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Lack of Chinese Approval for Import of U.S. Agricultural Products Containing Agrisure Viptera™ MIR 162: A Case Study on Economic Impacts in Marketing Year 2013/14

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Foreword

The National Grain and Feed Association (NGFA) and North American Export Grain Association (NAEGA) seek to facilitate trade and provide for regulatory compliance while improving the environment for all crop production methods, including crop biotechnology. To reap the greatest benefit across the value chain, U.S. farmers and agricultural companies need the ability to market agricultural products to both domestic and foreign customers.

Access to international markets for U.S. farm products can be disrupted or prevented by a lack of regulatory approvals for biotechnology-enhanced events that are approved for planting and production in the exporting country, but not yet by governmental authorities in the country of import. In the aftermath of recent disruptions in corn trade between the United States and China resulting from the presence of Syngenta North America Inc.'s Agrisure Viptera™ MIR162, which has not been approved yet for import by the Chinese government, the NGFA undertook an analysis to assess the economic impact to the U.S. grain value chain. This report conveys the results of that analysis, and is provided as a case study to inform stakeholders of the ramifications of commercialization of crop biotechnology prior to gaining approvals in major U.S. export markets.

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Introduction

In November 2013, China began enforcing a zero tolerance policy for the presence of Syngenta's Agrisure Viptera™ MIR 162 (hereafter referred to as MIR 162) in corn imports. This development resulted in a series of trade disruptions – including testing; delays in vessel discharge; and deferrals, diversion and rejections of cargoes – when MIR 162 subsequently was detected in U.S shipments of corn and distillers dried grains with solubles (DDGS). These disruptions effectively shut U.S. corn farmers out of China's feed grain import market, which previously almost exclusively had been supplied by the United States.

China subsequently has taken actions to utilize domestic, as well as international alternatives to U.S. corn. For instance, China's imports of U.S. grain sorghum have increased significantly. China also has sourced corn from Ukraine. And most recently, Brazil and Argentina each were granted approval to begin exporting corn to China.

This analysis estimates economic losses to U.S. sellers of corn and other affected commodities attributable to the loss of the Chinese corn market for the 2013/14 marketing year (September 1, 2013 to August 30, 2014).

Highlights

- U.S. corn exports to China have been disrupted as a result of China's enforcement of zero import tolerance for MIR 162. The disruption, tied to positive detections of MIR 162 that began in November 2013, has virtually halted U.S. corn trade with China. In addition, U.S. trade with China DDGS and other U.S. crops is being conducted in a riskier market environment.

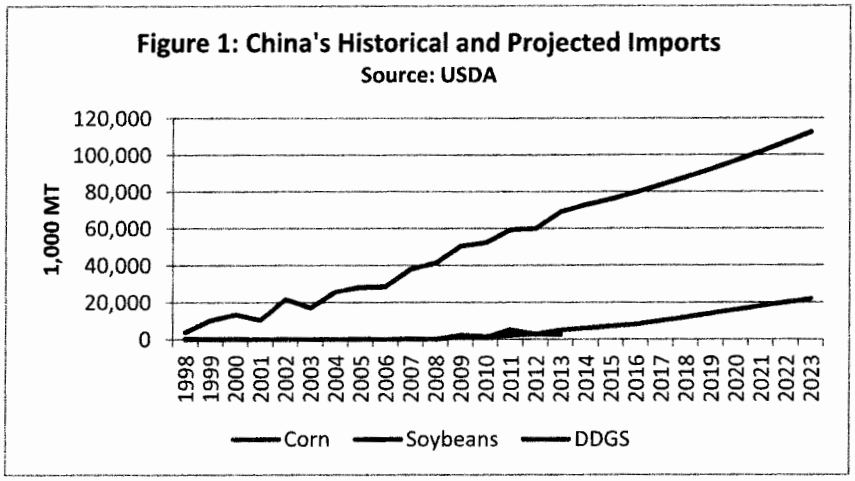
- China's corn import rejections before and after discharge, as reported to NGFA on an aggregated basis by U.S. exporters for purposes of this analysis, amount to a combined 1.45 million metric tons (mmt), substantially greater than the 908,800 metric tons (mt) reported most recently by the Chinese government.

- The U.S. Department of Agriculture's (USDA) 2013/14 marketing year corn import projection for China was reduced from 7 mmt to 5 mmt in January 2014. Based upon export sales commitment data from USDA, the United States was anticipated to be the principal corn exporter to China. However, fulfilled exports of U.S. corn, as reported for purposes of this analysis by U.S. exporters, total only 1.23 mmt.

