

Chapter 5. Grain and Feed

Loren W. Tauer, Professor

The December 2014 Corn Futures Contract (CZ4) on the Chicago Board of Trade closed at \$4.99 per bushel on May 1, 2014 when the new crop corn was beginning to be planted. On October 1 when corn harvest was beginning to gear up, that December 2014 Contract (CZ4) closed at \$3.21, a decrease of 36 percent from May 1! Since October 1 the price has increased somewhat but has not recovered to the highs of the spring. The large decrease in the price was due to a number of factors, including conflicts and economic conditions, the decrease in oil and then ethanol prices, but another reason for the large price drop was the estimate by the USDA that the United States, the largest producer of corn in the world, was on schedule to harvest the largest corn crop in U.S. history, the second record in a row.

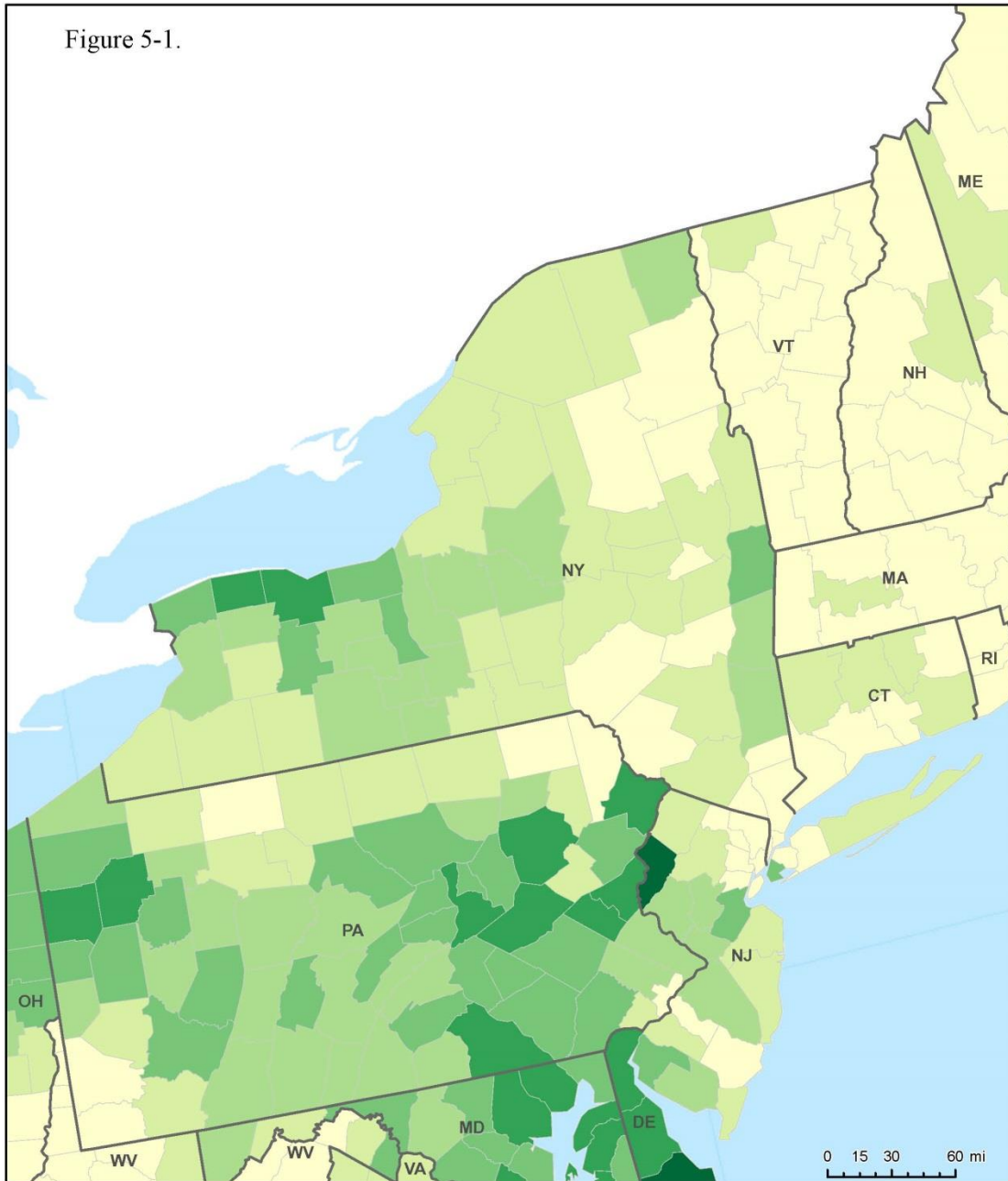
U.S. crop production estimates for the 2014 production year will again be released December 10, 2014 (this chapter is being written in late November) at which time the U.S. production for the year will be known (with estimates of variance around those estimates). What will determine prices over the rest of the crop season will be changing demand conditions as well as the Southern Hemisphere new crop beginning to arrive on the World markets in early spring of year 2015. So in this chapter I am going to present the projection of supply and demand conditions as of November 10, when the last crop report was released, and then discuss what factors may come into play that may alter those estimates. Because we only do one outlook per year I encourage you to visit web sites to obtain relevant information to revise your own estimate of grain prices over the year. I will report on corn for grain, soybeans and wheat, and then on animal feed, of which corn and soymeal are the largest components in the U.S.

