THE GLOBAL MARKET FOR RENDERED PRODUCTS

Kent Jay Swisher
Vice President, International Programs
National Renderers Association

Summary

Modern efficient renderers are mainly concentrated in North America, where they process nearly 25 million tons of raw materials per year, in the European Union (EU), about 15 million tons per year, and in the leading livestock and meat processing countries of Argentina, Australia, Brazil, Uruguay, and New Zealand, roughly 10 million tons per year. The value of the products sold by the worldwide rendering industry is estimated to be in the range of $6 to $8 billion per year. The global rendering industry provides products that are critical to other industries around the world, and they are developing new products such as biofuels and enzymes to meet changing demands worldwide. Rendered products include edible and inedible tallow, lard and greases, feed fats (yellow grease and poultry fat), animal protein meals, hides and skins, and gel bone. High-quality fats and proteins improve the nutrition of farm animals, poultry, and companion animals. Renderers also contribute essential ingredients for industrial products like fatty acids, lubricants, plastics, printing inks, and explosives; and consumer products such as soap, cosmetics, shaving cream, deodorants, perfumes, polishes, cleaners, paints, candles, and caulking compounds.

In the United States, exports have traditionally represented one-quarter of U.S. product annual disappearance. However, in 2004, that number dropped to one-fifth due to trade distortions created by the discovery of bovine spongiform encephalopathy (BSE) in North America. Trade and use of animal fats and grease have been relatively unaffected by BSE trade restrictions because the World Organization for Animal Health or OIE lists tallow as a product that can be safely traded if it has a maximum insoluble impurity of 0.15 percent. (The OIE is an intergovernmental organization that is involved in recommending standards in regards to the control of animal disease.) At the time of this writing, China is the only known country to ban the importation of animal fats from North America. However, animal proteins are facing much more scrutiny. At the time of this writing, ruminant animal proteins are banned by all U.S. major importers, whereas porcine and poultry meals have faired better. It must be noted that production and trade of meat and bone meal (MBM) includes ruminant MBM, porcine meal, and poultry meal. Non-ruminant protein meals should be unaffected by BSE concerns. Even though the trade and production statistics lump all of these products under one term, MBM, the author tries to distinguish between these products where appropriate.

The outlook for rendered products, especially animal proteins, is quite favorable. Even with many global trade impediments to rendered products, there is

a huge growing demand and this demand will become a catalyst for the resumption of trade.

History of Global Trade of Rendered Products– the Early Years (1800s-1945)

The early years of rendering and trade in rendered products were dominated by fat recovery and trade of potential tallow, soap, glue, and candle-making materials. The value of these products cannot be overlooked. For example, in the book *The Cattle on a Thousand Hills*, the author, Robert Glass Cleland, reported correspondence between two Western pioneers that translated to the sale of a single steer equating to $16 per head for fat and only $6 per head for meat. The tallow was worth approximately $0.20 per pound, which is similar to today's price in nominal terms. However, this $0.20 per pound in 1880 is equivalent to $3.67 per pound if converted to 2004 value by using the Consumer Price Index, yet the actual price in 2004 was approximately $0.19 per pound. This shows the relative importance of animal fats in the early years of the industry.

Prior to the depression, the United States was importing a fair amount of competing oils such as coconut oil, palm oil, and whale oil, while it exported much smaller amounts of tallow and lard. The nation was clearly a net importer of fats and oils. By 1932, the price of imported copra (coconut) oil, mainly from the Philippines, was driving down the price of rendered fats. The price of copra was nearly $0.02 per pound and it drove the price of animal fats down to similar levels. This price was an all-time low, and was a decrease of 75 percent from the normal average prices. In recent years, trade experts have learned to talk about fair trade instead of just free trade. This global trade problem threatened the very existence of renderers in the early 1930s and became the rallying call for the industry to organize and form the American Producers of Domestic Inedible Fats in 1933. This organization later became the National Renderers Association (NRA). The first act of the organization was to successfully lobby the U.S. government to impose the so-called fats and oils excise tax, which became part of the Revenue Bill of 1934. The intention of the organization was not to stop imports, but to provide some price support for the commodities, hence creating a "fair" market environment. The organization was successful and this legislation helped to strengthen and stabilize prices while still keeping the market open for imports. Focus on keeping this policy in place continued until World War II began. The World War II years found a controlled economy along with fixed prices for rendered products. In other parts of the world the same scenario transpired along with a basic collapse of commercial infrastructures in some countries. After World War II, the market for rendered products changed quickly and dramatically.

