

CHAPTER 28

Factors that Affect DDGS Pricing and Transportation Logistics

Introduction

ONE OF THE BIGGEST FACTORS for determining whether DDGS is an economical animal feed ingredient in the international market are the price and transportation logistics to import DDGS. This chapter describes the current factors, challenges and pricing mechanisms for determining the destination cost of importing U.S. DDGS. Historically, the primary users of DDGS were the dairy and beef industries in the U.S. (**Figure 1**). However, beginning in 2003-2004, with new research information available on the benefits of using DDGS in swine and poultry diets, usage of DDGS in the swine industry began to increase dramatically, and to a lesser extent in the poultry industry. Today, the U.S. swine and poultry industries consume about 25 percent of the domestic DDGS market and this growing trend is likely to

continue, especially when prices of competing ingredients, such as corn and soybean meal, are high and fluctuations in supply occur from year to year.

The U.S. production of ethanol and DDGS increased dramatically from 2001 to 2010, but since 2010 production has been relatively steady. As shown in **Figure 2**, growth of the U.S. ethanol industry has resulted in increases in DDGS production, as well as changes in the percentage of DDGS being exported. As the U.S. livestock and poultry markets achieve maximal market penetration for DDGS use, an increasing proportion of DDGS production will be exported. However, the amount of increase in DDGS exports will be highly dependent on the price relationship of competing ingredients in the international market as well as transportation costs.

Composition of Domestic Usage (One Thousand Short Tons DDGS Equivalent)

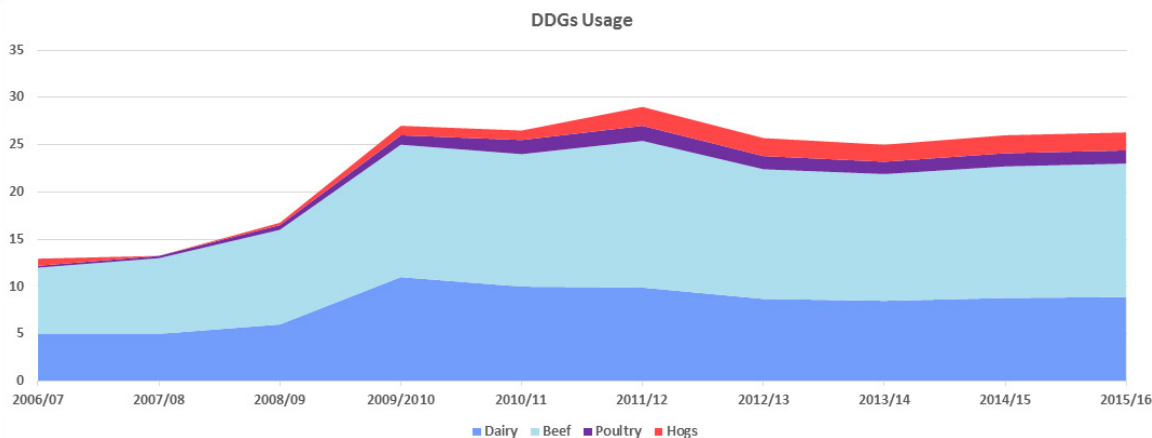


Figure 1. Historical consumption of DDGS with soluble in the livestock and poultry industries from 2006 to 2016 for the October to September crop Year (Source: Steve Markham, CHS Inc.)



Figure 2. Estimates of historical and future trends in U.S. DDGS production and exports from 2009 to 2017 (Source: Sean Broderick, CHS Inc.)

Factors Affecting DDGS Price

A number of factors can affect DDGS pricing. First, it should be noted that the highest demand for DDGS is in the U.S., where about 75 percent of the distiller's grains produced today are consumed by livestock and poultry. As a result, about 25 percent of DDGS was exported in 2017. However, the amount of DDGS exported to other countries is increasing every year. Ethanol and co-product producers and marketers of DDGS are aware that the export markets are a very important component in overall DDGS demand.

DDGS is a very unique mid-protein, high-energy feed ingredient. It partially replaces corn, soybean meal and phosphorus supplements in animal feeds. Therefore, the price of DDGS is affected by several factors including: the market price of corn and soybean meal, availability of supply for export, seasonality of domestic DDGS consumption, fluctuating transportation costs and import tariffs imposed by many countries. Although many feed ingredient traders consider DDGS to be a "protein meal," and consequently compare it to soybean meal, it actually

is more similar in nutritional and economic value to corn. In fact, the DDGS price follows the corn market more closely than the soybean meal market. **Figure 3** shows historical corn and DDGS prices FOB at the Gulf of Mexico. Overall trends in both the corn and soybean meal markets affect the DDGS price, but daily volatility in the corn or soybean meal market on the Chicago Board of Trade does not always translate into daily volatility in price in the DDGS market. If corn and/or soybean meal prices are generally high relative to DDGS price, DDGS will often replace a larger proportion of corn and soybean meal in animal feeds (i.e. higher dietary DDGS inclusion rates).