- The negative price impact of this trade disruption has not been confined to U.S. corn prices. Other sectors of the U.S. grain value chain also have been affected negatively, including most notably DDGS and the soybean complex because of the substitutability of corn, DDGS and soybean meal in livestock and poultry rations, as well as the increased risk of detecting MIR 162 in U.S. DDGS and soybean shipments to China.

- Financial losses stemming from MIR 162-induced trade disruptions continue to mount. Losses to the U.S. corn, DDGS and soybean sectors of the U.S. grain industry are estimated to range from $1 billion to $2.9 billion.

- Regaining and maintaining access to the Chinese import market is critically important to both the short-and long-term prospects for U.S. agriculture, given the current size and projected growth in China's imports of corn, DDGS and soybeans. USDA currently forecasts China's corn imports to increase from 2.7 mmt in 2012 to 22 mmt by 2023, which would account for nearly half the projected growth in world corn trade. Figure 1 displays China's imports over the last 15 years and USDA's 10-year projection of rising demand.



Overview

Since mid-November 2013, China has enforced a zero tolerance for Syngenta's MIR 162 because of the trait's lack of approval for import. Consequently, the brisk corn trade that existed previously between the United States and China came to a halt, and other costly actions began to occur, such as testing of shipments; delays in discharge; and deferrals, diversions and rejections of cargoes. Further, a serious adverse economic impact on U.S. DDGS trade began in December that included the rejection of at least 2,000 mt. Moreover, a concurrent downward pressure was exerted on soybean meal prices and U.S. soybean exports.

Analysis

This analysis quantifies the economic losses sustained by U.S. corn exporters, describes impacts on the DDGS market and soybean complex, and projects impacts on the rest of the U.S. agricultural economy during the 2013/14 corn and soybean marketing year. This analysis is based upon the assumption that adverse economic impacts associated with shipment disruptions – and the ensuing decline in U.S. prices for corn, DDGS, soybean meal, soybeans and related products – have not been offset by Syngenta, given its stated unwillingness to do so.

U.S. Supply and Demand for Corn and DDGS

For a perspective on the importance of exports to both the U.S. corn and DDGS markets, supply and demand balance sheets are included in Tables 1 and 2. For the marketing years encompassing 2006/07 through 2013/14, exports have averaged 14% of total corn demand and 20% of total DDGS demand. After corn exports lost market share to more inelastic ethanol demand following the drought-reduced 2012 crop, exports rebounded in 2013/14 and have been instrumental in sustaining U.S. corn market prices above break-even levels for producers.

Table 1: U.S. supply and demand for corn (million bushels) 1/

Item	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Beginning stocks	1,967	1,304	1,624	1,673	1,708	1,128	989	821
Production	10,531	13,038	12,092	13,092	12,447	12,360	10,780	13,925
Imports	12	20	14	8	28	29	162	35
Total Supply	12,510	14,362	13,729	14,774	14,182	13,517	11,932	14,781
Feed & residual	5,540	5,858	5,182	5,126	4,799	4,557	4,335	5,300
Food, seed, & industrial	3,541	4,442	5,025	5,961	6,426	6,428	6,044	6,400
Ethanol and by-products	2,119	3,049	3,709	4,591	5,019	5,000	4,648	5,000
Domestic use	9,081	10,300	10,207	11,087	11,225	10,985	10,379	11,700
Exports	2,125	2,437	1,849	1,979	1,830	1,543	731	1,625
Total Demand	11,207	12,737	12,056	13,066	13,055	12,528	11,111	13,325
Ending stocks	1,304	1,624	1,673	1,708	1,128	989	821	1,456

1/ As of March 2014.

Table 2: U.S. supply and demand for DDGs (1,000 metric tons) 1/

Year	Production 2/	Imports	Exports	Domestic Use
	----------Supply----------		----------Demand----------	
2013/14	38,555	NA	NA	NA
2012/13	35,841	414	8,195	28,060
2011/12	38,555	351	7,581	31,325
2010/11	38,702	429	8,286	30,845
2009/10	35,402	409	8,279	27,531
2008/09	28,600	251	4,969	23,883
2007/08	23,511	145	3,921	19,735
2006/07	16,340	191	1,780	14,751

1/ As of March 2014.

2/ Assumes 17 pounds of DDGs per bushel of corn used for ethanol.

U.S. Corn and DDGS Exports

According to USDA forecasts, U.S. corn exports to China currently are projected to reach 22 mmt by 2023, accounting for nearly half the projected growth in total world corn trade. Of course, there is no guarantee that the United States will be the principal exporter to this potentially dynamic market. Other corn exporting nations, such as Ukraine, are capable of replacing the United States as the principal exporter to China if issues such as unapproved biotech traits continue to disrupt trade between the United States and China.