The Global Market for Animal Fats and Greases

Before and shortly after World War II, the U.S. rendering industry was mostly dedicated to the domestic market. Animal protein production went to the local feed industry and the majority of tallow went to domestic soap manufacturers

to produce flakes, powders, and granules. A major turning point for the industry came in the early 1950s when the U.S. soap industry turned to detergents that were made from petrochemicals. Tallow producers lost 40 percent of their market in a couple of years and fat prices dropped to less than three cents per pound. This was a 50 to 75 percent price drop for tallow. At this time the rendering industry decided to work on promoting its products to the global marketplace and by 1953, between one-third and one-half of all tallow produced was exported, and by 1956, at least half of tallow and grease production was exported, indeed making up for the lost market domestically. It was this same year that the NRA entered into a cooperative agreement with the U.S. Department of Agriculture Foreign Agricultural Service (FAS) to jointly fund international marketing activities for animal fats and greases. This important cooperative relationship remains to this day. The initial marketing efforts of the FAS/NRA cooperation from the 1950s through 1980 were aimed at promoting industrial demand for beef tallow from soap companies and the fatty acid chemical industry through technical and marketing seminars and the production of technical and promotional literature. In addition, highly successful national soap and hygiene promotion programs were undertaken in Japan, Turkey, Taiwan, Korea, and elsewhere in collaboration with domestic soap producers and government ministries of education and health to encourage soap usage, and thus demand for high quality tallow.

Figure 1. NRA Booth Promoting Soap Use at a Trade Show in Asia. Early Promotional Efforts Included Billboards in Subways, Magazines, Newspapers, and Education Hand Washing Campaigns at Grade Schools.

Figure 2. NRA President Ralph Van Hoven Participates in a Soap Exhibit in Osaka, Japan, in the Late 1950s.

Figure 3. Tallow-Based Laundry Soap from the 1950s Produced and Packaged by Nihon Detergent Manufacturing Co., Ltd., Toho Fats & Oils Co., and Nippon Fats and Oils Co.

Over the period of 1960 to 2004, the global market for fats and oils became saturated. Rendered animal fats, the traditional choice for soaps, began receiving great pressure from detergents and competing vegetable oils (Table 1).

Table 1. Global Exports of Fats and Oils, 1960 - 2004.

	1960	1996	2004
	Million Metric Tons		
Soybean	0.67	5.69	9.06
Palm Oil	0.62	10.80	25.06
Rapeseed Oil	0.05	1.75	1.15
Sunflowerseed Oil	0.22	2.71	2.52
Coconut Oil	0.27	1.40	1.73
Palm Kernel Oil	0.06	0.91	1.85
Fish	0.36	0.77	0.71
Tallow	1.08	2.12	2.25

Source: Oil World (1960 – 1996); USDA/FAS for 2004 vegetable oil data; FAO for fish oil and tallow 2004 data.

Tallow went from being the largest exported fat in 1960, to the fourth largest traded in 2004, and from a commodity that set the oil and fat prices to one of a price taker. The dramatic increases in the production of competing vegetable oils that resulted in large supplies during this time had the affect of depressing prices for animal fats. The trade in palm oil, the major competitor to tallow for industrial uses, went from 0.62 million metric tons (mmt) in 1960 to approximately 25 mmt in 2004, or a 40-fold increase in exports versus a two-fold increase in tallow exports in the same period. Global soybean oil exports also grew 14-fold over the same period. This was the result of the large growth in the production of these products. For example, palm oil production grew from 1.32 mmt in 1960 to 33.24 mmt in 2004, and soybean oil production grew from 3.36 mmt to 32.43 mmt during the same period. Malaysia and Indonesia have historically been the largest producers of palm oil. Together, these two countries have traditionally accounted for well over 80 percent of total global production in palm oil. In regards to soybean production, traditionally the United States has been the largest producer followed by Brazil, China, and Argentina.