The price of DDGS is also influenced by season of the year. Most of the domestic DDGS use is in cattle feeds. When cattle are moved to pastures for grazing during the summer months (May through October; **Figure 4**), the number of cattle on feed decreases causing the domestic demand for distiller's grains to decrease dramatically. This results in an increased supply available for the export market and usually results in lower DDGS prices compared to other months of the year. Lower elevation costs coupled with traditionally

DDGS Prices Relative to Corn

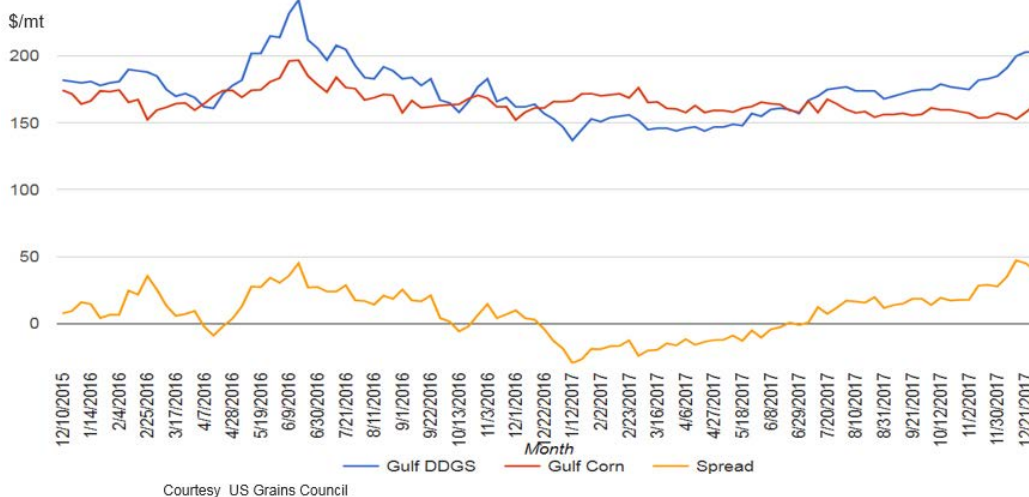


Figure 3. DDGS prices relative to corn in the US Gulf December 2015-January 2018
(Source: Steve Markham, CHS Inc.)

**Cattle on Feed U.S.
From USDA (in thousands)**

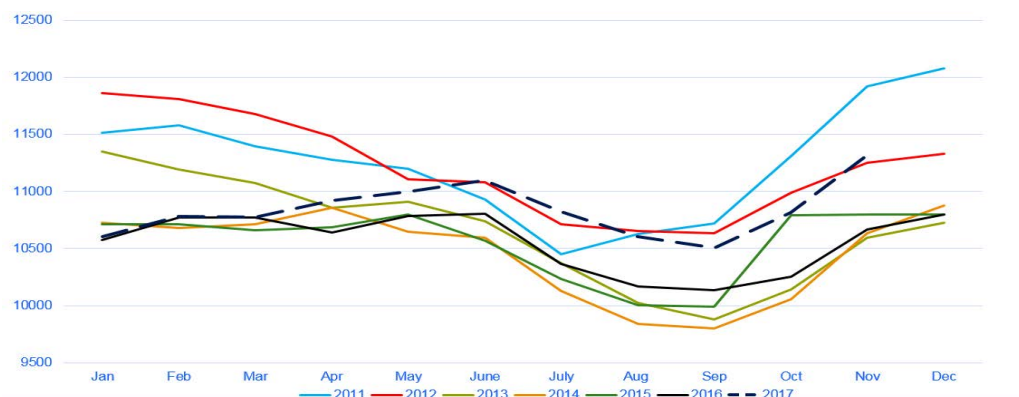


Figure 4. Seasonality of U.S. cattle on pasture vs. feedlots consuming high grain diets
(Source: Sam Erwin, CHS Inc.)

lower barge freight during the summer months also adds to a more competitive DDGS value during this time period.