The 2012 Agriculture Census which was recently released provides a picture of where corn for grain is produced in New York. A map of the counties in New York as well as the counties in neighboring states where corn for grain as a percentage of total harvested acres is shown in figure 5-1. Note that this shows the relative importance of corn in the county by the percentage of acreage in corn and not corn acreage or total corn production. The major corn areas in New York are in the Northwest and Finger Lakes counties, but a significance percentage of acreage is east of the Hudson River. In some of these counties much of the grain is used on the farm for dairy and animal feed. Figure 5-2 shows the same statistic for soybeans. It is somewhat similar to the figure for corn except that Seneca County in the Finger Lakes Region is prominently highlighted.

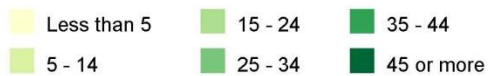
Corn Supply and Demand

The U.S. Feed Grain and Corn Supply and Use estimates which were released November 10, 2014 are shown in Table 5-1. Feed grain includes Corn, Sorghum, Barley and Oats, but Corn constitutes the bulk of feed grain, and the estimates for Corn are shown separately in the bottom of Table 5-1. The next release date is December 10, 2014 when final new crop production will be estimated. Additional release dates for the year 2015 are Jan. 12, Feb. 10, March 10, April 9, May 12, June 10, July 10, Aug. 12, Sept. 11, Oct. 9, Nov. 10, Dec. 9, all at 12:00 noon ET.

