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## Potential Growth in Corn Used for Ethanol Production

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February 24, 2014

*farmdoc daily* (4):34

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Recommended citation format: Good, D. "[Potential Growth in Corn Used for Ethanol Production](#)." *farmdoc daily* (4):34, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 24, 2014.

Permalink: <http://farmdocdaily.illinois.edu/2014/02/potential-growth-in-corn-used-for-ethanol-production.html>

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In last week's issue ([farmdoc daily February 24, 2014](#)) it was argued that corn consumption during the current marketing year appears to be more responsive to lower prices than generally anticipated, particularly in the export market. The responsiveness reflects not only lower corn prices in absolute terms, but also in relation to the price of other feed ingredients. Arguably, corn has become one of the cheaper feed ingredients currently available.

In addition to increased feed consumption of corn in the domestic and foreign markets, there are also indications that domestic corn consumption could be boosted by growing export demand for ethanol. It is argued that the combination of generally high crude oil prices, and therefore high gasoline prices, in relation to ethanol prices will make ethanol an attractive source of octane around the world. With corn prices at current levels, U.S. ethanol is very competitively priced in the world market. Anticipating export demand for ethanol, however, is difficult and opinions about the size of that market vary considerably. U.S. ethanol exports totaled about 400 million gallons in 2010, but ballooned to almost 1.2 billion gallons in 2011 as high sugar prices and limited Brazilian ethanol supplies boosted demand for U.S. ethanol, particularly in Brazil. Exports retreated to about 730 million gallons in 2012 as Brazilian ethanol production rebounded and totaled only about 620 million gallons in 2013. However, exports were on the rise late in the year, totaling 82.5 million gallons in November 2013 and nearly 65 million gallons in December 2013. Weekly statistics from the U.S. Energy Information Administration (EIA) suggest that exports have been brisk so far in 2014. Canada is the largest importer of U.S. ethanol, accounting for 45 percent of U.S. exports in December 2013. Brazil accounted for an additional 22 percent of U.S. exports. An additional 44 countries imported some U.S. ethanol in November or December 2013.

A combination of larger ethanol exports, increased domestic motor fuel consumption, and a final EPA rule making for the RFS for 2014 that provided more "push" for higher ethanol blends in the domestic fuel supply could provide for meaningful expansion in domestic ethanol production and corn consumption. The magnitude of ethanol imports will also factor into that potential expansion. With so many unknowns, it is difficult to quantify potential growth. However, there is not unlimited capacity to produce corn-based ethanol in the U.S. It is conceivable that with limited imports, growing exports, and expanding domestic

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consumption of ethanol that production capacity could be challenged at some point. That capacity, then, will determine the limit of growth in corn consumption associated with ethanol production.

The Renewable Fuels Association estimates the nameplate capacity of current bio-refineries at 14.875 billion gallons, with an additional 165 million gallons of new construction or expansion underway. Translating that capacity into maximum potential for corn consumption is not straightforward for at least three reasons. First, it is possible for refineries to produce above nameplate capacity. Second, feedstocks other than corn are used in some refineries. Third, there is a variation in the estimates of yield of ethanol per bushel of corn processed into ethanol and the yield can vary by the intensity of use relative to nameplate capacity. As a result, estimates of maximum corn consumption vary.

The most recent private industry survey (for the year ended June 2013) revealed an average industry yield of 2.72 gallons of undenatured ethanol per bushel of corn. Assuming total nameplate capacity of 15.04 billion gallons of ethanol and recognizing that production can exceed nameplate capacity (but that not all feedstock is corn), corn based ethanol production capacity might be near 15.2 billion gallons. With a yield of 2.72 gallons per bushel, maximum corn consumption for ethanol would be 5.588 billion bushels. That compares to the USDA projection of 5.0 billion bushels for the current marketing year.

There is a bit more to the story, however. A co-product of ethanol refining is a variety of distillers grains solubles (DGS) that are used as livestock feed. Those solubles substitute for other feed ingredients, mostly whole corn. The same private survey cited above indicated that an average of 16 pounds of livestock feed is produced for each bushel of corn refined. That is, for each bushel refined, 0.286 bushels are available to substitute for other feed ingredients. If, for example, 80 percent of those solubles substitutes for whole corn, then 0.229 bushels of whole corn are replaced (domestically or internationally) for each bushel of corn refined into ethanol. Using that relationship, the net consumption of corn from ethanol production can be calculated. Processing 5.0 billion bushels of corn into ethanol would represent a net use of 3.855 billion bushels [ $5.0 - (.229 \times 5.0)$ ] and processing 5.588 billion bushels would represent a net use of 4.308 billion bushels. Under the assumptions made here, moving from 5.0 billion bushels of corn processed into ethanol to the maximum industry capacity of 5.588 billion bushels, then, would result in a 453 million bushel net increase in corn consumption rather than a 588 million bushel increase.

Ethanol is expected to continue to be a large and likely growing segment of demand for U.S. corn, suggesting that corn prices could be supported at higher levels than expected during a period of more abundant supplies. However, there is a limit to growth without motivation to expand corn-based ethanol production capacity.

## Reference

Good, D. "[Who's Right about Corn Prices?](#)" *farmdoc daily* (4):29, Department of Agricultural and Consumer Economics, University of Illinois at Urbana-Champaign, February 17, 2014.

Also available at:

<http://farmdoc.illinois.edu/marketing/weekly/html/022414.html>