As stated earlier in this chapter, the rendering industry output is bound by livestock production. Hence, the industry cannot increase or decrease output in changes to market conditions, and has become a price taker in the global market. The large increases in production of competing vegetable oils have been partly fueled by government support and intervention in the production of these products, giving them an unfair advantage against rendered fats and greases in the world marketplace. These same government policies have also had the effect of artificially changing the global fats and oils prices and, hence, unfairly affected the

price that renderers receive in the global marketplace for their products. The major suppliers of tallow in the world are as follows (Table 2).

Table 2. Tallow Exports by Major Suppliers, 2000 – 2005.

	2000	2001	2002	2003	2004	2005	% change last 2 yr
	Metric Tons						
United States	915,879	781,383	1,034,398	904,673	853,015	790,204	-7.36%
Australia	384,099	414,962	340,901	384,758	396,129	376,064	-5.07%
Canada	227,099	252,480	245,243	173,433	289,432	227,654	-21.34%
New Zealand	117,421	125,045	114,180	136,337	143,760	142,493	-0.88%
Brazil	146	22,974	13,352	4,259	46,347	44,491	-4.00%
World Total	1,687,718	1,611,027	1,814,947	1,653,582	1,807,845	1,658,928	-8.24%

Source: Global Trade Atlas for national exports; world total excludes intra EU trade.

Tallow production is tied to the cyclical nature of the beef industries in the producing nations. Exports from the major suppliers have been fairly static over the last five years. However, it is interesting to see a very large increase in exports from Brazil. Brazil's rendering industry is fairly new and will probably continue to increase its exports in the near future. The majority of tallow exports from these countries are utilized for industrial purposes with the remaining used in livestock feed as an energy source. The major importers for tallow are listed in Table 3.

Table 3. Tallow Imports by Major Markets, 2000 – 2005.

	2000	2001	2002	2003	2004	2005	% change last 2 yr
	Metric Tons						
Mexico	261,458	283,464	377,441	370,966	454,512	430,619	-5.26%
China	332,914	299,265	320,865	296,478	318,520	306,575	-3.75%
Cent. Am & Carib	139,852	136,832	161,852	150,460	169,214	98,389	-41.86%
Turkey	123,656	88,436	136,430	116,640	130,993	133,891	2.21%
Pakistan	99,838	71,324	84,324	113,483	70,189	83,126	18.43%
Nigeria	47,615	57,215	51,585	62,705	57,834	105,440	
World Total	1,687,718	1,611,027	1,814,947	1,653,582	1,807,845	1,658,928	-8.24%

Source: Global Trade Atlas; world total excludes intra EU trade.

As would be expected, Mexico, the largest importer of tallow, imports nearly all of their tallow from the United States, and China imports from Australia and New Zealand. Before BSE was found in North America, China was importing increasingly large quantities of tallow from North America. However, after BSE was found, China closed the market and as of this writing they have not re-opened to tallow from North America, despite all scientific evidence that shows tallow with a maximum insoluble impurity level of less then 0.15 percent is safe.

Post World War II Protein Meals

Research at Purdue University by Professor Plumb in the early 1900s showed that pigs fed protein residue or tankage along with corn grew much better then those fed corn alone. So began the feeding of rendered animal proteins to livestock because of the rich nutrient content and amino acid complex of these proteins. Prior to World War II, very little, if any, animal proteins were traded. Most were fed back to the livestock industry in the countries where they were produced. After World War II, there continued to be little trade in animal proteins because they were valuable and thus utilized in the countries where they were produced. Hence, it is extremely difficult to find trade data for animal proteins prior to the late 1980s. It appears that entering the late 1980s, exports of animal proteins meals started to increase dramatically. Many countries in the world are protein deficient and as their livestock industries have developed, the need for imported protein feed ingredients has grown. High quality animal proteins offer a good source of nutrition along with a desirable amino acid complex, and are a very good complement to plant-based protein meals in a ration.

Animal protein meal exports have become increasingly more important to the American rendering industry. During the period 1992 to 2002, U.S. exports went from 160,000 metric tons to over 550,000 metric tons, a near four-fold increase. However, in 2004 and 2005, due to BSE concerns by importing nations, exports of animal proteins decreased substantially. On the domestic side, according to the U.S. Census Bureau's monthly surveys and NRA estimates, U.S. production of animal protein meals is somewhat static to down slightly (Table 4).

Table 4. U.S. Production and Consumption of Animal Protein Meals.