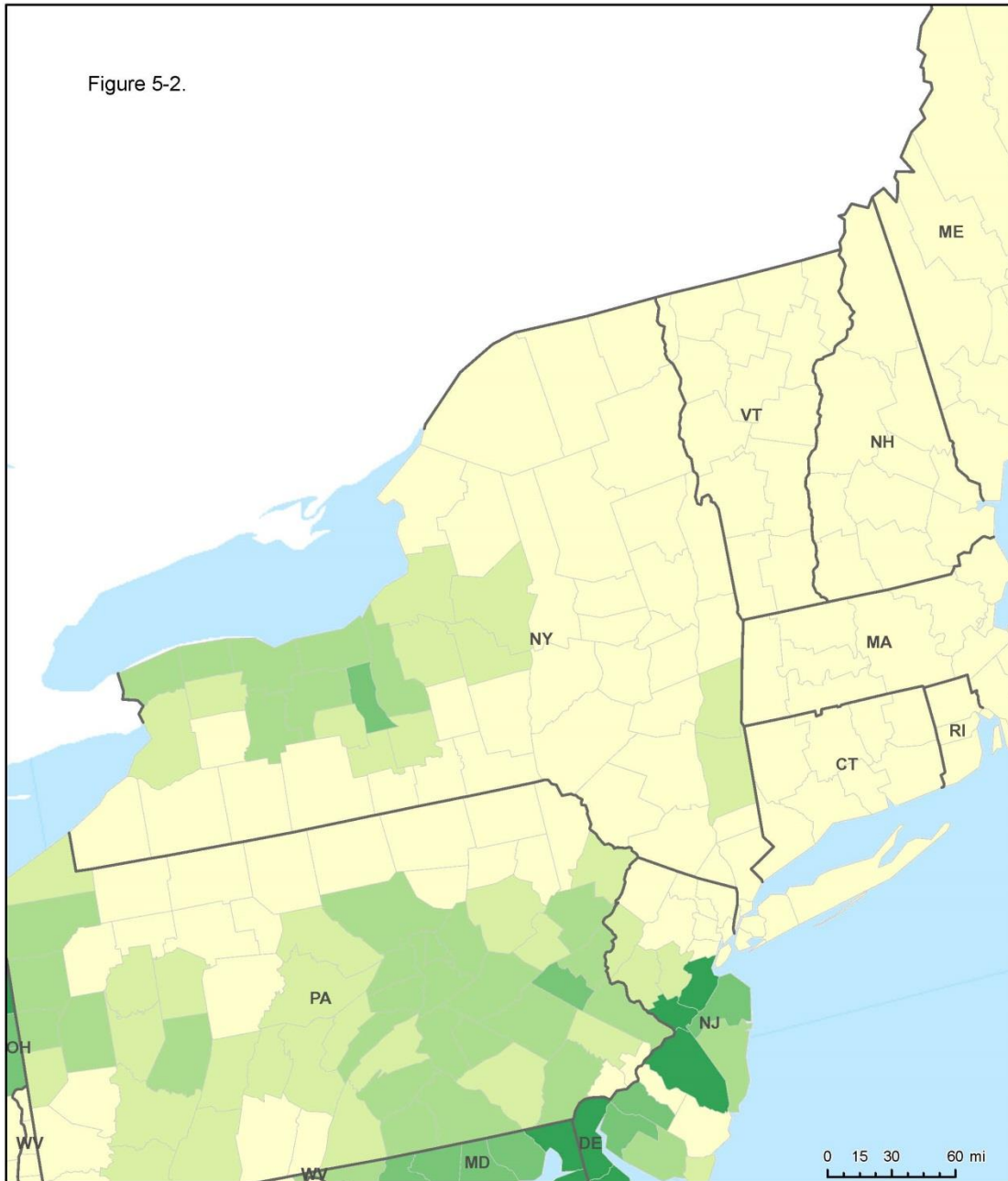
The November estimate of total U.S. corn production for the year is 14,407 million bushels, which was a downward estimate from the October estimate of 14,475 bushes. This record production will



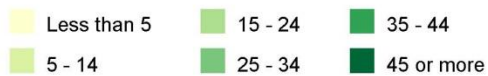
Acres of Corn Harvested for Grain as Percent of Harvested Cropland Acreage: 2012



NASS map ID: 12-M161 Date: 11/10/2014
For data collection, some county equivalent entities in AK, HI, MD, MO, and VA are included in other county equivalent entities.
Source: USDA National Agricultural Statistics Service, ESRI.
For more information: http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Ag_Census_Web_Maps/Overview/



Acres of Soybeans Harvested for Beans as Percent of Harvested Cropland Acreage: 2012



