

Ethanol Has Made the Traditional Feedgrain Balance Sheet Obsolete

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For decades agricultural economists have constructed, and sometimes hotly debated, tables of numbers that track feed commodity inventories, production, use and price. Recent changes in the structure of corn use resulting from increased ethanol production imply that we should make some modifications in the way we look at the use of corn, and other feedgrains that can substitute for corn. This article is a look at one way to account for increased ethanol byproduct production and the overall feedgrain supply. It is not intended as the final word on the subject. There are likely to be refinements that can be made to this effort, but the numbers show that just looking at grain use alone is highly misleading.

Increased complexity of feedgrain supply, demand and stocks has at least three major considerations.

1. Increased DDGS production (for purposes of this article all ethanol plant feed by-product production is calculated as 14% DDGS) adds directly to the potential feed supply. DDGS appears to be replacing mostly grains, not soybean meal, in feed rations.
2. DDGS has about the same digestible energy per ton as corn, slightly higher total usable protein, but a very different amino acid composition compared to soybean meal.
3. Increased demand for corn for ethanol production has shifted acres away from other grain and oilseed crops, principally wheat, oats, sorghum and barley. Reduced supply of those crops available for feed use has to be recognized as an offset to increased corn acres and production.

Methodology: Distiller's grains have grown to become our #2 feed ingredient, behind corn but just ahead of soybean meal. However, the government does not report distiller's grains production of ethanol plants. Therefore, we need to estimate DDGS production. Since we also do not have DDGS stocks data, DDGS feed use will be estimated as production minus exports.

Distiller's grains come in a range of moisture content. However, water has no feed value. To account for DDGS use we need a standardized product that is roughly equivalent to corn at 14% moisture. According to ethanol industry sources, a 56 pound bushel of corn produces 17 pounds of 10% DDGS. On a weight basis, the DDGS yield is 0.304 ($17 \div 56$). Corrected to 14% moisture, the

yield would be .316. The following equations were used to estimate 14% DDGS production and feed use:

$$\text{Tons 14\% DDGS Production} = 0.316 \times (\text{Tons corn used for ethanol})$$

$$\text{Metric Tons 14\% DDGS Feed Use} = \text{Production} - \text{Exports}$$

It is assumed that for feeding purposes a ton of 14% DDGS substitutes for a ton of corn.

Results: The table below is a total feedgrains balance sheet, including DDGS, for September 1 crop years 2005/2006 through a projection for 2011/2012. Even this rough measure of total feed use of feedgrains and DDGS is a marked improvement over simply looking at total feedgrain or corn feed use alone.

Total Feedgrains and DDGS Supply and Use, Metric Tons
(September 1 Marketing Year, DDGS Tons Estimated @ 14% Moisture)