	2000	2001	2002	2003	2004	2005	% change last 2 yr
	Thousand Metric Tons						
Production	4,215.5	4,120.1	4,525.1	3,845.1	4,020.5	3,881.1	-3.5%
Consumption							
Domestic	3,729.6	3,619.1	3,916.7	3,296.8	3,841.5	3,644.9	-5.1%
Exports	485.8	501.0	608.4	548.3	179.0	236.2	32.0%
Total	4,215.5	4,120.1	4,525.1	3,845.1	4,020.5	3,881.1	-3.5%

Sources: U.S. Census Bureau. Global Trade Atlas for exports. Domestic consumption is derived.

The livestock industry must comply with a 1997 Food and Drug Administration (FDA) BSE safeguard measure that prohibits the feeding of ruminant-derived (mainly cattle and sheep) materials back to ruminant animals. This has resulted in market differentiation whereby porcine materials and poultry meals command a price premium. As a consequence, prior to December 2003, renderers successfully marketed ruminant-derived and/or mixed-species materials into the export market. However, since the United States announced a case of BSE from an imported cow toward the end of 2003, all export markets for ruminant or mixed materials have disappeared. The exports of 236,000 metric tons in 2005 was attributed mostly to poultry by-product meal, porcine meal, feather meal, and a brief period of exports of ruminant MBM to Indonesia before two additional cases of BSE were reported. Amazingly enough, after BSE was reported, most international markets even closed the doors to North American porcine and poultry meals. However, government-to-government negotiations soon resulted in most of these markets reopening. This has led to price premiums in the domestic market for these proteins as opposed to ruminant MBM. There also continues to be a shift in consumption whereby ruminant or mixed material is being fed domestically to poultry and pigs, and the single species, non-ruminant material is commanding a premium in the export market, opposite the case prior to December 2003.

World exports of animal proteins were relatively stable in the time period 2000 to 2005 (Table 5). The European Union issued a ban on the exports of MBM due to BSE in 2000 that caused a 29 percent decrease in global exports of MBM between 2000 and 2001. Soybean acreage in the major producing countries continues to grow, pushing exports of soybean meal from approximately 36 mmt in 2000 to about 48 mmt in 2005.

Table 5. World Meal Trade, 2000 – 2005.

	2000	2001	2002	2003	2004	2005	% change last 2 yr
	Million Metric Tons						
Total veg. & fish meal	48.79	52.79	53.72	58.49	59.91	62.27	3.9%
Soy	36.11	41.53	42.67	45.41	46.15	47.89	3.8%
Fish	3.46	3.19	2.88	3.13	3.55	3.60	1.4%
Other	9.22	8.07	8.17	9.95	10.21	10.78	5.6%
Animal Prot.	1.37	0.97	1.23	1.12	1.26	1.27	0.8%

Sources: USDA/FAS Oilseeds: World Markets and Trade Circular, February 2006.
NRA estimates and forecast for animal proteins.

The world trade in protein meals increased by approximately four percent in 2005, continuing a trend of increases in trade for all protein meals. Soybean meal trade increased by four percent to total 48 mmt versus trade in animal proteins of a little over one million tons.

In 2005, U.S. exports of MBM increased by about 42 percent over 2004 levels mainly due to a substantial increase in exports of non-ruminant protein meals to Mexico and to the brief period in which ruminant MBM was exported to Indonesia (Table 6). Australian exports increased, as did exports from Argentina. Both countries were filling the demand that was left open due to the United States and Canada being out of the ruminant MBM market. Of interest to note among the group of exporters is that the EU-25 continues to increase exports of MBM. As they re-enter the export market they will be strong competition to U.S. exports. Brazil is one of the world's largest producers of poultry and beef, so, as their rendering industry develops, they could become a major competitor as well.

Table 6. Meat and Bone Meal Exports by Major Suppliers, 2000 – 2005.