NASS map ID: 12-M191 Date: 11/10/2014
For data collection, some county equivalent entities in AK, HI, MD, MO, and VA are included in other county equivalent entities.
Source: USDA National Agricultural Statistics Service, ESRI.
For more information: http://www.agcensus.usda.gov/Publications/2012/Online_Resources/Ag_Census_Web_Maps/Overview/

TABLE 1-1. U.S. FEED GRAIN AND CORN SUPPLY AND USE ^{1/}			
November 2014			
FEED GRAINS	2012/13	2013/14 Est.	2014/15 Nov. Proj.
		<i>Million Acres</i>	
Area Planted	109.9	109.9	103.8
Area Harvested	96.6	98.2	92.7
		<i>Bushels</i>	
Yield per Harvested Acre	2.95	3.76	4.11
		<i>Million Bushels</i>	
Beginning Stocks	27.8	23.5	34.4
Production	285.1	369.3	381.2
Imports	6.4	3	3.1
Supply, Total	319.4	395.8	418.7
Feed and Residual	114.9	135.7	141.8
Food Seed & Industrial	160.3	171.3	172.5
Domestic, Total	275.2	307	314.3
Exports	20.7	54.4	50.5
Use, Total	295.8	361.4	364.8
Ending Stocks	23.5	34.4	53.9
CCC Inventory	0	0	0
Free Stocks	23.5	34.4	53.9
Outstanding Loans	0.8	2	5.9
CORN	2012/13	2013/14. Est	2014/15 Nov. Proj.
		<i>Million Acres</i>	
Area Planted	97.3	95.4	90.9
Area Harvested	87.4	87.7	83.1
		<i>Bushels</i>	
Yield per Harvested Acre	123.1	158.8	173.4
		<i>Million Bushels</i>	
Beginning Stocks	989	821	1236
Production	10755	13925	14407
Imports	160	36	25
Supply, Total	11904	14782	15668
Feed and Residual	4315	5132	5375
Food, Seed & Industrial ^{2/}	6038	6497	6535
Ethanol & by-products ^{3/}	4641	5134	5150
Domestic, Total	10353	11629	11910
Exports	730	1917	1750
Use, Total	11083	13546	13660
Ending Stocks	821	1236	2008
CCC Inventory	0	0	0
Free Stocks	821	1236	2008
Outstanding Loans	32	76	230
Avg. Farm Price (\$/bu) ^{4/}	6.89	4.46	3.20 - 3.80

Note: Totals may not add due to rounding. 1/ Marketing year beginning September 1 for corn and sorghum; June 1 for barley and oats. 2/ For a breakout of FSI corn uses, see Feed Outlook table 5 or access the data on the Web through the Feed Grains Database at www.ers.usda.gov/data-products/feed-grains-database.aspx. 3/ Corn processed in ethanol plants to produce ethanol and by-products including distillers' grains, corn gluten feed, corn gluten meal, and corn oil. 4/ Marketing-year weighted average price received by farmers.

be obtained from a projected 83.1 million harvested acres, which is less than the 87.7 million acres harvested the previous year and 87.4 million acres in 2012. The record production this year is from a yield per acre of 173.4 bushels, the result of excellent growing conditions this summer. This is a much higher yield than the 123.1 bushels per acre harvested during the drought year of 2012 and the yield of 156.8 bushels per acre in 2013.

Although the total corn supply this year at 15,668 million bushels will be more than the 14,782 million bushels supply last year, given the weaker global economy and the stronger U.S. dollar, 167 million fewer bushels are expected to be exported this year. Given the low projected price, 243 million more bushels are expected to be used as feed in the U.S. Ethanol plants were running at full capacity this year, earning record profits early in the year, so only 16 more million bushels are expected to be turned into ethanol alcohol. Given these estimates of uses during the year, the ending stocks is projected to be 2,008 million bushels, which is 14 percent of the production, and lower than the ending stocks 2013/14 (beginning this year) of 1,236 million bushels. This leads to a projected average weighted farm price for the coming year from \$3.20 to \$3.80, much lower than the average farm price of \$6.89 for the year 2012/13. A price less than half of the price from two years earlier is a significant change and will require major adjustment on the part of the industry, especially if this low price continues for more than one year. Current corn-belt land values are not sustainable on three dollar corn.