Annual U.S. corn exports to primary destinations are shown in Table 3. As of December 2013, USDA projected Chinese imports for 2013/14 to reach 7 mmt. However, USDA in January 2014 reduced its projection to 5 mmt in response to the halt in corn trade between the United States and China. According to USDA's Foreign Agricultural Service (FAS), U.S. corn export commitments to China for the 2013/14 marketing year as of March 20, 2014 amount to 4.1 mmt, down from 4.695 mmt in mid-November 2013 when the export rejections began.

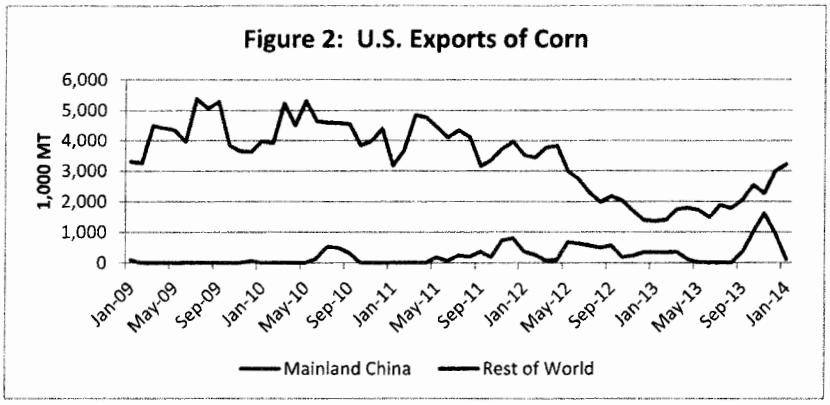
Further downward revisions for corn export commitments are anticipated because of the halt in U.S. corn trade with China.

Table 3: U.S. exports of corn (1,000 metric tons) 1/

Country/region	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
Japan	15,109	14,689	15,519	15,128	13,914	11,518	6,866	
Mexico	8,768	9,818	7,841	8,253	7,483	10,182	4,581	
China (Mainland)	49	9	90	1,199	980	5,146	2,417	
Venezuela	515	974	1,204	1,106	856	1,336	1,078	
China (Taiwan)	4,329	3,844	3,609	3,181	2,737	1,553	528	
Canada	2,050	3,140	1,842	2,098	958	870	469	
South Korea	4,043	8,556	5,196	7,076	6,123	3,564	451	
Saudi Arabia	418	1,053	504	755	576	362	346	
Cuba	538	810	684	583	454	475	274	
Jamaica	255	248	236	234	283	253	243	
Other	17,914	18,773	10,240	10,657	12,118	3,924	1,326	
Total	53,987	61,913	46,965	50,270	46,481	39,182	18,579	41,277

1/ Marketing year is September - August. Source: Bureau of the Census/Foreign Trade Statistics for 2006/07 - 2012/13.
2/ World Agricultural Supply and Demand Estimate (WASDE) projection as of March 2014.

U.S. corn exports to China had gained significantly over the last five marketing years, as depicted in Figure 2. However, corn trade between the United States and China declined drastically in January 2014 after the trade disruption resulting from detection of MIR 162. USDA projects the upward trend to resume in the out years, contingent upon renewal of corn trade between the United States and China.



Trade between the United States and China is perhaps even more important as a share of demand to the DDGS market than to the corn market. Beginning in 2009/10, China became the largest customer for U.S. DDGS, and has imported 2.541 mmt during the first five months of the 2013/14 marketing year (Table 4). USDA does not forecast DDGS exports. However, based upon the pace through January 2014, U.S. DDGS exports to China could exceed 6 mmt for 2013/14, more than twice the previous record level.

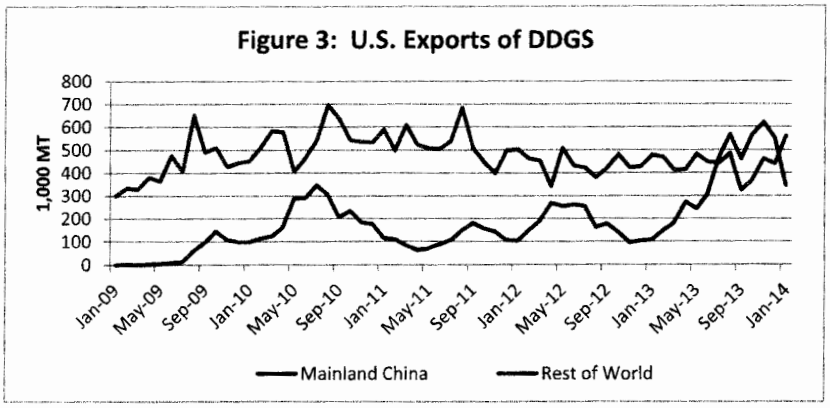
Table 4: U.S. exports of DDGs (1,000 metric tons) 1/