	2000	2001	2002	2003	2004	2005	% change last 2 yr
	Metric Tons						
U.S.	460,824	458,641	569,435	505,671	136,932	193,857	41.6%
Australia	192,903	204,747	222,424	282,486	201,869	205,821	2.0%
N. Zealand	133,169	140,384	132,540	131,390	233,018	132,049	-43.3%
EU-25	365,628	21,773	32,638	46,007	111,434	117,559	5.5%
Canada	53,005	65,634	110,011	77,393	60,891	57,811	-5.1%
Brazil	2,243	3,493	16,448	31,847	44,505	40,296	-9.5%
Argentina	62,952	32,302	39,864	41,813	75,058	75,887	1.1%
World Tot.	1,050,745	884,311	1,180,683	1,197,084	872,504	915,890	5.0%

Source: Global Trade Atlas for national exports; does not include intra EU trade.

Regarding global importers of MBM, Indonesia continues to be the largest importer (Table 7). However, in 2005, imports declined by 15 percent—a continued decline since 2004. This decrease is mostly due to the presence of avian influenza in that country and the liquidation of poultry flocks. In 2005, imports of MBM by Egypt also declined by 34 percent, again due to the concerns of avian influenza and the impact on the poultry industry and consequently the feed industry. In 2005 the major suppliers of MBM to Egypt were Argentina and Uruguay. In 2004, imports of MBM into China were down 79 percent due to banning MBM from the United States and Canada, its two major suppliers. However, in 2005, Australia filled this demand and exports grew by 78 percent.

Table 7. Meat and Bone Meal Imports by Major Markets, 2000 – 2005.

	2000	2001	2002	2003	2004	2005	% change last 2 yr
	Metric Tons						
Indonesia	283,816	250,021	310,301	394,379	212,056	180,469	-14.9%
Egypt	65,112	74,610	111,465	106,920	110,651	73,518	-33.6%
Mexico	92,755	79,868	62,634	61,711	59,750	113,267	89.6%
Bangladesh	10,971	24,746	30,373	30,667	110,187	46,032	-58.2%
China	135,972	75,314	130,932	73,561	21,097	37,323	76.9%
Taiwan	35,023	31,142	56,169	88,020	36,420	44,044	20.9%
World Tot.	1,050,745	884,311	1,180,683	1,197,084	872,504	915,890	5.0%

Source: Global Trade Atlas for national exports; does not include intra EU trade.

Traditionally, exports of protein meals went to countries with larger poultry sectors because they have provided nutrients needed by poultry at reasonable prices. MBM is unique as compared to other feedstuffs in that it provides for a highly digestible source of protein, fat, calcium, and phosphorous—all in one source. Poultry producers understand the importance of MBM in the ration because of its nutritional and economic benefits. This is important for poultry companies competing as low-cost producers in the global marketplace. Using animal proteins as opposed to a corn and soybean meal-only diet, has shown a five percent savings in feed cost, with some showing a savings as high as 10 percent (*Render*, August 2004). According to researchers in Brazil, when their poultry industry stopped using animal proteins to meet European Union requirements, the following observations were noted (Penz, Brazil, 2004):

- $10/ton increased feed cost
- Poorer feed conversion
- Compromised pellet quality
- Increased harmful oligosaccharides and antigens
- Increased feet and leg problems
- Increased water intake and wet litter
- Lower metabolizable energy
- Variability of SBM protein, digestibility not accounted for in research

Hence, there is good reason why animal proteins are so highly demanded around the world from poultry producers. Demand for animal proteins is starting to increase in the aquaculture sector as well. As the production of fish meal, a main ingredient in aquaculture feed, is not keeping up with the demand, prices are rising to extreme levels and aquaculture producers are searching for alternatives to fish meal. Animal proteins are an excellent source to partially replace and complement fish meal in an aquaculture ration, at a fraction of the cost of fish meal.

Production Outlook for Rendered Products

Extrapolating data from the Economic Research Service (ERS) meat production forecasts, U.S. production of protein meals should remain steady in the near-term and rise to over 2.9 mmt by 2013 (Table 8), a 19 percent increase over 2003. Production of animal fats and greases is predicted to rise by 15 percent between 2003 and 2013, reaching approximately 4.9 mmt in 2013 (Table 9).

Table 8. U.S. Animal Protein Meal Production Forecast, 2003 – 2013.

Year	Metric Tons
2003	2,432,603
2004	2,392,234
2005	2,565,505
2006 (Forecast)	2,601,388
2007 (Forecast)	2,655,684
2008 (Forecast)	2,709,603
2009 (Forecast)	2,767,493
2010 (Forecast)	2,800,743
2011 (Forecast)	2,833,385
2012 (Forecast)	2,867,069
2013 (Forecast)	2,900,551

Table 9. U.S. Production Outlook for Fats and Greases, 2003 – 2013.