Supply changes that may occur

The most significant supply change may be what happens to production in the Southern Hemisphere. Brazil and Argentina have increasingly become major players in the corn market so the market will be keeping an eye on growing conditions in those countries to determine the size of those crops as their growing season progresses. Later in the year the developing conditions of the 2015 U.S. corn crop will become a factor. The record yield per acre of this year may not be repeated and if growing conditions deteriorate during the coming summer that should strengthen corn prices. If a farmer has storage and can maintain grain quality into the summer months there may be an opportunity to benefit this coming summer from possible price increases.

A supply factor impacting movement to users will be the ability of the U.S. transportation system to move the corn from production to usage areas, including exports. Given the railroads are moving much of the increased oil production out of North Dakota, the ability of the railroads to move a larger amount of grain to export loading facilities is limited. However, large amounts of corn is used in ethanol production in localized plants, especially in the northwest corn belt, which is typically moved by trucks, so the bottleneck in the trains may not be as significant as some suspect.

One issue always with a bumper crop, however, is the ability of the industry to dry and adequately store the corn until needed. Temporary storage must be used and maintaining the quality of the corn in temporary storage until consumed can be a challenge leading to deterioration in quality, especially if transportation is not available to move the corn to users. Some grain may become unsuitable especially for ethanol production but also for animal feeding. Given the weak basis that typically occurs in regionally surplus regions, and the low interest rate, many farmers will store grain given a belief that the upside potential might be more than downside risk.

Demand changes that may occur

Ethanol plants were extremely profitable for the last few years and were running flat out producing ethanol. Ethanol producers had a very profitable year until the recent decrease in ethanol price. Oil prices continue to fall which will impact ethanol price and the operating margins for ethanol plants. As with most markets biofuels have become an international market but often subject to policy distorting mandates.

The economies of the world will influence demand for animal protein and the use of corn in the production of animal protein as well as products milled from corn. Europe is still struggling economically with the German economy possibly not as robust. China's growth continues but it appears that growth may occur at a decreased rate. None-the-less China appears to be committed to expanding their livestock industry through large scale production systems that will depend upon imported feed ingredients given the limited capacity to expand crop production in China and limited ability of China too domestically collect and move the large quantities of feed necessary to sustain the larger livestock operations.

If the U.S. economy continues to expand then there will be increased demand for meat. Poultry can be scaled up quickly and pork to a certain extent, but given the reduction in the U.S. beef cow herd there will be a limit to beef expansion. A strong U.S. economy, however, will also strengthen the U.S. dollar which will make agricultural commodities and products more expensive. If the Federal Reserve allows interest rates to increase during 2015 that will increase the demand for U.S. dollars for bond investments, as well as purchases of other U.S assets.

Armed conflicts historically have meant higher agricultural prices as production is reduced or supply channels are disrupted. Eyes will be on the conflict in the Ukraine and the decision by Russia to not purchase agricultural products from Europe, the U.S. and other signature countries restricting specific exports to Russia. Corn and many agricultural commodities are fungible so Russia will be able to obtain these commodity products from Brazil and other countries, often at only a slight increased cost of transportation. Also a factor is that Ukraine is one of the largest producers of corn in Europe and any expanded conflict may disrupt the production of corn in the Ukraine this coming summer.

