		(0.0)	(0.0)
	2016	492.7	493.1	493.2	32.7	-259.8	-456.5
			(0.1)	(0.1)		NA	NA
	2020	513.5	512.2	510.8	-379.8	-688.9	-950.8
			(-0.2)	(-0.5)		(81.4)	(150.3)

Percentage change in Parenthesis

CONCLUSIONS

Recently, commodity markets experienced price increases which were caused, in the most part, by forces outside of agriculture. Late 2005 and early 2006 the price of crude oil doubled which drove up the price of energy. Increased energy prices increased the demand for and price of ethanol. The high price of corn caused by increases in ethanol production impacted all other commodities. During 2008, commodity prices returned to levels near historical levels. Prices again increase for most commodities in late 2010 and early 2011.

In spite of high commodity prices, world trade of U.S. corn and soybeans remained strong, due mainly to the weakening of the U.S. dollar against major currencies. China, the largest importer of soybeans, continued to import increasing amounts of soybeans for its domestic use.

The U.S. will be the largest exporter of corn; however exports should remain near current levels. Increases in corn production in the U.S. will be absorbed by the growing corn-based ethanol industry. Feed use for corn will also increase, but only moderately. Some of the increased demand will be absorbed by DDGs.

The ethanol industry in the U.S. will continue to grow but at a slower rate than in the past. The processing capacity of corn-based ethanol will not continue to increase since profit margins have narrowed in the past 2 or 3 years. The Energy Independence and Security Act of 2007 requires 36 billion gallons of ethanol to be blended with the U.S. gasoline supply with about 25 billion gallons coming from bio-mass based ethanol by 2025. The corn based ethanol industry is currently at or near the expected production of 11 billion gallons. Bio-mass ethanol production has not moved beyond the testing and research stage due to high production costs.

China's demand for soybeans continues to increase into the future as increases in its per capita income continue to change dietary patterns in the country. In 2010, China imported 2.1 billion bushels of soybeans. By 2020, it is projected to import about 2.8 billion bushels of soybeans. Most of the additional soybeans demand in China will come from the South American nations since the U.S. does not have additional land to increase soybean production.

Under the base scenario, the price of corn is expected to slowly fall from the current price of $5.36 to $4.68 in 2015 before increasing to $5.35 by 2020. Soybean price is expected slowly fall throughout the forecast period. By 2020 soybean price is expected to be $9.22 per bushel. Under the alternative scenarios, the price of corn is expected to be $6.07 per bushel for the 15% scenario and $6.72 per bushel for the 20% scenario. The alternative scenarios will increase the price of soybeans to $9.50 per bushel in 2020 under the 15% scenario and $9.70 per bushel in 2020 under the 20% scenario.

The U.S. ethanol industry used 5.0 billion bushels of corn for ethanol production in 2010 and is projected to use 6.0 billion bushels of corn for the production of ethanol in 2020. With the increased blender ratio, ethanol production will require more corn. Under the 15% scenario, 7.5 billion bushels of corn will be used for ethanol production and under the 20% scenario 9.0 billion bushels of corn will be used for ethanol production.

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