Country/region	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14
China (Mainland)	1	5	98	2,177	1,588	2,228	2,808	2,541
Mexico	608	1,001	1,387	1,613	1,823	1,534	1,277	
Canada	190	683	714	1,078	882	647	524	
Japan	79	151	211	229	285	338	398	
South Korea	88	176	279	351	385	377	376	
Vietnam	48	101	184	383	455	456	374	
Turkey	18	403	380	553	41	122	298	
European Union-	204	168	117	265	723	138	286	
Thailand	51	130	270	283	269	179	254	
China (Taiwan)	126	173	179	150	192	240	228	
Other	368	930	1,150	1,198	1,643	1,322	1,371	2,152
Total	1,780	3,921	4,969	8,279	8,286	7,581	8,195	4,694

1/ Marketing year is September - August. Source: Bureau of the Census/Foreign Trade Statistics for 2006/07 - 2012/13.
2/ Monthly Sales for September 2013 - January 2014.

Figure 3 illustrates China's importance to the DDGS market. In the last half of 2013, China was importing more DDGS from the United States than all other countries combined. However, after the trade disruption attributable to detection of MIR 162, U.S. DDGS exports to China declined in January 2014.

Figure 3: U.S. Exports of DDGS



Weekly Corn Exports and Inspections for 2013/14

The FAS reports weekly U.S. export sales for corn and issues weekly updates to reflect the actual final destination of shipments. As can be viewed in Table 5, U.S. weekly corn exports to China for 2013/14 reached 2.592 mmt by January 2, 2014, but almost flat lined thereafter because of shipment diversions, cancellations and deferrals. Since December 2013, FAS has been reducing accumulated exports to China, and likely will continue to make downward adjustments to reflect U.S. exports that failed to materialize.

Total U.S. corn export commitments to China, which consist of accumulated exports plus outstanding sales, were 4.695 mmt in mid-November 2013 when the rejections began. But those commitments by March 20, 2014 had decreased to 4.053 mmt because of shipment diversions and cancelled sales triggered by the response to detections of MIR 162. USDA's import projection for China was 7 mmt in December 2013, dropped to 5 mmt in January 2014 and may decline further unless other foreign corn exporters displace the lost U.S. exports.

Table 5: Weekly corn export sales to China (1,000 metric tons)

Date	Weekly Exports	Accumulated Exports	Outstanding Sales	Gross Sales	Net Sales	Total Commitments
3/20/14	0	2,670	1,383	8	-10	4,053
3/13/14	0	2,670	1,392	69	69	4,062
3/6/14	0	2,670	1,323	57	-117	3,993
2/27/14	1	2,670	1,439	110	-71	4,109
2/20/14	11	2,669	1,512	0	-3	4,181
2/13/14	0	2,658	1,525	3	-19	4,184
2/6/14	6	2,658	1,544	0	-228	4,202
1/30/14	6	2,652	1,778	234	-72	4,430
1/23/14	14	2,646	1,856	2	0	4,503
1/16/14	14	2,632	1,871	77	76	4,503
1/9/14	26	2,618	1,809	0	-170	4,427
1/2/14	93	2,592	2,004	70	-57	4,597
12/26/13	155	2,500	2,154	66	-116	4,654
12/19/13	141	2,345	2,425	74	-44	4,770
12/12/13	245	2,203	2,610	9	124	4,814
12/5/13	135	1,958	2,732	118	-124	4,690
11/28/13	277	1,823	2,991	61	52	4,814
11/21/13	209	1,546	3,216	135	67	4,762
11/14/13	163	1,337	3,357	11	145	4,695
11/7/13	121	1,174	3,375	74	116	4,550
10/31/13	76	1,053	3,381	241	172	4,434
10/24/13	499	977	3,285	491	598	4,262
10/17/13	0	478	3,186	0	0	3,664
10/10/13	0	478	3,186	0	0	3,664
10/3/13	185	478	3,186	171	231	3,664
9/26/13	115	294	3,140	3	115	3,433
9/19/13	119	179	3,140	76	131	3,318
9/12/13	60	60	3,128	10	65	3,188
9/5/13	0	0	3,123	129	6	3,123

Source: Foreign Agricultural Service

USDA's Federal Grain Inspection Service (FGIS) performs official inspections of U.S. corn shipments for export. Unlike FAS's weekly export sales reports, the FGIS inspection data is not corrected based upon actual export destinations. Rather, FGIS data reflects the intended export destination. As shown in Table 6, inspections for U.S. corn intended for export to China for 2013/14 were 3.922 mmt as of March 20, 2014. After a strong inspection pace during the first four months of the 2013/14 marketing year, inspections at the Gulf ceased as of December 12, 2013. Meanwhile, inspections of U.S. export corn shipments at Pacific Northwest ports continued for a while longer, but ceased as of January 9, 2013. U.S. corn trade with China has been virtually non-existent since January 2, 2014.