Year	Metric Tons
2003	4,243,334
2004	4,302,755
2005	4,185,366
2006 (Forecast)	4,367,026
2007 (Forecast)	4,458,174
2008 (Forecast)	4,548,690
2009 (Forecast)	4,645,872
2010 (Forecast)	4,701,690
2011 (Forecast)	4,756,486
2012 (Forecast)	4,813,033
2013 (Forecast)	4,869,241

Unknown variables within the United States could change the production forecasts dramatically. Of specific concern is the long awaited follow-up to FDA's July 14, 2004, advance notice of proposed rulemaking (ANPR) that was officially published in the *Federal Register* on October 5, 2005. There was a 75-day public

comment period that closed on December 20, 2005. Currently, the FDA is reviewing all comments and will make a determination regarding a final rule. The FDA has the ability to implement the rule as written, alter the rule due to comments, or decide not to issue a final rule. Due to the process involved in issuing a final rule, and the extremely low level of risk, it may likely be towards the end of 2006 before it is known what FDA's final decision will be regarding a final rule. This ANPR proposes, among other things, the elimination of specified risk material (SRM) from cattle over 30 months and dead stock from the feed chain. An NRA funded study by Informa Economics predicts that these restrictions, if enacted, would decrease production of MBM by over 35,800 metric tons, valued at over $7.1 million dollars. The same restrictions would decrease tallow production by 21,772 metric tons at a value of over $8.6 million. Hence, total rendered product production could fall by over 57,572 metric tons. This is equal to approximately four percent of U.S. exports by volume (2005 data). As stated earlier, the comment period for this rule ended on December 20, 2005. As of September 2006, FDA had taken no action on this rule. Due to the relatively high cost and disruption to the market, for a relatively miniscule risk level, and the already proven effectiveness of existing regulations, it would be hard to justify such a rule on pure scientific terms. Another unknown variable in the production of fats and greases is energy prices. Production of fats and greases in 2005 was down approximately three percent compared to 2004 production, while at the same time the cattle slaughter by weight was higher, along with MBM production. It appears, due to high energy costs, producers of fats and greases relied upon their own production to fuel their plants, hence leading to a decrease in the reported production of fats and greases. If this trend continues, the production forecast would need to be adjusted downward.

Outlook for Rendered Products

The demand outlook for rendered products is quite favorable. Aside from the continued demand for rendered products in traditional markets, the future holds great promise for new demand patterns to form. Demand for fats and greases is expected to increase dramatically as biodiesel production continues to absorb more raw materials, including both vegetable oils and animal fats and greases. The demand for animal proteins should continue to grow in the long term; however, in the short term, the stigma of BSE still acts as a catalyst for importing nations to raise regulatory barriers blocking the imports of some products. As time passes, and the relative low risk of BSE in North America is understood, and as demand for protein meals grows, markets will open slowly to the imports of MBM. The rendering industry is quite unique in that it takes waste material from the slaughter of animals and converts this waste into high quality, high value products that are in turn the solution to providing safe alternative ingredients to the livestock, aquaculture, and industrial sectors.

Problem—Shortage of Fish Meal
Solution—Animal Proteins as a Substitute

The outlook for increased demand for animal proteins is being fueled by demand for fish meal, for which animal proteins make a good substitute. Fish meal is a major feed ingredient in poultry rations, but more so in aquaculture rations. According to Dr. Albert Tacon, University of Hawaii, the average annual growth in the aquaculture sector has been approximately nine percent per year since 1970. In contrast, the average annual growth rate in the non-food catch of fish has only been 0.8 percent per year between 1970 and 2002 (Tacon, 2004). This contrast shows the dramatic increase in demand for fish meal and the lack of increased supplies while prices of fish meal have increased to unheard-of levels. In May 2006, it was reported that fish meal prices reached nearly $1,000 per metric ton as opposed to average traditional price levels of $400 to $600 per metric ton. This is compared to rendered protein meals that range from $120 to $300 per metric ton. As this shortage of fish meal continues and the prices increase, feed millers will have no choice but to find alternative proteins, and rendered protein meals are a good fit. Feed trials that have been conducted by NRA further prove the positive effect of substituting rendered protein meals for fish meal (Yu, 2006). Furthermore, the reduced fish meal supply could have catastrophic effects on the aquaculture sector in China. Since fish is considered to be the food of choice in China, much like beef is in the United States; disruption in the aquaculture sector is a serious concern. The substitution of animal proteins for fish meal in poultry and aquaculture rations is a viable solution to the ever-growing crises created by the shortage of fish meal, and feeding trials have proven the replacement to cause no ill effects.