During seasonal price increases in the DDGS market, corn and soybean meal will be more price competitive with DDGS, resulting in less DDGS being used in least cost diet formulations. Strong demand in the early months of the year, coupled with historically short supplies at the same time, has typically caused higher DDGS prices in January through May. However, even though this has been a historical trend, it is not a certainty that DDGS will always be priced higher during this time of year. With the large quantities of DDGS being produced by the U.S. ethanol industry and supplied to the market, both buyers and sellers should not expect supply shortages normally seen in the late winter and spring. However, as the U.S. swine and poultry industries continue to use a greater share of total DDGS production, and since they are not associated with the grazing season like cattle, the seasonal effects on DDGS price will likely become less dramatic in the future. The DDGS export market also plays a big role in reducing the volatility of high and low prices in the U.S. market, and often results in exporting greater amounts of DDGS to other countries when domestic prices get too low.

Transporting DDGS

Barges and ocean vessels

Ocean freight rates, based on the Baltic Exchange Panamax Index, have varied dramatically over the past 10 years (**Figure 5**). For example, ocean charter vessels cost more than \$94,000 per day in September 2007 and then dropped as low as \$3,350 per day in December 2008, a little more than one year later. The high volatility in charter vessel freight has a major impact on the cost of obtaining DDGS for international customers. Current freight rates have increased substantially from the low point in January 2016, but are much more reasonable than the highest freight cost that occurred during the winter of 2010.



Photo Courtesy of Steve Markham, CHS Inc.

BALTIC PANAMAX SHIPPING INDEX



Figure 5. Baltic Shipping Index since 2009

One of the most cost-effective freight options available in the U.S. is to transport DDGS on the river system via barges, and then load it onto ocean vessels. Barge freight trades as a percentage of tariff, but these percentage rates fluctuate over time. Long trips (e.g. Minneapolis, Minnesota to New Orleans, Louisiana) will have a higher tariff and probably a higher percentage rate compared to transporting shorter distances from origins in more southern locations. The U.S. has 5,000 miles of navigable waterways for barges and tug boats, and different tariffs and percentage rates are traded for each navigable river in the U.S.

Barges traded to New Orleans are usually offered as CIF (Cost, Insurance, and Freight) to New Orleans (NOLA). A CIF price excludes loading the product onto the boat. In general, DDGS is loaded onto barges in the interior U.S. and shipped to the Port of New Orleans and surrounding areas where it is transferred into holds on ocean going vessels. This transfer is usually done using mid-stream loaders. Both barges and vessels are pulled up alongside the midstream loader where the transfer is made. Vessel sizes vary, but the most common vessel types are Handysize, Handymax and Panamax vessels. The Handysize vessel will hold 20,000 to 30,000 metric tons of cargo, whereas the Handymax holds 35,000 to 49,000 metric tons, and the Panamax holds 50,000 to 75,000 metric tons of cargo. One Panamax vessel will hold the DDGS equivalent of about the same amount contained in 37 barges or 555 rail cars. Ocean freight trades like a commodity and the rates change on a daily basis.

Ocean freight rates depend on a number of factors including, but not limited to:

- market conditions
- type of vessel needed
- port drafts
- port charges
- load terms
- discharge terms
- time of year

Factors affecting the overall ocean freight market include:

- supply and demand issues
- cost of vessel construction and operation
- new vessel construction vs. vessel retirements
- seasonal demand (e.g. grain harvest in North and South America)
- China's demand for all raw materials
- length of voyage
- turnaround time
- market psychology or expectations

Freight chartering options include:

- Voyage Charters – point A to point B shipments
 - less risky for cost calculations
- Time Charters – give more flexibility because the vessel is chartered for a specified amount of time rather than by the voyage
 - This option gives potentially higher risk and potentially higher reward. Once the cargo arrives to destination port it is unloaded via clam buckets which scoop the product out of the vessel, or it is unloaded pneumatically.

Containers

The United States is currently the world's largest container importer, which puts it in a very unique situation. Containers filled with electronics, textiles, auto parts, etc., arrive in the U.S. primarily from Asia, and they need to be shipped back to that region in order to be re-loaded with the same types of consumer goods for another shipment to the U.S. Steamship lines prefer to generate some revenue on the backhaul, rather than sending empty containers back to Asia which do not generate any revenue for them. This backhaul is where DDGS, along with other agricultural products, have found their niche in this freight market. The largest surpluses of empty containers in the interior U.S. are found in Chicago, Illinois and Kansas City, Missouri, followed by Memphis, Tennessee. The typical container export process is as follows:

1. DDGS is shipped from the ethanol plant to a facility dedicated to container loading. These facilities are typically located close to large container collection yards where the empty containers are stored.
2. In some cases, ethanol plants load containers with DDGS on site, thereby circumventing the costs associated with a third-party container loader.