Table 6: Weekly corn inspections to China from U.S.(1,000 metric tons)

Date	Gulf	Pacific	Interior	Atlantic	Total	Accumulated Inspections
3/20/14	0	0	0	0	0	3,922
3/13/14	0	0	0	0	0	3,922
3/6/14	0	0	0	0	0	3,922
2/27/14	0	0	0	0	0	3,922
2/20/14	0	0	0	0	0	3,922
2/13/14	0	0	0	0	0	3,922
2/6/14	0	0	1	0	1	3,922
1/30/14	0	0	0	0	0	3,920
1/23/14	0	0	1	0	1	3,920
1/16/14	0	0	3	0	3	3,919
1/9/14	0	3	3	1	7	3,915
1/2/14	0	129	8	2	139	3,909
12/26/13	0	132	12	4	149	3,770
12/19/13	0	173	28	3	204	3,621
12/12/13	0	183	30	6	218	3,417
12/5/13	185	229	35	0	448	3,199
11/28/13	176	327	32	1	536	2,750
11/21/13	122	196	29	0	347	2,214
11/14/13	153	185	27	2	367	1,868
11/7/13	106	0	20	2	128	1,501
10/31/13	173	0	18	11	201	1,372
10/24/13	59	0	5	13	77	1,171
10/17/13	420	0	4	2	426	1,094
10/10/13	175	0	5	6	186	668
10/3/13	176	0	2	9	186	482
9/26/13	115	0	0	2	117	295
9/19/13	119	0	0	0	119	179
9/12/13	60	0	0	0	60	60
9/5/13	0	0	0	0	0	0

Source: AMS Report WA-GR101

U.S. Grain Export Industry Information on U.S. Corn Exports to China

To gain greater understanding than is available through USDA and Bureau of Census export reports, the NGFA and NAEGA asked outside legal counsel to obtain and aggregate information from their member companies on U.S. corn export sales to China for the 2013/14 marketing year. It is believed that the collected aggregated data represents, as of the end of February 2014, most of the U.S. corn export sales to China for the 2013/14 marketing year.

As shown in Table 7, there were 4.561 mmt of U.S. corn sales to China, but only 1.234 mmt of fulfilled sales – significantly less than the 2.67 mmt reported by FAS as of February 27, 2014. The large difference between the industry data and the FAS data may be attributable to a lag in reporting to FAS.

Chinese corn shipment rejections before and after discharge, as reported by industry, total 1.45 mmt (0.457 mmt plus 0.993 mmt), which is substantially more than the 908,800 mt reported thus far by the Chinese government. Of significance is the 0.457 mmt reported by the U.S. export industry that was rejected after discharge. Recovering discharge for re-export requires an arduous effort and inordinate amount of time, with resulting economic costs.

Industry data reveals cancelled sales at 0.458 mmt and deferrals at 1.419 mmt. Presumably, deferrals will become cancellations or rolled into next year's sales if the disruption is not remediated in time for shipments to resume during the 2013/14 marketing year.

Table 7: 2013/14 U.S. corn sales with China - Industry Information (1,000 metric tons)

Marketing Year	Fulfilled	Rejected after Discharge	Rejected before Discharge	Cancelled	Deferred	Total
2013/14	1,234	457	993	458	1,419	4,561

A comparison of U.S. corn export sales to China from the Census Bureau and China corn imports from FAS shows that the United States was China's almost exclusive supplier of imported corn for the 2012/13 marketing year. If the United States would have been China's almost exclusive corn trading partner again in 2013/14, there would have been almost 7 mmt of U.S. corn exported to China during the 2013/14 marketing year had no disruption occurred (7 mmt was USDA's corn import forecast for China prior to the disruption). This calculates to 5.766 mmt (7 mmt – 1.234 mmt of fulfilled export sales) of lost U.S. corn exports attributable to the trade disruption. However, rather than assume the United States "lost" 5.766 mmt in corn export sales, this analysis takes a more conservative approach and assumes the United States lost only 3.327 mmt (4.561 mmt of booked U.S. corn export sales from industry data – 1.234 mmt of fulfilled corn export sales from industry data) of corn export sales to China.

