

Taking Animal Fat Biodiesel

As the demand for biodiesel increases in the United States, manufacturers are looking to diversify the feedstocks that can be used to produce this renewable fuel. The biodiesel industry is looking to animal fat as one such choice.

The amount of animal fat used by the biodiesel industry has more than doubled from 2006 to 2008, while allowing biodiesel to be competitive in the diesel fuel marketplace.

“Our industry understands that the market potential for biodiesel is huge in that it’s going to take vegetable oil and animal fat, as well as newly developed feedstocks, to satisfy that growing demand,” explained Dave Elsenbast, vice president of procurement at Renewable Energy Group (REG) and an American Fats and Oils Association board member. “We haven’t even begun to scratch the surface of the potential demand for biodiesel in the U.S. marketplace.”

Approximately 700 million gallons of biodiesel were produced in the United States in 2008 and new federal legislative measures effective in 2009 will allow for biodiesel made from new feedstocks to be competitively priced with conventional petroleum diesel. Innovative production techniques mean manufacturers can continue to produce high quality biodiesel from feedstocks like animal fats.

There’s no question that demand for competitively priced biodiesel exists and is increasing, and that there is no one “silver bullet” feedstock that can meet all the needs of this growing industry. The question is, which feedstocks will be

used to fill this demand?

To make animal fat even more appealing as a feedstock, the biodiesel industry is looking at potential changes in the way it works with the rendering industry, such as pricing animal fat on an index and utilizing advanced technology for filtering impurities in the production process.

Creating Opportunity for Competitively Priced Biodiesel

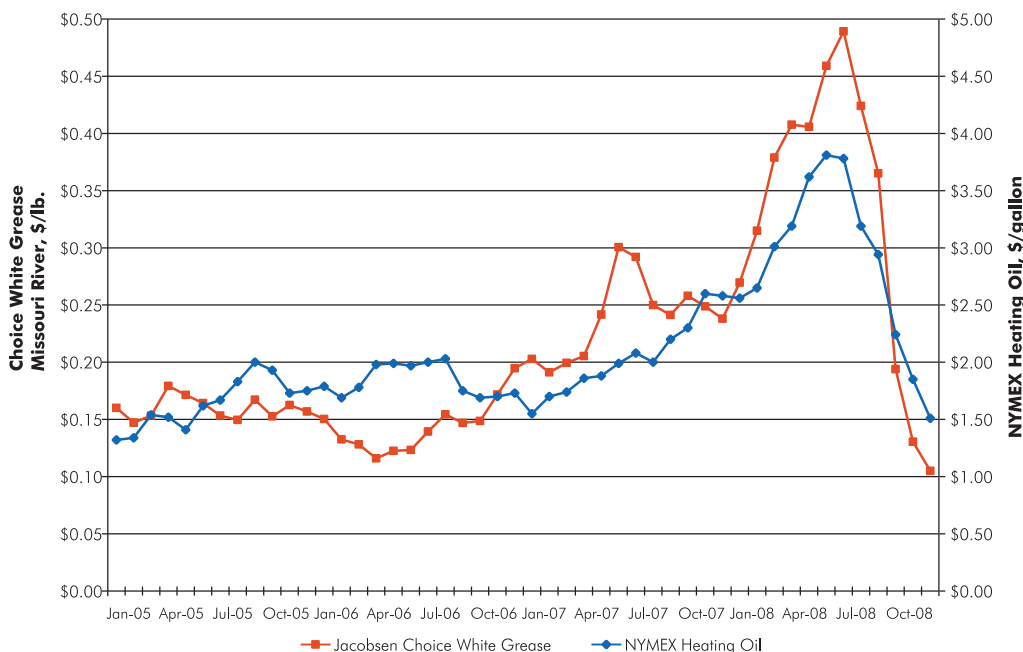
Of course, feedstocks must remain affordable or biodiesel producers end up pricing themselves out of the diesel market.

“We’re creating a large portfolio of feedstocks,” explained Elsenbast, who oversees feedstock purchases and risk management for the nine commercial-scale biodiesel facilities that make up the REG network. “The demand is increasing and we are producing more biodiesel, and a portfolio of feedstocks allows us flexibility.

“When the price of one goes up, we can reduce production with that feedstock and increase the use of one that costs less, such as animal fats,” Elsenbast said of REG’s use of tallow, poultry fat, and choice white grease.

According to a report by Informa Economics, approximately 20 percent of the biodiesel manufactured in the United States in 2008 was produced from animal fats and greases, and recycled cooking oils. That amount nearly doubled from 2007.