Item	2005/ 2006	2006/ 2007	2007/ 2008	2008/ 2009	2009/ 2010	2010/2011 FarmEcon fcst.	2011/2012 FarmEcon Projected
Area Planted (Mill. Ac.)	96.4	92.5	109.0	101.8	100.1	99.6	106.0
Area Harvested (Mill. Ac.)	85.9	80.1	98.3	91.0	89.6	89.7	95.5
Yield (Tons/Ac)	3.47	3.50	3.56	3.58	3.90	3.69	3.75
Beg. Stocks (Mill. Tons)	58.8	54.8	36.2	45.1	47.0	48.0	26.5
Production (Mill. Tons)	298.5	279.9	349.7	325.7	349.0	331.0	358.1
Imports (Mill. Tons)	1.9	2.4	3.3	3.0	2.2	2.0	2.5
Total Supply (Mill. Tons)	359.2	337.1	389.2	373.7	398.2	381.0	387.2
Feedgrains Feed Use (Mill. Tons)	163.1	148.0	157.8	140.9	137.6	137.0	133.0
SBM Feed Use (Mill. Tons)	30.1	31.2	30.1	27.9	27.8	27.5	27.2
DDGS Feed Use (Mill. Tons)	12.1	15.8	21.1	25.7	29.3	29.4	30.5
Grains+DDGS+SBM feed use	205.3	195.0	209.0	194.5	194.7	193.9	190.7
FSI Use (Mill. Tons)	81.6	94.4	116.5	134.8	157.8	164.0	169.5
Fuel Ethanol Refinery Use (Mill. Tons)	40.7	53.8	76.9	94.2	116.0	121.9	127.0
Est. DDGS Prod. (Mill. Tons)	13.4	17.7	25.4	31.1	38.3	40.2	41.9
Est. Corn Used by Ethanol (Mill. Tons)	27.3	36.0	51.5	63.1	77.8	81.7	85.1
DDGS Exports (Mill. Tons)	1.3	1.9	4.3	5.4	9.0	10.9	11.4
Other FSI Use (Mill. Tons)	40.9	40.6	39.6	40.6	41.8	42.1	42.5
Exports (Mill. Tons)	59.8	58.3	69.9	50.9	54.8	53.5	53.5
Total Use (Mill. Tons)	304.5	300.9	344.1	326.6	350.2	354.5	356.0
Ending Stocks (Mill. Tons)	54.8	36.2	45.1	47.0	48.0	26.5	31.2
% Feedgrains Used for Fuel Ethanol	14%	19%	22%	29%	33%	37%	35%
Ending Stocks-to-Use Ratio	18%	12%	13%	14%	14%	7%	9%
U.S. Average Farm Corn Price, \$/Ton	\$79	\$120	\$165	\$160	\$140	\$201	\$167
DDGS, 10%, Central IL, \$/Ton	\$72	\$104	\$144	\$111	\$106	\$163	\$154
SBM, Hi-Protein, Decatur, IL, \$/Ton	\$158	\$186	\$305	\$300	\$282	\$299	\$318

The estimated net tons of corn used for ethanol production increases from 27.3 in 2005/2006 million to over 80 million currently. That corn is not available for feeding or other uses, and puts upward pressure on prices.

The projection for 2011 plantings of 106 million acres is based on the need to produce enough feedgrains to build stocks to a more comfortable level. It will be

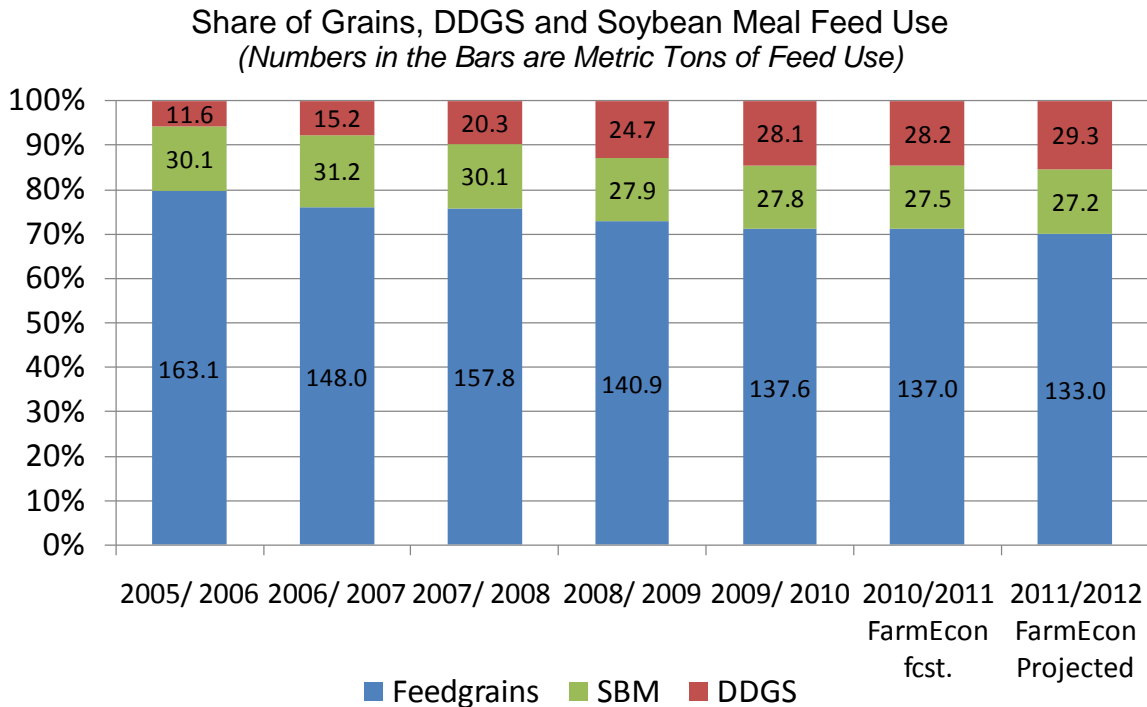
difficult to find that many acres without taking a substantial portion away from soybeans, and repeating the soybean-shortage scenario of 2007.