Weekly Prices at Terminal Locations

Prices at major terminal locations for DDGS, corn, soybean meal and soybeans are displayed in Table 8. All four commodities made harvest-time lows during the late September 2013 through early November 2013 time frame, and then began to increase. However, the MIR 162-triggered disruption in the Chinese market caused new lows to be set for DDGS and corn prices in January 2014. Because of China's large share of U.S. DDGS demand, the disruption was detrimental especially for U.S. DDGS prices, which declined by between $80/mt and $100/mt at terminal locations in less than a month following the disruption. While corn prices did not suffer a large price loss, the price increase that would have been expected to follow surging exports to China failed to materialize.

Further, soybean meal prices have been affected adversely because of the substitutability of corn, DDGS and soybean meal in livestock and poultry rations. Soybean meal prices had been escalating in November 2013 and December 2013, but suddenly declined $30/mt in January 2014. Soybean prices did not falter dramatically, but did not escape unscathed either. Soybean

bids were affected negatively by lower values for corn and increased risk of finding low levels of MIR 162 in U.S. soybean shipments to China.

Table 8: Weekly prices for DDGS, corn, soybean meal and soybeans ($ per metric ton)

Date	Gulf	PNW	Chicago	Gulf	Chicago Export	Central IL	Gulf
	----------DDGs----------			---------Corn---------		Soymeal	Soybeans
3/21/2014	$358	$369	$298	$218	$187	$554	$592
3/14/2014	$353	$359	$298	$228	$189	$528	$584
3/7/2014	$364	$364	$298	$226	$190	$543	$613
2/28/2014	$342	$358	$287	$219	$180	$569	$596
2/21/2014	$320	$342	$270	$215	$178	$559	$579
2/14/2014	$342	$333	$265	$208	$173	$562	$568
2/7/2014	$325	$317	$259	$206	$173	$556	$562
1/31/2014	$303	$303	$254	$204	$169	$533	$548
1/24/2014	$298	$295	$254	$200	$172	$525	$550
1/17/2014	$281	$287	$254	$196	$165	$522	$570
1/10/2014	$270	$278	$248	$201	$168	$522	$555
1/3/2014	$231	$259	$204	$197	$165	$522	$548
12/27/2013	$281	NA	$267	$199	$166	$551	$565
12/20/2013	$314	$325	$281	$201	$169	$555	$568
12/13/2013	$336	$331	$292	$197	$166	$541	$564
12/6/2013	$331	$322	$287	$199	$168	$534	$563
11/29/2013	$336	$324	$281	$197	$164	$534	$557
11/22/2013	$314	$320	$292	$200	$166	$505	$557
11/15/2013	$303	$309	$292	$201	$164	$505	$544
11/8/2013	$284	$292	$271	$199	$166	$479	$551
11/1/2013	$300	$303	$276	$201	$166	$479	$537
10/25/2013	$303	$306	$287	$204	$171	$504	$552
10/18/2013	$294	$297	$276	$203	$170	$484	$548
9/27/2013	$298	$290	$270	$203	$173	$495	$557
9/20/2013	$292	$301	$287	$203	$172	$524	$556
9/13/2013	$298	$306	$289	$209	$175	$606	$583
9/6/2013	$291	$299	$289	$216	$220	$602	$588

Source: U.S. Department of Agriculture, Agricultural Marketing Service.

Losses for U.S. Corn Exporters

A large quantity of U.S. corn export sales to China for the 2013/14 marketing year were made before the beginning of the 2013/14 marketing year. In the months prior to the 2013/14 marketing year, corn prices were as much as $3/bu. (or $118/mt) greater than in mid-November 2013 through January 2014, when shipments were rejected and/or diverted, or cancelled/deferred. Thus, the negated U.S. corn export sales to China were of greater value than the replacement sales.

For this analysis, export sales prices for the rejected, cancelled and deferred corn sales are assumed conservatively to be $50/mt greater than market prices in mid-November 2013 through January 2014, when the bulk of the deliveries to China were scheduled to be executed. The penalty for cancelled sales that was assessed by the Chinese on U.S. exporters for failing to deliver approved corn also is included in the estimated $50/mt price loss. This analysis assumes deferred sales eventually will be cancelled. Based upon data provided by U.S. exporters for purposes of this analysis, the total volume of rejected (1.45 mmt), cancelled (0.458 mmt), plus deferred sales (1.419 mmt) is 3.327 mmt. A $50/mt price decline on 3.327 mmt of lost corn exports rounds to $166 million.

In addition, the countries that took delivery of the rejected corn almost assuredly would have negotiated a discount for early delivery on existing sales. Further, new sales would have been discounted even more given the compromised negotiating leverage of U.S. corn exporters. It is plausible to estimate U.S. corn exporters conservatively may have lost another $30/mt on the sale of diverted corn, since they were placed in a compromised economic position. U.S. exporter-provided data shows 1.45 mmt of rejected corn; all of this corn is assumed to have been diverted for sale to another country. A $30/mt price loss on 1.45 mmt of corn rounds to $44 million.

