

# BIODIESEL DEMAND FOR ANIMAL FATS AND TALLOW GENERATES AN ADDITIONAL REVENUE STREAM FOR THE LIVESTOCK INDUSTRY

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## Overview/Introduction

As the U.S. biodiesel industry has expanded and contracted over the last 5 ½ years, the industry has adapted its feedstock utilization based on feedstock availability and cost. A consistent biodiesel feedstock source has recently been animal fats and tallow. These by-products of animal slaughter had traditionally been used as a feed ingredient, for industrial purposes, and on a smaller scale as a food ingredient. Therefore, as their use has shifted towards biodiesel production, it has drawn attention to the impact of the change in utilization and consequently prices on the livestock industry. The ultimate question has been “How has the biodiesel industry’s use of animal fats and tallow affected the livestock industry?” This paper will report the utilization of animal fats and tallow for biodiesel production beginning in 2007, proffer reasons for the new demand, explore price relationships, and conclude with illustrations showing how livestock producers have impacted from the increased demand.

## Animal Fats and Tallow Use as a Biodiesel Feedstock

The U.S. biodiesel industry has experienced significant growth beginning in 2007. While soybean oil was the dominant biodiesel feedstock and the feedstock of choice in 2007, feedstock substitutes have easily entered the market which is a strength of the biodiesel industry. Animal fats and tallow have been consistent feedstocks since 2008. Figure 1 reports animal fats and tallow share of total biodiesel production using two data sources<sup>1</sup>. Animal fats and tallow use jumped from about 1% of the biodiesel produced in 2007 to over 10% in 2008. Since there is a large disparity in the two data sources’ 2010 data as shown in Figure 1, both data sources are presented to show the potential range of the share of animal fats and tallow use that year. Animal fats and tallow were around 13% of the biodiesel feedstocks the first seven months in 2012.

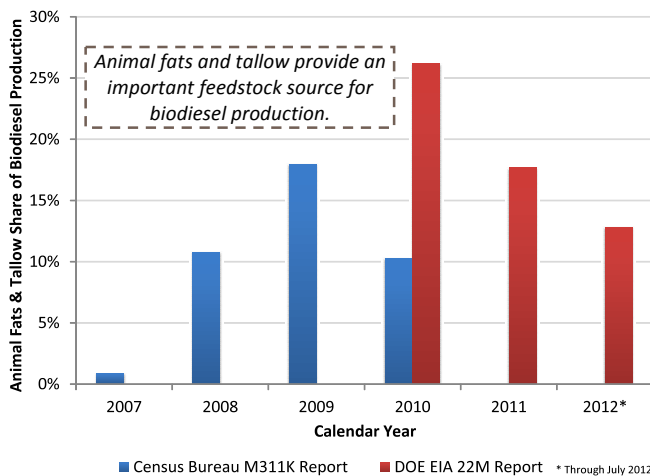


Figure 1. Animal Fats and Tallow Share of Biodiesel Production

## Biodiesel Feedstock Demand for Animal Fats and Tallow

There are multiple reasons for the increased use of animal fats and tallow. These reasons include their availability, the fact that they qualify for D4 fuel pathway for generating RINs, and importantly, their price advantage over virgin vegetable oils, despite their need for additional processing due to their high free fatty acid (FFA) content.

## Biodiesel Feedstock Price Relationships

Figure 2 illustrates two points; the first observation is the confirmation of the consistent price advantage that animal fats and tallow have had over crude soybean oil averaging 7 to 11 cents per pound less than crude soybean oil. The second point is the closer tracking of soybean oil, animal fats and tallow prices beginning in 2007.

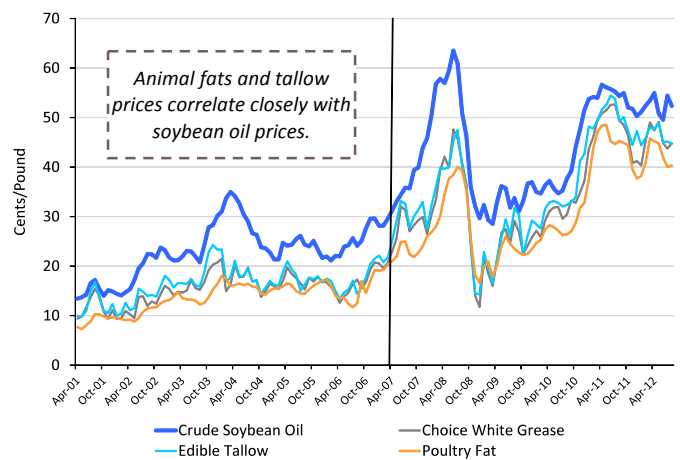


Figure 2. Biodiesel Feedstock Prices

<sup>1</sup> The Census Bureau’s M311K reports provided the data for 2007 through 2010, while the Department of Energy’s Energy Information Administration began collecting similar data, starting with 2010 production. Therefore, there is an overlap of information in 2010.