Soybean Supply and Demand

Like corn in the coarse grains, soybeans are the major component of the U.S. oilseed production, which includes sunflower, cottonseed, rapeseed, as well as peanuts. U.S. Soybean production for this year is projected to be 3,958 million bushels with a record yield of 47.5 bushels per acre, which is greater than the 44 bushels per acre the previous year and 40 bushels per acre in the production year of 2012. This yield per acre increase of 9.3 percent is slightly greater than the 9.2 percent increase in corn yields, but unlike acres of corn harvested that decreased this year, the acres of soybeans harvested increased from 76.8 million acres to 84.2 million acres. This large harvest of soybeans also had a deterioration impact on soybeans prices into this fall but not to the same extend as corn. Although soybean oil can be used as a biofuel, it is not as extensively used for that purpose as is corn for ethanol production (and biodiesel). The price of oil and then ethanol fell dramatically through the summer.

Soybean crush in the U.S. is projected to be 1,780 million bushels this year, up from 1,734 million bushels the previous year. Exports are also projected to be relatively strong at 1,720 million

bushels compared to 1,647 bushels the previous year. Ending stocks are projected to be at 450 million bushels compared to ending stocks last year of only 92 million bushels.

Given the projected domestic use and exports the season average soybean price in the U.S. is projected to be between \$9.00 and \$11.00 per bushel. With a soybean price of \$10.00 and a corn price of possibility \$3.50, the soybean price to corn price ratio would be 2.86. There may be adjustment in either or both prices to approach the average ratio of 2.52 since 1975. Carl Zulauf at The Ohio State University states that the price ratio should be between 2.19 and 2.85 at a 67percent probability using monthly data since 1975 (<http://farmdocdaily.illinois.edu/2013/09/soybean-corn-price-ratios-since-1975.html>). If this high ratio continues into the spring there will be an incentive for farmers to shift some acreage from corn to soybeans, especially if the ratio also occurs in next year's corn and soybean futures prices.

The relationship between corn and soybeans not only exists on the farm but also at the usage level. Feed rations in the U.S. use corn as the primary carbohydrate source and soybean meal as the primary carbohydrate source with roughage included for the ruminants. Distillers' grain from corn ethanol is higher in protein than corn which reduces the amount of supplemental protein (soybean meal) necessary in the ration.

Changes in Soybean Supply and Demand

Many of the identical factors impacting the supply and demand for corn will also impact the supply and demand for soybeans given the relationship between the two commodities in production and usage. Production of soybeans in the Southern Hemisphere has a more significant impact than production of corn given the large amount of U.S. soybeans exported and the large production of soybeans produced in Brazil and also exported. The bumper crop of soybeans in the Corn Belt is not as problematic for storage and quality as for corn if for no other reason than soybeans are harvested first and get the storage bins before corn is harvested. Given the higher value per bushel, soybeans would be given the preference for indoor storage.

A strong U.S. dollar will reduce the demand for soybeans as will weaker world economies. If animal protein production continues to expand in Asia then demand for soybean meal will continue to be strong as will corn. Although protein feed substitutes exist for soybean meal as there are carbohydrate substitutes for corn, there is limited substitution potential because many of those substitutes are allocated to human diets.

TABLE 5-2. U.S. SOYBEANS AND PRODUCTS SUPPLY AND USE (DOMESTIC MEASURE) ^{1/}			
November 2014			
SOYBEANS	2012/13	2013/14 Est	2014/15 Nov. Proj.
		<i>Million Acres</i>	
Area Planted	77.2	76.8	84.2
Area Harvested	76.1	76.3	83.4
		<i>Bushels</i>	
Yield per Harvested Acre	40	44	47.5
		<i>Million Bushels</i>	
Beginning Stocks	169	141	92
Production	3042	3358	3958
Imports	41	72	15
Supply, Total	3252	3570	4065
Crushings	1689	1734	1780
Exports	1317	1647	1720
Seed	89	98	92
Residual	16	0	23
Use, Total	3111	3478	3615
Ending Stocks	141	92	450
Avg. Farm Price (\$/bu) ^{2/}	14.4	13	9.00 - 11.00
SOYBEAN OIL	2012/13	2013/14 Est	2014/15 Nov. Proj
		<i>Million Pounds</i>	
Beginning Stocks	2540	1705	1165
Production ^{4/}	19820	20130	20560
Imports	196	165	160
Supply, Total	22555	22000	21885
Domestic			
Disappearance	18687	18958	18450
Biodiesel ^{3/}	4689	4800	4800
Food, Feed & other Industrial	13998	14158	13650
Exports	2164	1877	2100
Use, Total	20850	20835	20550
Ending stocks	1705	1165	1335
Avg. Price (c/lb) ^{2/}	47.13	38.23	34.00 - 38.00

