

BOARD OF TRADE OF THE CITY OF CHICAGO INC.

ANALYSIS OF DELIVERABLE SUPPLY

CORN FUTURES

AUGUST 2018

In estimating deliverable supply for Corn futures, the Board of Trade of the City of Chicago Inc. (“CBOT” or “Exchange”) relied on long-standing precedent, which provides that the key component in estimating deliverable supply is the portion of typical supply stocks that could reasonably be considered to be readily available for delivery. In its guidance on estimating deliverable supply, the Commodity Futures Trading Commission (“CFTC” or “Commission”) states:

In general, the term “deliverable supply” means the quantity of the commodity meeting a derivative contract’s delivery specifications that can reasonably be expected to be readily available to short traders and saleable by long traders at its market value in normal cash marketing channels at the derivative contract’s delivery points during the specified delivery period, barring abnormal movement in interstate commerce. Typically, deliverable supply reflects the quantity of the commodity that potentially could be made available for sale on a spot basis at current prices at the contract’s delivery points. For a non-financial physical-delivery commodity contract, this estimate might represent product which is in storage at the delivery point(s) specified in the futures contract or can be moved economically into or through such points consistent with the delivery procedures set forth in the contract and which is available for sale on a spot basis within the marketing channels that normally are tributary to the delivery point(s).¹

Background:

Corn is the most widely produced feed grain in the United States, with most of the crop providing the main energy ingredient in livestock feed. Corn is also processed into a wide range of food and industrial products including fuel ethanol. USDA estimates the 2017/18 U.S. corn crop at 14.604 billion bushels, a 3.59 percent decrease compared to 2016/17. CBOT Corn futures are the global price discovery and risk management benchmark.

Corn Futures Delivery Capacity (Updated Annually):

The following territories are defined for delivery in CBOT Corn futures:

- A. Chicago and Burns Harbor, Indiana Switching District - The Chicago Switching District is the area geographically defined by Tariff ICC WTL 8020-Series and that portion of the Illinois Waterway at or above river mile 304 which includes the Calumet Sag Channel and the Chicago Sanitary & Ship Canal. The Burns Harbor, Indiana Switching District is the area geographically defined by the boundaries of Burns Waterway Harbor at Burns Harbor, Indiana which is owned and operated by the Indiana Port Commission.
- B. Lockport-Seneca Shipping District - The Lockport-Seneca Shipping District is the portion of the Illinois Waterway below river mile 304 at the junction of the Calumet Sag Channel and the Chicago Sanitary & Ship Canal and above river mile 244.6 at the Marseilles Lock and Dam.
- C. Ottawa-Chillicothe Shipping District - The Ottawa-Chillicothe Shipping District is the portion of the Illinois Waterway below river mile 244.6 at the Marseilles Lock and Dam and at or above river mile 170 between Chillicothe and Peoria, IL.
- D. Peoria – Pekin Shipping District - The Peoria-Pekin Shipping District is the portion of the Illinois Waterway below river mile 170 between Chillicothe and Peoria, IL and at or above river mile 151 at Pekin, IL.

¹ http://www.ecfr.gov/cgi-bin/text-idx?SID=74959c3dbae469e2efe0a42b45b8dfae&mc=true&node=ap17.1.38_11201.c&rgn=div9

Beginning with the March 2019 contract delivery period, the Corn futures delivery area will be extended to St. Louis and will be consistent with the Soybean futures delivery territories². The following additional territories will be added:

- E. Havana-Grafton Shipping District - The Havana-Grafton Shipping District will be that portion of the Illinois Waterway below river mile 151 at Pekin, IL to river mile 0 at Grafton, IL.
- F. St. Louis-East St. Louis and Alton Switching Districts - The St. Louis-East St. Louis and Alton Switching Districts will be that portion of the upper Mississippi River below river mile 218 at Grafton, IL and above river mile 170 at Jefferson Barracks Bridge in south St. Louis, MO.