The price correlations between crude soybean oil (SBO) and tallow, choice white grease (lard) and poultry fat have all increased since January 2007 (Table 1). These more highly correlated price relationships hint at an increased alignment of utilization across these feedstocks (e.g., they are increasingly used for the same purpose such as biodiesel production as SBO) and that they are impacted by similar market forces such as changes in demand for biodiesel production.

**Table 1. Feedstock Price Correlations**

Feedstocks	Correlation Coefficients	
	Apr '01 – Dec '06	Jan '07 – Aug '12
Crude Soybean Oil and Edible Tallow	0.7969	0.8885
Crude Soybean Oil and Choice White Grease	0.8094	0.8976
Crude Soybean Oil and Poultry Fat	0.8172	0.8712

## Impact of Biodiesel Use of Animal Fats and Tallow on Livestock Industry

Basic economic principles state that when demand increases for a product, prices for that product increase. For products for which there is direct demand such as beef, increased demand stimulates increased supply. However, animal fats and tallow are by-products of livestock and poultry harvest, and increased demand does not stimulate increased supply due to their small share of the gross revenue of the animal carcass. While these by-products are not primary drivers in determining the prices paid for poultry, fed cattle and market hogs, they do affect the profit margins in these industries by increasing the by-product “drop value.” As a result, the increased prices received for the animal fats and tallow have helped support or possibly increased the prices paid for the animals. These relationships are demonstrated through the positive price correlation between edible tallow and slaughter steers of 0.863. This correlation does not imply that one price is causing the other price to increase, but simply indicates that the prices tend to increase or decrease together.

The potential economic benefit of increased animal fats and tallow prices to livestock producers can be illustrated on a per head basis for feeder steers, market hogs, and broilers. The following tables summarize the average yield of the respective species' fat or tallow per head. In addition, it shows the value of the fat or tallow at two points in time. The “2007” prices are from January 2007 before the demand for animal fats and tallow increased significantly. The “2012” prices are what were experienced early in 2012 after animal fats and tallow use as a biodiesel feedstock had been incorporated into the demand and supply structure of the livestock slaughter

industry. Summarizing the differences between the 2007 and 2012 price scenarios stated in these tables are not meant to imply the total change in value per head are directly attributable to the increased biodiesel use for animal fats. There are other demand and supply factors that mostly likely are impacting the increased value of the animal fats. However, these numbers provide a starting point from which to estimate a contribution by the biodiesel industry to the increased drop value.

Table 2 indicates that the change in drop value from 2007 to 2012 for edible and inedible tallow for one steer is \$16.79. Tallow production did not change significantly between 2006 and 2010 (the most recent year in which twelve months of Census Bureau data are available), thus supply, which could have impacted prices, did not vary greatly. Over the same timeframe, there was a significant increase in inedible use of tallow, while edible consumption remained fairly constant. Those factors lead one to conclude that the majority of the change in prices was driven by the change in inedible use (in other words, biodiesel use). Multiple market factors impact prices so all of the recent increases in animal fats and tallow prices should not be attributed to increased biodiesel use. However, because of no significant changes in supply or edible use of tallow, it is conceivable that biodiesel demand for tallow could have contributed approximately 60 to 72% of the change in value or between \$10 to \$12 per head of the increased drop value of the tallow. Using 2011 slaughter numbers for beef steers and heifers only (representing 78% of the total cattle slaughtered), total contribution of biodiesel demand could possibly have ranged from \$262.6 MM to \$315.2 MM.

Table 3 shows that the change in drop value from 2007 to 2012 for lard and choice white grease for one market hog is \$1.69. Assuming \$1.00 to \$1.25 could be attributed to biodiesel demand (using similar assumptions about the supply and demand factors causing the lard and choice white grease price increases as for tallow) and 2011 barrow and gilt slaughter (97% of the hogs slaughtered), the range of increased value the biodiesel industry may have contributed to the pork industry is \$26.3 MM to \$32.8 MM.