If you were to look at feedgrain and soybean meal feed use alone, it would appear that feed use has dropped by about 15% since 2005/2006. Adding back DDGS use reduces, but does not eliminate, this decline. Ethanol proponents are not correct in saying that increased DDGS production has made up for increased corn use for ethanol production. Feed users are also not correct just looking at the feedgrains used for feed without considering increased DDGS production.

One important factor beyond supply is quality. DDGS is not a perfect substitute for either feedgrains or soybean meal. The 30 million ton reduction in feedgrains available for feeding from 2005/2007 to today may have grain pricing implications that go beyond the supply numbers.

Also, note that DDGS exports are increasing steadily since 2007/2008. This is likely due to limitations on the amount of DDGS that can be included in rations.

So, how is DDGS being used – for energy or protein? Feed use patterns for grains, DDGS and soybean meal strongly suggest that DDGS is being used mostly for ration energy, not protein (see chart). The fact that DDGS is priced competitively with corn, and not soybean meal, also suggests that energy is what users see as the underlying value.



Increased demand for corn and oilseeds over the last 20 years has resulted in major changes in what U.S. farmers plant, but little change total acreage. The

next table shows harvested acreage shifts from 1990 to 2010. All of the increase in corn and oilseed acreage has been offset by declines in all grains other than corn. Total acreage increased by a modest 1.03 million. It appears that acreage has been swapped among the feedgrains, and among oilseeds and wheat.

Declines in sorghum, barley and oat acreage have reduced the availability of those grains for feed use, but corn yields per acre are higher than the other feedgrains. Reductions in sorghum, barley and oats were more than offset by increased corn production. Still, it would be a serious mistake to look at just the corn balance sheet, and not correct for the production losses in other feedgrains that have resulted from corn acreage increases.

Harvested Acres, U.S. Grains and Oilseeds (000)

Commodity	1990	2010	1990-2010 Change
Corn	66,953	81,263	14,310
Barley	7,529	2,466	(5,063)
Sorghum	9,089	4,658	(4,431)
Oats	5,948	1,263	(4,685)
Net Change, Feedgrains			131
Rapeseed	77	1,421	1,344
Soybeans	56,513	76,823	20,310
Oilseed, Sunflowerseed	1,851	1,873	22
Wheat	69,103	47,637	(21,466)
Net Change, Oilseeds and Wheat			210
Rye	376	264	(111)
Rice	2,822	3,623	801
Total	220,260	221,290	1,030

Conclusions: Increased corn used for ethanol production has had major effect on how we need to look at feedgrain supply and use. Analysis indicates that DDGS is priced at, and used for, energy in rations. Therefore, it needs to be included with grains supply and use, not protein meals. Reduced acreage of minor feedgrains as a result of increased corn plantings also makes important to look at the total feedgrains, not just corn, balance sheet.

As a result of the rapid increase in DDGS production, there are increasingly serious distortions in official USDA corn and feedgrain balance sheets. To correct those omissions, USDA would need to estimate feed by-product production of ethanol refineries, and DDGS stocks. With DDGS feed use now the second most important item in U.S. feed rations, this omission has had significant effects on the feedgrain balance sheet. Reductions in feed use have been overstated by the official balance sheet estimates.

Further Research: Further refinement of these rough production and use estimates would require actual ethanol plant feed by-product production and stocks estimates. Those estimates would likely need to come from currently unavailable USDA research and surveys. Contacts at USDA indicate that work is underway to address the production estimate.

Balance sheets have traditionally been used to aid forecasts of annual average grain and oilseed prices. The grain and oilseed pricing implications of increased use of corn for ethanol production are significant, but not well-understood. The traditional balance approach to forecasting currently suffers from the data omissions discussed above and emerging price dynamics between ethanol and corn markets. In a follow-up article these issues will be discussed, and suggestions made for further research.