For the purposes of this analysis, the traditional Corn futures facilities located in territories A through D above will be referred to as the Northern River and the expanded territories E and F above will be referred to as the Southern River.

Facilities approved for delivery on Corn futures are limited in the number of shipping certificates that they may issue to an amount not to exceed 20 times their total daily rate of loading barges, or in the case of the Chicago and Burns Harbor delivery territory, their registered storage capacity. As of August 2018, firms regular for delivery on CBOT Corn futures had approved capacity to issue 10,395 shipping certificates or 51.97 million bushels of corn. Assuming that the facilities currently regular for delivery in Soybeans on the Southern River also become Corn futures regular delivery facilities, the approved capacity would increase from 10,395 to 17,435 shipping certificates (i.e., increase from 51.97 million bushels to 87.18 million bushels).

Below are the facilities regular for delivery on Corn futures as of August 2018 along with the maximum number of shipping certificates they may issue, with each shipping certificate equivalent to 5,000 bushels:

Firm	Location	Maximum Certificates Deliverable
Cargill, Inc.	Burns Harbor, IN	1,553
COFCO International Grains US LLC	Chicago, IL	2,462
Cargill, Inc.	Morris, IL	440
CHS Inc.	Morris, IL	220
ADM Grain Company	Morris-E, IL	220
Cargill, Inc.	Seneca, IL	440
ADM Grain Company	Ottawa-N, IL	440
Cargill, Inc.	Ottawa, IL	440
ADM Grain Company	Ottawa-S, IL	220
Maplehurst Farms, Inc.	Ottawa, IL	220
Zen-Noh Grain Corporation	Utica, IL	220
Consolidated Grain and Barge Co.	Utica, IL	220
Zen-Noh Grain Corporation	Peru, IL	220
Consolidated Grain and Barge Co.	Peru, IL	220
CHS Inc.	Peru, IL	220
ADM Grain Company	Spring Valley, IL	220
Cargill, Inc.	Spring Valley, IL	440
ADM Grain Company	Hennepin, IL	440
Zen-Noh Grain Corp.	Hennepin, IL	220
Consolidated Grain and Barge Co.	Hennepin, IL	220
ADM Grain Company	Lacon, IL	220
Cargill, Inc.	Lacon, IL	440
ADM Grain Company	Creve Coeur, IL	440

Following delivery expansion and assuming the facilities currently regular for delivery in Soybean futures also become regular for delivery in Corn futures, the following facilities would be added³:

² <https://www.cmegroup.com/content/dam/cmegroup/notices/ser/2017/08/SER-7956RR.pdf>

Firm	Location	Maximum Certificates Deliverable
Cargill, Inc.	Havana-N, IL	440
Cargill, Inc.	Havana-S, IL	440
ADM Grain Company	Havana-N, IL	220
ADM Grain Company	Havana-S, IL	440
Cargill, Inc.	Beardstown, IL	440
ADM Grain Company	Beardstown, IL	220
Cargill, Inc.	Meredosia, IL	440
ADM Grain Company	Naples, IL	220
Zen-Noh Grain Corp.	Naples, IL	220
Consolidated Grain and Barge Co.	Naples, IL	220
Cargill, Inc.	Florence, IL	440
CHS, Inc.	Beardstown, IL	220
CHS, Inc.	Havana, IL	220
CHS, Inc.	St. Louis, MO	220
ADM Grain Company	St. Louis, MO	880
Bunge North America	Fairmont City, IL	440
Cargill, Inc.	E. St. Louis, IL	440
Consolidated Grain & Barge Co.	Cahokia, IL	220
Louis Dreyfus Company River Elevators LLC	Cahokia, IL	220
COFCO GROWMARK LLC	Cahokia, IL	440

Corn Futures Deliverable Supply Procedures and Estimate (Updated Annually):

As mentioned above, beginning with the March 2019 contract month and beyond, the Corn delivery territory will expand to include the Southern River. The expansion of territory will increase Deliverable Capacity, which this analysis considers in the estimation of Deliverable Supply.