Table 4 reports that the increased value in poultry fat from 2007 to 2012 for a single broiler is estimated at \$0.18. If \$0.11 to \$0.12 per broiler could be attributed to increased use as a biodiesel feedstock (using the same assumptions about the supply and demand factors causing the poultry fat price increases as for tallow, lard and choice white grease) and 2011 young chicken slaughter, total contribution of biodiesel demand for poultry fat to the poultry industry could possibly have ranged from \$2.8 MM to \$3.2 MM.

**Table 2. Beef Tallow Drop Value**

	Yield <sup>1</sup> (lbs/cwt)	Price		Value per Head		Difference (\$/hd)
		2007 <sup>2</sup> (\$/cwt)	2012 <sup>3</sup> (\$/cwt)	2007 (\$/hd <sup>4</sup> )	2012 (\$/hd <sup>4</sup> )	
Edible Tallow	1.20	\$21.75	\$45.25	\$3.33	\$6.92	\$3.60
Inedible Tallow	4.50	\$20.75	\$43.75	\$11.91	\$25.10	\$13.20
Total Tallow Drop Value				\$15.23	\$32.02	\$16.79
Biodiesel Contribution to Price Increase (Estimated Share Ranging from 60 to 72%) \$10 - \$12						
Estimated Aggregate Biodiesel Contribution to Beef Sector <sup>5</sup>				\$262.6 MM to \$315.2 MM		

<sup>1</sup> Source: USDA AMS NW\_LS441 Report, 05.01.12

<sup>2</sup> Source: USDA AMS NW\_LS441 Report, 01.02.07

<sup>3</sup> Source: USDA AMS NW\_LS441 Report, 03.29.12

<sup>4</sup> For typical slaughter beef animal weighing 1,275 lbs

<sup>5</sup> Based on 2011 slaughter numbers for steers and heifers

**Table 3. Pork Lard and Choice White Grease Drop Value**

	Yield <sup>1</sup> (lbs/cwt)	Price		Value per Head		Difference (\$/hd)
		2007 <sup>2</sup> (\$/cwt)	2012 <sup>3</sup> (\$/cwt)	2007 (\$/hd <sup>4</sup> )	2012 (\$/hd <sup>4</sup> )	
Lard	1.72	\$21.75	\$53.00	\$0.94	\$2.30	\$1.35
Choice White Grease	0.50	\$20.75	\$47.00	\$0.26	\$0.59	\$0.33
Total		5%	13%	\$1.20	\$2.89	\$1.69
Total Lard and Grease Drop Value				\$1.47	\$3.48	\$2.02
Biodiesel Contribution to Price Increase (Estimated Share Ranging from 60 to 74%) \$1.00 - \$1.25						
Estimated Aggregate Biodiesel Contribution to Pork Sector <sup>5</sup>				\$26.3 MM to \$32.8 MM		

<sup>1</sup> Source: USDA AMS NW\_LS446 Report, 04.27.12

<sup>2</sup> Source: USDA AMS NW\_LS446 Report, 01.05.07

<sup>3</sup> Source: USDA AMS NW\_LS446 Report, 04.27.12

<sup>4</sup> For typical slaughter hog animal weighing 252 lbs

<sup>5</sup> Based on 2011 slaughter numbers for barrows and gilts

**Table 4. Poultry Fat Value**

	Yield <sup>1</sup> (lbs/hd)	Price		Value per Head		Difference (\$/hd)
		2007 <sup>2</sup> (\$/lb)	2012 <sup>3</sup> (\$/lb)	Low (\$/hd)	High (\$/hd)	
Poultry Fat	0.75	\$20.08	\$43.43	\$0.15	\$0.33	\$0.18
Total Poultry Fat Value				\$0.15	\$0.33	\$0.18
Biodiesel Contribution to Price Increase (Estimated Share Ranging from 60 to 70%) \$0.11 - \$0.12						
Estimated Aggregate Biodiesel Contribution to Poultry Sector <sup>4</sup>				\$2.8 MM to \$3.2 MM		

<sup>1</sup> Estimate based on Havenstein, Ferket and Qureshi article

<sup>2</sup> Poultry fat price, Jan '07

<sup>3</sup> Poultry fat price, Feb '12

<sup>4</sup> Based on 2011 slaughter numbers for young chickens

Data indicate an increase of \$10 to 12 per head between 2007 and 2012 due to biodiesel use of tallow.

Data indicate an increase of \$1.00 to \$1.25 per head between 2007 and 2012 due to biodiesel use of lard and choice white grease.

Data indicate an increase of \$0.11 to \$0.12 per head between 2007 and 2012 due to biodiesel use of poultry fat.

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