Chart 1. Correlation Between Choice White Grease and Heating Oil, January 2005-October 2008



After biodiesel companies began purchasing animal fat in late 2006, the price increased dramatically, offering renderers additional value to their partnership with the biodiesel industry. As reported by The Jacobsen Publishing Company, the average price of choice white grease at Chicago in 2006 was 16.13 cents per pound. By 2008, that value had more than doubled to 33.22 cents per pound. Bleached fancy tallow saw a similar increase, with an average price at Chicago of 16.86 cents per pound in 2006, and 34.2 cents in 2008.

Informa Economics reports indicate the biodiesel industry accounted for 13 percent of the animal fat market in 2008. Yet, animal fat remains one of the most price volatile of any feedstock being used to produce biodiesel.

Level to the Next

By Emily Schettler
Renewable Energy Group

It's also the only feedstock used by the biodiesel industry that is not traded or indexed to a regulated futures exchange. Being able to manage price risk, and trade forward ownership and sales positions is critically important to pricing finished product in the biodiesel industry and should help the consistency of demand for renderers' products.

The biodiesel industry is asking livestock slaughter and rendering companies to consider selling animal fats at a price that is indexed to heating oil, which is traded on the New York Mercantile Exchange.

"We feel this would remove some of the volatility associated with animal fats we've seen in the last year and provide forward pricing options to biodiesel producers, who in turn can offer forward sales pricing options to consumers of biodiesel," explained Elsenbast. He notes that now is an ideal time for animal fat sellers to create a pricing index program because the animal fat market has begun to correlate to the heating oil market (see Chart 1). As the price of heating oil goes up, the price paid for animal fat would increase by the same percent.

Added Value from Recent Legislation

On January 1, 2009, the federal Renewable Fuel Standard (RFS) took effect calling for 500 million gallons of biodiesel to be used nationally in 2009. That mandate will grow to more than one billion gallons in 2012.

Animal fat biodiesel has a very good score when it comes to greenhouse gas emissions. A carbon lifecycle analysis for animal fat biodiesel has not been released, but biodiesel made from soybean oil generates 79 percent less atmospheric carbon overall than regular diesel and researchers are anticipating similar or even better results for biodiesel made from animal fats. This score makes animal fat biodiesel more competitive under proposed RFS regulations.

Tax credits have helped the biodiesel industry remain competitive in the diesel field. At the beginning of this year, the federal blender's tax credit for non-virgin fats and waste vegetable oil grew from 50 cents to one dollar per gallon, and that price point could potentially be passed on as value to consumers as competitively-priced fuel. (This change was only made for biodiesel. Renewable diesel still receives a 50 cent tax credit.)

Production Expertise Reigns

It is the production expertise and technology, not the feedstock, that determines finished biodiesel quality.

"The biodiesel process that we use involves taking a

triglyceride molecule and converting that into biodiesel," explained Larry Breeding, plant manager at Western Iowa Energy, a REG network 30 million gallon per year biodiesel facility in Wall Lake, IA. "We have to remove anything from the feedstock that's not a triglyceride molecule."

At Breeding's facility, a proprietary pretreatment process refines and filters the feedstock. The refining process removes any phosphorous, while filtering takes out other metals that may be present.

Currently, four plants managed by REG, including Western Iowa Energy, are outfitted with fatty acid stripping columns that allow ASTM-quality biodiesel to be produced. Elsenbast said that the addition of this equipment demonstrates the commitment by REG and its network of partners to a multi-feedstock business model.

"This is a large investment for the REG network," Elsenbast said. "We are confident that animal fat will be a valuable resource for us in the future."

Quality, Regardless of Feedstock

Renewable Energy Group guarantees that every lot of biodiesel produced exceeds ASTM specifications, regardless of feedstock. Each load of biodiesel sold comes with a certificate of analysis guaranteeing the product's composition and quality.

"It is REG's production technology that allows this guarantee to be in place," explained Myron Danzer, vice president of customer and technical service who oversees quality for the network. "Because of its characteristics, some biodiesel manufacturers are faced with animal fat-based biodiesel that often does not meet ASTM cold soak filtration standards, which became mandatory in October 2008."

Cold soak filtration is a new ASTM requirement indicating cold weather performance. The intent of the test is to look for insoluble particulate matter that might fall out of solution in biodiesel after being stored at cold temperatures for an extended period of time. Impurities in animal fat left behind from the rendering process often make it difficult to purify the biodiesel to the necessary standard. REG plants with the capability to manufacture biodiesel from animal fat produce a fuel that exceeds ASTM standards, including the cold soak filtration requirement. They have done so by running the product through their patent-pending filtration process.

Breeding and his staff spent months working to produce a biodiesel that could stand up to and surpass industry cold soak specifications.

Continued on page 12

“Western Iowa Energy began working with choice white grease in December 2006. By spring of 2007, we had a product we were ready to sell,” Breeding said. He acknowledged that some animal fat feedstocks show up to the plant in better shape than others, but his team and his plant are up to the challenge.