Each Tuesday the Registrar's Office publishes corn meeting deliverable grades that are in-store as of the previous Friday at all regular delivery facilities. The USDA-AMS publishes a weekly Grain Transportation Report (GTR) that covers developments affecting the transport of grain, both in the domestic and international marketplace (<http://www.ams.usda.gov/AMSV1.0/gtr>). This weekly publication reports on the latest volume and price data for barges, railroads, trucks, and ocean vessels involved in the transport of grain. Included in this report is the amount of corn shipped through Lock 27⁴ on the Mississippi River, which is a measure of corn that flows through the Illinois River delivery territory and the delivery territory for Corn futures starting in 2019.

Deliverable supply is estimated as the stocks of grain in regular facilities on the Friday prior to First Notice Day plus the amount to corn that passes through Lock 27 on the Mississippi River during the four weeks prior to First Notice Day. The Exchange believes these measures capture supply going into the delivery period and is the relevant supply to consider when estimating what would be available for each contract expiration. In order to estimate the stocks of corn in the new delivery territories, this analysis considers Soybean Deliverable Supply, and assumes that the ratio of deliverable grade soybean stocks on the Northern River compared to the Southern River are also a reasonable estimate of the ratio of deliverable grade corn stocks in the north versus the south. For example (also demonstrated in the table below), on the Friday prior to First Notice Date for the March 2017 contract, deliverable grade soybean stocks on the Northern River were 10,617 million bushels and on the Southern River 4,877 million bushels. That is, stocks in the south were $(4,877 \div 10,617)$ or 45.94 percent of the stocks in the north. On the same date corn stocks on the Northern River were 3.95 million bushels. Applying the soybean ratio to corn stocks results in an estimated 1.82 million additional corn bushels in the Southern River for this time period. The

³ All approved soybean facilities on the Southern River have either applied or indicated they will be applying for Corn regularity.

⁴ <http://www.mvs.usace.army.mil/Missions/Navigation/Locks-and-Dams/Lock-Dam-27/>

analysis uses the soybean stock ratio from each Friday prior to on each First Notice Date to corresponding to the futures contract. This is likely a very conservative estimate of deliverable supply because it does not count the significant amount of corn that is likely to enter export channels and could be economically placed into delivery position. While this analysis of deliverable supply does not attempt to include these stocks, they could be estimated to some degree using economic theory. Economic theory and the theory of storage would suggest these uncounted stocks would exceed the stocks reported in the Stocks of Grain report⁵. Regular delivery facilities are in position to load barges for export; thus, the value of grain in a delivery facility is greater than the value in the country because grain in the country destined for export needs to be transported to a barge loading facility. The cost to store grain includes opportunity cost, and opportunity costs increase with value. Thus, the cost to store grain in position at a regular delivery facility is greater than the cost to store in the country all other factors equal. If there is grain being stored in position at a barge loading facility, it suggests demand for grain in the export market, and theory would suggest a greater amount of stocks destined for export would be stored internally due to the lower cost. The Exchange may, at a later date, decide to estimate these stocks and included them in future deliverable supply estimates.

To compare the additional deliverable supply from the expanded Southern River delivery territory, the deliverable supply was also estimated using deliverable stocks of grain in regular facilities in the Northern River on the Friday prior to First Notice Day plus the amount of corn that passes through Lock 8⁶ on the Illinois River during the four weeks prior to First Notice Day. This measurement of flow through Lock 8 accounts for the supply estimate in Illinois River delivery territory prior to the 2019 expansion and is published weekly in the USDA's GTR.