Problem –High Energy Costs and Reliance on Unstable Foreign Oil
Solution—Animal Fats and Greases as a Feedstock for Biodiesel

In regards to fats and greases, the outlook for use in biodiesel is the largest variable on the demand side of the equation. The drastic rise in oil prices and the uncertainty of day-to-day supplies of oil from unstable regions of the world have led many nations to look to renewable energy sources and biodiesel as a solution. According to the U.S. Department of Energy, "Biodiesel is made by transforming animal fat or vegetable oil with alcohol and can be directly substituted for diesel either as neat fuel (B100) or as an oxygenate additive (typically 20 percent-B20)."

The European Union is the world's largest producer of biodiesel and the United States is the second largest producer. The growth in biodiesel production is astonishing. According to the European Biodiesel Board, European Union production of biodiesel between 2002 and 2004 increased by about 35 percent per year, and increased by 65 percent in 2005 versus 2004 (Table 10).

Table 10. Estimated EU Biodiesel Production.

Year	Million Gallons
2001	278
2002	319
2003	430
2004	580
2005	955

Source: European Biodiesel Board.

In the United States, biodiesel production went from a relatively small production of two million gallons in 2000 to 75 million gallons in 2005. The growth tripled between 2004 and 2005 (Table 11). Extremely high energy prices starting in 2005 and continuing through 2006, along with government incentives to develop renewable fuels have sparked massive growth in biodiesel production. Since animal fats and greases are a good raw material for biodiesel, demand for these products will increase as biodiesel production continues to increase. On a global level, the International Energy Agency (IEA) predicts global production of biodiesel to increase from below 0.8 billion gallons in 2003 to approximately 6.2 billion gallons by 2020 (Table 12). Hence, a whole new market for fats and oils is emerging in which both vegetable and animal fats will compete.

Table 11. Estimated U.S. Biodiesel Production.

Year	Million Gallons
1999	0.5
2000	2.0
2001	5.0
2002	15.0
2003	20.0
2004	25.0
2005	75.0

Source: National Biodiesel Board.

Table 12. Global Biodiesel Production Projections to 2020.

Year	Million Gallons
1990	0
1995	211
2000	309
2005	991
2010	2,906
2015	4,438
2020	6,208

Source: International Energy Agency/Organization for Economic Cooperation and Development (IEA/OECD), 2004, p 169.

Conclusion

In conclusion, there continues to be a very large demand for animal proteins globally from countries that are protein deficient. Animal proteins are best positioned for use in the poultry and aquaculture industries, as well as in pet food and swine rations. As fish meal prices continue to climb, demand for high quality animal protein meals continue to rise as well. However, one obstacle for North American proteins is the food and feed safety barrier related to BSE. Unfortunately, the situation in the EU, where close to 200,000 cases of BSE have been reported, drove the global regulatory structure to stop trade of ruminant MBM from any country that had a case of BSE. Obviously, North America, with fewer than 12 cases total through August 2006, should not be treated similarly to the European Union in regard to risk level and import standards.

There is also a growing demand for animal fats and greases as a renewable energy source. Their use for energy is two-fold. First, they can be used directly in industrial burners. As energy prices rise, there is more direct burning occurring, especially within renderers' own plants. Second, the growing biodiesel industry will also demand more. Currently, in the United States, most of the biodiesel facilities utilize soybean oil, and in the EU, they use canola oil. However, there are a growing number of plants that can use multiple sources of feedstock, and some that utilize animal fats and greases alone. Since this industry is at the beginning of major expansion, it is hard to predict the ultimate impact. However, the expansion will result in increased demand for animal fats and greases. Rendered products are the solution to two major problems being faced today and in the foreseeable future—the growing cost of energy and the growing cost of fish meal.

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