Finally, freight rates from the U.S. Gulf to China were approximately $50/mt in December 2013 when the majority of the rejections and/or diversions occurred. Contracted shipment time for loading at the U.S. Gulf through discharging at China is assumed to be 25 days. Daily demurrage is assumed to equal $2/mt ($50/mt freight rate / 25 days). If the rejections and/or diversions added five demurrage days to the contracted shipment time, the demurrage loss would be $10/mt ($2/mt x 5 days).

According to data collected from U.S. corn exporters for this analysis, the volume of corn rejected after discharge is 0.457 mmt, and the volume of corn rejected before discharge is 0.993 mmt. This totals 1.45 mmt. A $10/mt demurrage loss on 1.45 mmt calculates to approximately $15 million in demurrage costs. This estimate represents the low-side for demurrage costs because costs for recovering discharged corn for re-export may be substantially higher.

Adding the $166 million market price loss on unfulfilled export sales, $44 million price loss attributable to compromised U.S. exporter economic position on diverted sales and $15 million demurrage loss equals a $225 million loss for U.S. corn exporters.

Importantly, not included in this analysis are likely losses of U.S. corn export sales that may have been made in 2013/14 were it not for the disruption in sales and shipments to China resulting from MIR 162. Also not included in the analysis of costs to U.S. corn exporters are the damages from export disruptions for DDGS and soybeans.

Losses for U.S. Grain Value Chain

The interconnectivity of the grains markets suggests losses that affect corn, the largest U.S. grain in terms of volume, will affect other grains negatively, as well. However, for this analysis, losses are only estimated for corn, DDGS and soybeans.

Corn

The effect of Chinese rejections on U.S corn prices is harder to estimate. A large price decrease did not occur, but reports of corn price losses were as much as $0.50/bu. To be extremely conservative, a price model was created that assumes one-half of the 3.327 mmt of lost U.S. corn export sales to China will be replaced by increased U.S. domestic feed use, while the other one-half will accumulate to U.S. corn stocks. The model estimates that U.S. national average corn prices would be $0.11/bu. greater if the MIR 162-related trade disruptions had not occurred. This is equivalent to a 2.4% price impact. The $0.11/ bu. impact is assessed for the last nine months of the marketing year, since the corn rejections began in mid-November 2013 and may not resume this marketing year.

The 2013 U.S. corn crop is assumed to be marketed to end users evenly throughout the marketing year. As of March 2014, USDA projected U.S. corn production for the 2013 crop at 13.925 billion bushels. Meanwhile, marketings during the last nine months of the marketing year to end users were estimated to be 10.4 billion bushels. A $0.11/bu. price decline apportioned over 10.4 billion bushels results in a loss of $1.144 billion for farmers selling corn.

DDGS

After the DDGS trade disruption occurred at the end of 2013, DDGS prices at terminal locations declined between $80/mt and $100/mt in January 2014. Prices subsequently have retraced the price loss, but a discount likely still exists. For this analysis, a DDGS price loss equivalent to the modeled corn price loss is assumed because of the substitutability of corn and DDGS in livestock and poultry feed rations. The modeled price loss for corn is 2.4%, and applying 2.4% to an assumed $300/mt national average DDGS price equals $7/mt. Similarly to the corn analysis, DDGS marketings for the last nine months of the 2013/14 marketing year are assumed to be consistent throughout the marketing year.

Approximately 17 pounds of DDGS are produced from every 56-pound bushel of corn used for ethanol manufacturing. Applying this ratio to USDA's March 2014 estimate of 5 billion bushels of corn used to produce ethanol for 2013/14 results in a DDGS production estimate of 38.555 mmt. The share of the annual DDGS production estimate over the last nine months of the marketing year is 28.9 mmt. Multiplying a $7/mt loss by 28.9 mmt results in a $202 million loss to sellers of DDGS.

Soybeans

Soybean bids were affected negatively by lower values for soybean meal and increased risk of detecting adventitious presence of MIR 162 in U.S. soybean shipments to China. Moreover, some U.S. corn exporters that also export soybeans have reported there have been reduced and cancelled sales stemming from the possibility of MIR 162 detection in soybean shipments.

In this regard, NGFA and NAEGA are aware that several shipments of soybeans have been tested and detained by China after the detection of MIR 162.

After reaching $568/mt at the Gulf on December 20, 2013, soybean prices declined to $548/mt on January 3, 2014. In the ensuing months, soybean prices have reached higher levels. But a price-depressing impact still exists because of the overhanging trade uncertainty that results in the incorporation of increased risk premiums in commercial pricing, which, in turn, reduce U.S. prices.