TABLE 5-2. (Cont'd.)

SOYBEAN MEAL	2012/13	2013/14 Est	2014/15 Nov. Proj
	<i>Thousand Short Tons</i>		
Beginning Stocks	300	275	250
Production ^{4/}	39875	40685	42785
Imports	245	336	165
Supply, Total	40420	41296	43200
Domestic			
Disappearance	28969	29496	30100
Exports	11176	11550	12800
Use, Total	40145	41046	42900
Ending Stocks	275	250	300
Avg. Price (\$/s.t.)			
2/	468.11	489.94	330.00 - 370.00

Note: Totals may not add due to rounding. Reliability calculations at end of report. 1/ Marketing year beginning September 1 for soybeans; October 1 for soybean oil and soybean meal. 2/ Prices: soybeans, marketing year weighted average price received by farmers; oil, simple average of crude soybean oil, Decatur; meal, simple average of 48 percent protein, Decatur. 3/ Reflects only biodiesel made from methyl ester as reported by the U.S. Energy Information Administration. 4/ Based on an October year crush of 1,725 million bushels for 2013/14 and 1,800 million bushels for 2014/15.

Wheat Supply and Demand

Soybeans have supplanted wheat as the second largest harvested crop in the state of New York (other than hay). In 2014 there were 95,000 acres of wheat harvested (all winter) and 397,000 acres of soybeans. Table 5-3 lists the production and usage of all wheat and then because the various types of wheat are used to produce different type of products, Table 5-3 also lists the production by type of wheat. The U.S. production of soft red winter wheat for 2014/2015 is projected to be 455 million bushels, of which 266 will be used domestically and 155 million bushels will be exported. This will leave ending stocks of 162 million bushels given beginning stocks of 113 million bushels. The projected wheat price this year is between \$5.65 and \$6.15, which is a decrease from last year's price of \$6.87 and the 2012/2013 year price of \$7.77 per bushel. Again, determining factors for wheat prices will be production in other countries as well as global demand for wheat based upon the global economic conditions.

TABLE 5-3. U.S. WHEAT SUPPLY AND USE ^{1/}			
	November 2014		
	2012/13	2013/14	2014/15
		Estimate	Nov. Projection
Area Planted	55.3	56.2	56.8
Area Harvested	48.8	45.3	46.4
Yield per Harvested Acre	46.2	47.1	43.7
Beginning Stocks	743	718	590
Production	2252	2135	2026
Imports	123	169	170
Supply, Total	3118	3021	2785
Food	945	951	960
Seed	73	77	76
Feed and Residual	370	228	180
Domestic, Total	1388	1256	1216
Exports	1012	1176	925
Use, Total	2400	2432	2141
Ending Stocks	718	590	644
CCC Inventory	0	0	0
Free Stocks	718	590	644
Outstanding Loans	8	8	45
Avg. Farm Price (\$/bu) ^{2/}	7.77	6.87	5.65 - 6.15