3. Once containers are loaded with DDGS, they are shipped by trucks to the container collection yard and placed onto a rail chassis.
4. From there, containers are shipped by rail to a U.S. port to later be loaded onto a container vessel. Long Beach, California handles more containers than any other U.S. port. Typical transit time from Chicago to Long Beach is seven to 10 days. Typical transit time from Long Beach to Asian ports is 16 to 18 days.

Shipping via containers is an excellent option for the discriminating buyer who desires purchasing DDGS from a limited number of sources or ethanol plants.



Photo Courtesy of Steve Markham, CHS Inc.

Rail

Hopper rail cars are used to export DDGS to Mexico and Canada. Rail shipments of DDGS to Mexico are growing exponentially every year, and the number of rail car shipments to Canada is also increasing. Rail exports are considered to be the easiest transportation mode to manage considering the limited number of steps involved and the time in transit. Rail cars are loaded at the ethanol plant, billed with the railroad, and shipped to the final destination. Rail cars must be inspected and cleaned once they arrive at the border. Once inspected and cleaned, they cross the border and make their way to the final destination. The principal railroads serving the U.S. are Union Pacific (UP) and Burlington Northern Santa Fe (BNSF). Mexico's main rail lines are Ferromex (FXE) and Kansas City Southern de Mexico (KCSM), formerly TFM. Canada's principal rail lines are the Canadian National Railway (CN) and Canadian Pacific Railway (CPR).

Challenges of Exporting DDGS: Perspectives from DDGS Exporters

Loading cost and efficiency

It requires twice as much time to load an ocean vessel with DDGS as it does with corn. Because elevation margins are expensive, this is one of the major cost contributors to DDGS transportation costs. For exporters that do not have control of elevators, events when vessels do not arrive on schedule can cause them to default on the loading. To avoid this situation, DDGS exporters must have the right vessel at the right time from the right owner with the barges, rail cars or boats waiting to load it. Timing is critical to minimize cost.



Photo Courtesy of Steve Markham, CHS Inc.

Containers

Very few containers return empty today as they did a few years ago. As a result, availability has been a challenge in the world economy, and has led to a real problem with on-time delivery. As a general rule, use of bulk vessels is less expensive, more dependable and usually easier to control DDGS quality, especially when a sample is obtained and tested before loading.

Many of the containers today are loaded directly at the ethanol plant. Even plants that do an excellent job at producing high quality DDGS can, occasionally, produce a less than desirable DDGS co-product on a given day, and that co-product can be loaded in a container without the marketer knowing it.

Containers being delivered to the right ship for a timely delivery can also occasionally be a problem as well as

the possibility of freight rates changing at any time even after a container is loaded. Seasonality and variability in the container market occasionally causes disruption in the supply chain, including cancelled bookings and restricted availability in key origin markets.

Suggestions for Success in Importing DDGS

It is essential that DDGS importers know, and have a relationship with their supplier. Specifically, importers should understand the exporting company's logistical and transportation capabilities. If a DDGS exporter does not own export elevators, access to these elevators can be a problem. Currently, U.S. DDGS exporters have limited freight and elevation capacity because fewer elevators are available and record supplies of grain and grain co-products are being produced.

Exporters that have facilities and capabilities via multiple transit ways (Great Lakes, major rivers, Gulf of Mexico, Pacific Northwest) have a better ability to serve the export market around the globe. Purchasing DDGS at the lowest freight costs will require working with companies that have multiple transportation and loading options and flexibility.

Suppliers who market for specific ethanol plants have control over the origin of DDGS sources and can more easily control the quality of DDGS that is delivered. Buyers who purchase through brokers or other suppliers that do not have direct marketing agreements with ethanol plants cannot easily control the quality of DDGS being delivered. It is also possible for DDGS marketers that control the supply sources to send DDGS samples at the time of origination, to reputable commercial laboratories for testing and send results directly to the customer before a vessel or hold is loaded. It is important to identify and agree on a reputable third party commercial laboratory for sample analysis to avoid potential problems upon arrival at the destination.

Mycotoxin testing can be conducted on samples obtained at origin, or the supplier can provide the procedures and limits for corn used at the ethanol plants where the DDGS was produced. Color scores can also be determined for the DDGS customer using Hunter or Minolta color score measurements. Protein and fat guarantees should always be agreed upon before consummating a trade.

DDGS Unloading



Photos Courtesy of Steve Markham, CHS Inc.