Futures Contract Expiration	Corn Movement through Lock 27 on the Mississippi during the 4 Weeks Prior to FND (1M Bushels)	Stocks of Corn in Regular Facilities on the Friday prior to FND (1M Bushels)	Soybean Ratio (North: South)	Estimated Additional Stocks due to Expanded Delivery Territory (1M Bushels)	Total Stocks (1M Bushels)	Corn Movement Through Lock 8 on the Illinois during the 4 Weeks Prior to FND (1M Bushels)	Estimated Total Stocks using Lock 8 and Northern River Only (1M Bushels)
Mar-17	35.68	3.95	2.18	1.82	41.45	28.29	32.24
Mar-16	27.21	6.98	0.84	8.29	42.48	21.43	28.41
Mar-15	11.46	8.17	1.41	5.80	25.43	8.04	16.21
MAR AVG	24.78	6.37		5.30	36.45	19.25	25.62
May-17	69.68	1.90	2.90	0.66	72.24	16.25	18.15
May-16	66.46	3.13	1.17	2.68	72.27	19.43	22.56
May-15	37.14	7.84	2.51	3.12	48.10	15.18	23.02
MAY AVG	57.76	4.29		2.15	64.20	16.95	21.24
Jul-17	66.79	2.31	2.65	0.87	69.97	16.64	18.95
Jul-16	84.68	2.25	1.94	1.16	88.09	22.43	24.68
Jul-15	66.39	6.09	0.97	6.27	78.75	17.86	23.95
JUL AVG	72.62	3.55		2.77	78.94	18.98	22.53
Sep-17	59.11	7.33	6.41	1.14	67.58	8.46	15.79
Sep-16	83.32	1.95	2.68	0.73	86.00	26.21	28.16
Sep-15	69.75	3.27	1.85	1.77	74.79	21.00	24.27
SEP AVG	70.73	4.18		1.21	76.12	18.56	22.74

5 See <http://ajae.oxfordjournals.org/content/77/3/512.abstract>

6 https://marinas.com/view/lock/2mh24 Illinois_River_Peoria_Lock_Peoria_IL_United_States

Dec-17	50.14	10.21	1.75	5.84	66.19	15.32	25.53
Dec-16	64.46	8.77	0.64	13.79	87.02	16.93	25.7
Dec-15	42.18	6.59	0.90	7.41	56.18	10.39	16.98
DEC AVG	52.26	8.52		9.01	69.79	14.21	22.74
AVG ALL DELV MONTHS	55.63	5.38		4.09	65.10	17.59	22.97

Seasonality:

The Exchange continuously monitors the deliverable supply and the delivery requirements on the Contract. Further, the Exchange closely monitors seasonality and to the extent that the Exchange anticipates that 25 percent of any contract month's deliverable supply would fall below the current spot month limit, the Exchange would make a good faith effort to resolve conditions potentially limiting the adequacy of the deliverable supply or evaluate whether there is a need to adjust the spot-month position limit for that corresponding contract month.

Long Term Contracts:

There is no readily available data on corn under long-term contracts or agreements that could not be delivered on futures and should not be counted in deliverable supply estimates. To get a sense of the extent corn is under long-term agreements and not deliverable, the Exchange reached out to 4 corn regular delivery firms. Feedback from these firms indicates generally zero (0) percent of corn in their facilities is under long-term agreement and could not be delivered against Corn futures. One firm indicated generally zero percent under long-term agreement but at the very most five percent during some limited time frames. Given this feedback and the conservative nature of the estimate, the Exchange does not believe corn stocks under long-term agreements significantly affect deliverable supply.

ANALYSIS OF DELIVERABLE SUPPLY

Based on the above analysis, the Exchange estimates the monthly deliverable supply over the past five years to be 65.10 million bushels or **13,020** contract equivalents (contract size: 5,000 bushels). The expansion of the Southern River in March of 2019 accounts for an increase of 42.13 million bushels. A 38.04 Million bushel increase of corn movement from Lock 8 to Lock 27 and an estimated 4.09 million bushels increase of stocks at existing regular Soybean facilities. The current spot month limit of 600 contracts represents **4.61%** of this estimated monthly deliverable supply.