TABLE 5-3 CONTINUED. U.S. WHEAT BY CLASS: SUPPLY AND USE							
Year beginning June 1		Hard Red Winter	Hard Red Spring	Soft Red Winter	White	Durum	Total
<i>Million Bushels</i>							
2013/14 (Est.)	Beginning Stocks	343	165	124	63	23	718
	Production	747	491	568	271	58	2135
	Supply, Total	1109	733	713	341	125	3021
	3/ Domestic Use	427	318	318	120	73	1256
	Exports	446	246	283	171	31	1176
	Use, Total	873	564	600	291	103	2432
	Ending Stocks, Total	236	169	113	50	22	590
	2014/15 (Proj.)	Beginning Stocks	236	169	113	50	22
Production		738	556	455	224	53	2026
Supply, Total		985	805	583	283	130	2785
3/ Domestic Use		453	308	266	101	88	1216
Exports		320	280	155	145	25	925
Use, Total		773	588	421	246	113	2141
Ending Stocks, Total							
		Nov	212	217	162	37	17
	Oct	192	247	162	37	16	654

Note: Totals may not add due to rounding. 1/ Marketing year beginning June 1. 2/ Marketing-year weighted average price received by farmers. 3/ Includes imports.

Feed Supply and Price

Although there are many different types of livestock produced in New York the major feed use is for milk production. Most farmers produce most if not all of the forage for dairy, but that forage is augmented with energy from corn and protein from soybeans, as well as other ingredients to produce balanced rations for group feeding. Given the importance of corn and soybeans in the milk production ration, the new Margin Protection Program (MPP) for dairy producers uses the price of corn, soybean meal, and alfalfa to determine the cost of a feed ration required to produce hundred pounds of milk. The signup deadline for the MPP for 2015 was December 5, 2014. The late sign up date was due to the delayed time required to implement the new program. Future year signups will be during the period July 1 through September 30 for the following calendar year. So before the end of September 30, 2015 producers will need to make a decision concerning the level of protection to purchase for calendar year 2016.

The milk production margin is calculated as the difference between the price of a hundredweight of milk and the feed cost required to produce that milk. The milk price used in calculating the Margin is the U.S. all-milk price. The feed cost is 1.0728 times the U.S. average corn price (per bushel) plus 0.0137 times U.S. average alfalfa price (per ton) plus 0.00735 times the Central Illinois soybean meal price (per ton). The prices of milk, corn, and alfalfa will be obtained from the USDA publication *Agricultural Prices*. The soybean meal price is published by the USDA Agricultural Marketing Service (AMS). Actual payment is based upon these prices and not the price that an individual dairy producer receives for milk or pays for purchased feed. Here is the USDA web site with the documents and which will list the computed monthly margins as they occur.

<http://www.fsa.usda.gov/FSA/webapp?area=home&subject=dmpp&topic=landing>

There are a number of decision tools that have been constructed to assist dairy producers in deciding what coverage level from \$4.00 to \$8.00 to select. (There is no premium for the base \$4.00 coverage except for the \$100 administrative fee.) The best decision tools forecast upper and lower margin bounds which are based upon the futures prices for corn and soybean meal with variability of those prices extracted from option prices on those futures. Unfortunately there is no futures price for hay. However, because prices individual producers will pay for feed will differ from these prices it would be useful for producers to record the actual prices they received for milk and paid for the feed components of corn, soybean meal and alfalfa (if purchased) so that individual farm margins can be determined in relationship to the projected and later published margins. If a producer's margin is much greater than the MPP computed margin, maybe because of much higher milk prices, then that deviation should be a factor in deciding what level of margin protection to purchase.

Keeping up with market developments

There are numerous sources of data and information on corn, soybean, wheat, and feed price determinants. Some are public information from agricultural magazines and agricultural universities while others are proprietary information from advisory services in which you can fee subscribe. Many of these sources use as a starting point the supply and demand usage estimates of the USDA which can be found at the Office of the Chief Economist, USDA web site: <http://www.usda.gov/oce/commodity/wasde/>. You can visit that web site on release dates for the revised supply and demand estimates, or you can register on that site to have those estimates emailed to you on release dates. You can also subscribe electronically to *Agricultural Prices*.

Have a successful marketing year!