The Chinese import market is very important for U.S. soybeans, and trade uncertainty in this market can be very harmful to U.S. soybean prices. The importance of U.S. soybean exports to China is reinforced by USDA's projection that China's soybean import market will be 69 mmt in 2013/14, and that the United States will export 46% of its 2013 soybean crop. As of March 20, 2014, more than two-thirds of U.S. soybean export sales for the 2013/14 marketing year were to China.

Because of the uncertain trade environment for U.S. exports to China and the price linkage between other affected feedstuffs and soybean prices, the 2.4% modeled corn price loss is applied to the March 2014 national average soybean price of $12.95/bu. This results in a price loss of a $0.31/bu. during the last nine months of the 2013/14 marketing year for U.S. soybeans. To be extremely conservative and acknowledge that whole U.S. soybeans may not be as linked to U.S. corn prices as DDGS and soybean meal, the $0.31/bu. estimate is more than halved to $0.15/bu. for purposes of this analysis.

As of March 2014, USDA projects U.S. soybean production for the 2013 crop at 3.289 billion bushels. Marketings during the last nine months of the marketing year to end users are estimated to be 2.5 billion bushels. A $0.15/bu. price loss applied to 2.5 billion bushels results in a cumulative loss of $375 million for farmers selling soybeans.

Total Losses for U.S. Grain Value Chain

As presented previously, the following total economic losses are estimated for the U.S. grain value chain: 1) $225 million to corn exporters; 2) $1.144 billion for farmers selling corn; 3) $202 million to sellers of DDGS; and 4) $375 million for farmers selling soybeans. These losses total $1.95 billion. A range of $1 billion to $2.9 billion is estimated around the $1.95 billion mid-point estimate to acknowledge that the assumed price losses may have been more or less than estimated.

Summary

USDA currently is projecting Chinese corn imports will reach 22 mmt by 2023, which if realized would account for nearly half of the projected growth in total world corn trade. However, if the MIR 162-related trade disruption continues, other corn exporting nations, such as Ukraine, are capable of replacing the United States as the principal corn exporter to China.

China began importing U.S. DDGS heavily in 2009/10, and based upon import data through December 2013 is on track to import more than 6 mmt for 2013/14. If attained, that would account for nearly 16% of U.S. DDGS production. U.S. DDGS exports to China were disrupted at the end of 2013, and resumed in January 2014. But the impact of the disruption on DDGS prices has lingered.

In December 2013, USDA projected China would import 7 mmt of corn. However, USDA's projection for Chinese corn imports was reduced to 5 mmt in January 2014 when it became clearer that China would not resume importing U.S. corn in the near term. As of March 20, 2014, total commitments to China for U.S. corn exports were 4.053 mmt; but U.S. exporter-provided data shows that only 1.234 mmt of the commitments have been fulfilled.

The Chinese government has reported that 908,800 mt of U.S. corn have been officially rejected. However, rejections before and after shipment discharge, as reported by the U.S. export industry, are a combined 1.45 mmt. Export industry data also reveals cancelled sales at 0.458 mmt and deferrals at 1.419 mmt. Presumably, deferrals will become cancellations or rolled into next year's sales if the disruption is not remediated in time for shipments to resume during the 2013/14 marketing year. In total, 3.327 mmt of U.S. corn export sales to China potentially may be lost in 2013/14.

The disruption in U.S. corn exports to China has affected more than U.S. corn prices because of the substitutability of corn for other feedstuffs in livestock and poultry feed rations, as well as because of the increased risk of Chinese detection of the presence of MIR 162 in shipments of other U.S. commodities to China.

For the U.S. corn, DDGS and soybean sectors, the MIR 162-induced trade disruption has resulted in market price loss on unfulfilled export sales, price loss on diverted sales because of the compromised economic negotiating position of U.S. exporters, demurrage costs, and lower market prices for U.S. commodities and products. The total loss for these sectors of the U.S. grain industry is estimated to range from $1 billion to $2.9 billion.

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[Note: This analysis is based primarily upon publicly available data and fully disclosed assumptions stated herein. No company provided company-specific data to either NGFA or NAEGA. This analysis is intended to provide a reasonable estimate of the economic losses sustained by market participants, which have resulted or will result from the commercialization of technology products prior to their approval for import in major U.S. export markets. As stated herein, this analysis does not consider or evaluate every potential loss, and, therefore, the estimates may be understated. Similarly, it does not attempt to analyze potential strategies for mitigating market risk that may be utilized by individual market participants based upon an assessment of their individual operations, customer base and markets, as these are decisions made by individual market participants. Neither NGFA nor NAEGA, nor any member company of either association, guarantees the accuracy of the data utilized in this analysis, or the conclusions reached herein.]