“When we first began two years ago, we started with choice white grease,” Breeding said. “And since we weren’t using a lot of it, we were able to get product that was of pretty good quality. As we began to use more and more, we had to begin using fat that was not of the same quality, but we were still able to meet and then exceed ASTM specifications.”

Distributor Confidence

Marketing has been integral to REG’s ability to sell biodiesel made from animal fat. There has long been a belief in the downstream petroleum industry that biodiesel made from tallow, yellow grease, and other rendered fats is not of as high a quality as biodiesel made from soybean oil. REG has taken aggressive measures to help its customers overcome their stigma for the product. Constant communication with partners and customers throughout the distribution chain has been crucial.

“We found that our customers were most concerned with how well the product was made, not what it was made of,” said Gary Haer, REG’s vice president of sales and marketing. “Once we made the quality guarantee that we will exceed ASTM specifications regardless of feedstock, that’s when we got over this ‘soy is quality and nothing else is quality’ mindset.”

REG began selling animal fat-based biodiesel as soon as Western Iowa Energy began producing it in the spring of 2007. As time progressed and REG’s portfolio of feedstocks grew, the company launched a new product lineup, REG-9000, in April 2008. The lineup is unique in the biodiesel industry because the fuel is marketed based on finished fuel attributes, not feedstock.

According to Haer, the transition to marketing the biodiesel based on finished fuel attributes made sense because that is how REG’s largest customer base, the petroleum industry, sells its own products.

“Gasoline and diesel fuel purchased by the petroleum industry are purchased on a spec of the fuel, just as we’ve done with the REG-9000 lineup,” Haer explained. “That absolutely influenced our decision to market our fuel this way. We wanted to give our customers confidence in the quality of the fuel.”

The current lineup consists of three products – REG-9000-1, REG-9000-5, and REG-9000-10 – each categorized by their cloud point in degrees Celsius. All three products are made from a mixture of feedstocks, with vegetable oils as the main component of REG-9000-1 and animal fat as the main component of REG-9000-10.

One of the biggest hurdles facing the company’s animal fat-based biodiesel is educating its customers. Because biodiesel made from animal fat has a higher cloud point, precautions must be taken during winter months to ensure that the fuel is used and stored properly.

“Technical support to the supply chain and to our

customers has been key for REG to develop as we integrate new feedstocks like animal fat and open the market for biodiesel with higher cloud points,” Haer said. He added that some biodiesel customers are nervous about animal fat-based biodiesel because of bad experiences with biodiesel producers who weren’t meeting the quality specifications in the past.

“We’re selling through a lot of negative impressions with animal fat,” Haer commented. To combat those impressions, REG engineers have been working one-on-one with customers to educate them on operability issues concerning animal fat-based biodiesel. As technical lead, Danzer works with everyone from blenders to distributors to customers at the pump.

“Typically the way fuel has been handled over the last 50 to 75 years is a distributor will go to the terminal, pick it up, blend it in, and that’s all he really has to worry about,” Danzer explained. “Well, now a distributor has to worry about cloud points and certain characteristics. He has to manage his fuel more, and then he has to think about his end user and where he’s going to use it.”

This hard work has paid off, and petroleum distributors are beginning to embrace biodiesel made from feedstocks other than soybean oil.

“Since the REG-9000 launch last year, we have seen great success in the market’s acceptance of the product,” Haer said. “That’s been a winning situation for our company and a great benefit for the rendering companies’ demand for their feedstock.”

Although REG-9000-10 has a higher cloud point than other fuels, some of its other attributes make it more desirable. Oxidation stability and cetane are both higher than for lower cloud point biodiesel. All biodiesel already has a higher cetane number than conventional diesel fuel, but the even higher cetane number of animal fat biodiesel can yield better engine performance. That’s a benefit for truckers, school buses, garbage trucks, and others using the fuel.

One of the greatest benefits of the new lineup, according to Haer, has been the company’s ability to provide customers with choices, not only in fuel attributes, but also in price.

“We’ve had very positive feedback from customers,” Haer said. “They like that there are price point differences and that they can choose. We’re still in the process of getting customers to accept the product year-round, but we’re getting there. I firmly believe that the momentum will continue.”

The Next Level

With index pricing programs and advanced process technology, Elsenbast and his team are bullish on animal fat-based biodiesel.

“The future of animal fat biodiesel looks bright,” he explained. “The market potential for competitively priced biodiesel is strong, and the market will continually be looking for feedstocks that provide the best economics while offering quality.”

“The integration of animal fat for biodiesel is a never-ending progression of improvement and relationship building,” Elsenbast continued. “Recent values for animal fats demonstrate that value from the biodiesel is here, and here to stay, for the American livestock producers, livestock slaughterers, and the entire rendering industry.” **R**