Overview of the Domestic Wheat Gluten Industry

Rodney B. Holcomb
FAPC Extension Economist

Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
http://osufacts.okstate.edu

State support for value-added processing efforts has persuaded Oklahoma producer cooperatives to examine alternatives for further processing wheat. Much of this interest has been limited to flour milling. However, some producer groups have focused on vital wheat gluten, the protein-rich component of wheat flour that may be separated when the flour is in solution (i.e., wet-milling). This paper briefly summarizes the current structure of the domestic wheat gluten industry, including the major domestic suppliers, the impacts of foreign trade on the U.S. market in recent years, and the outlook for the industry.

Vital Wheat Gluten

Vital wheat gluten is a sticky, paste-like substance, roughly 75% of which is protein. Whereas dry (flour) milling results in a powdered mixture of protein and starch, the wet-milling process fully separates wheat starch and wheat gluten. Wheat starch may be used as an ingredient in other food items, commercial glues and pastes, or ethanol production. Wheat gluten is almost exclusively used in food and feed items.

Once it has been dried and powdered, the primary use of vital wheat gluten is to increase the protein content of flour (Table 1). The addition of wheat gluten increases the protein level in dough, thereby adding strength and elasticity needed to endure the commercial mixing and kneading processes. In this manner, vital wheat gluten allows manufacturers of pan breads to manage the consistency of their end products. This is especially important during crop years when domestic wheat protein levels are low and/or variable across production regions.

Wheat varieties in the U.S. are typically higher in protein than those grown in the European Union (EU), so the domestic use of wheat gluten has been limited. However, the growing demand for flour-based products, specifically specialty breads and many refrigerated/frozen dough products (which necessitate stronger, more flexible dough), has initiated an increase in the demand for wheat gluten by commercial bakeries. Most of the vital wheat gluten utilized by U.S. processors goes into high protein bread items (e.g., bagels, hearth breads, multigrain breads), while the rest is used for pet food items.

Domestic Market/Industry

Consumption of vital wheat gluten in the U.S. has risen drastically. In a trade report issued by the U.S. International Trade Commission (USITC), domestic wheat gluten utilization increased from roughly 255 million lbs. in 1993 to approximately 299 million lbs. in 1997. Imports of wheat gluten rose from 128 million lbs. in 1993 to 177 million lbs. in 1997, resulting in imports-to-production ratios of 100.6% and 145.4%, respectively.

A portion of the growth in domestic gluten demand can be attributed to population growth and increased consumer preferences for "healthy" grain-based products (e.g., bagels). The demand for more (and varied) bakery products has therefore driven the demand for vital wheat gluten. Also, increased gluten availability from the EU, Australia, and other countries has driven down domestic prices and made the use of vital wheat gluten in commercial baking operations much more feasible in recent years. Issues related to imports, however, are further addressed in the next section.

The domestic gluten market is almost completely controlled by four manufacturers: Midwest Grain Products, Inc. (Midwest Grain); Manildra Milling Corp.(Manildra); Archer Daniels Midland (ADM); and Heartland Wheat Growers (Heartland). There are a few "fringe" processors, but they operate on such a small scale that their collective share of the domestic market is extremely limited.

Midwest Grain was, for many years, the largest provider of vital wheat gluten operating in the United States. While the (domestic) market share currently and formerly controlled by Midwest Grain is unknown, the company produced vital wheat gluten at a larger scale than ADM long before Manildra or Heartland began operations. Midwest Grain currently operates gluten facilities in Atchison, Kansas and Pekin, Illinois.

Manildra, based out of Sydney, Australia, is probably the largest single wheat gluten processor in the world. Since Manildra expanded its operations to the U.S., the company's domestic and imported gluten supplies have made it the largest provider of wheat gluten to U.S. food and feed processors. U.S. headquarters are based in Shawnee Mission, Kansas, but the company also operates milling facilities in Minneapolis, Minnesota and Hamburg, Iowa.

ADM is one of the most recognized U.S. grain and grain products companies, both nationally and internationally. ADM's operations include a variety of grain and oilseed processing ventures, with vital wheat gluten being a very small part of the corporation's activities. ADM formerly wet-milled wheat into gluten and starch at their facility in Arkansas City, Kansas (on the Oklahoma/Kansas border), but that facility has been retrofitted for dry milling wheat flour. ADM does, however, still operate at least one wet-milling gluten facility in Shawnee Mission, Kansas. Other ADM facilities may also be involved in vital wheat gluten and starch processing to some degree.

Heartland developed in the 1990s from a strategic alliance between a few Kansas wheat producer coopera-

Table 1. Gluten Supplementation Guide – Pounds of Dry Gluten Needed to Increase the Protein Level of 100 lbs. Wheat Flour[a].

Current Protein Level	*Desired Protein Content*										
	7%	8%	9%	10%	11%	12%	13%	14%	15%	16%	17%
6%	1.47	2.99	4.55	6.15	7.81	9.25	11.29	13.11	15.00	16.95	18.97
7%	----	1.49	3.03	4.62	6.25	7.94	9.68	11.47	13.33	15.25	17.24
8%	----	----	1.52	3.08	4.69	6.35	8.06	9.84	11.67	13.56	15.52
9%	----	----	----	1.54	3.13	4.76	6.45	8.20	10.00	11.86	13.79
10%	----	----	----	----	1.56	3.17	4.84	6.56	8.33	10.17	12.07
11%	----	----	----	----	----	1.59	3.23	4.92	6.67	8.47	10.34
12%	----	----	----	----	----	----	1.61	3.28	5.00	6.78	8.62
13%	----	----	----	----	----	----	----	1.64	3.33	5.08	6.90
14%	----	----	----	----	----	----	----	----	1.67	3.39	5.17
15%	----	----	----	----	----	----	----	----	----	1.69	3.45
16%	----	----	----	----	----	----	----	----	----	----	1.72

Source: 1998-99 Reference Source (*Milling & Baking News*).

[a] Cells represent the lbs. of vital wheat gluten needed to increase the protein level of 100 lbs. of flour from the level listed in the first vertical column to the level listed in the top horizontal row, assuming 75% protein in the vital wheat gluten (commercial average).

tives and Farmland Industries. Located in Russell, Kansas, Heartland has suffered from start-up problems and financial stress, largely due to an untimely market entrance when high gluten imports and strengthened domestic competition were depressing prices.

During the 1990s wheat gluten processing capacity increased by almost 62%, from 162.8 million pounds in 1993 to 273.9 million pounds in 1997 (USITC). Virtually all of this increase can be attributed to the new Midwest Grain facility in Illinois and the development of Heartland in Kansas. However, the Wheat Gluten Industry Council (WGIC) reported that capacity utilization between 1993 and 1997 dropped from 78.4% to 44.5%. These three factors -- the few large companies controlling the gluten industry, increased capacity, and the decline in capacity utilization -- have limited the opportunities for other firms to profitably enter the domestic market. Balzer and Stiegert contribute these factors, along with reduced domestic ethanol incentives (for cleaner burning fuels) and increased gluten imports, to declining domestic gluten prices.

Because of the industry's few yet competitive domestic suppliers, and the limited information provided by these suppliers, price information for vital wheat gluten is not publicly reported. Even *Milling & Baking News*, the trade publication of the grain products industry, does not list vital wheat gluten prices in its "Ingredients Week" or "Supplemental Market Data" sections. However, two Oklahoma companies specializing in flour products and baked goods, upon the condition of anonymity, have indicated that their 1998 purchase prices for vital wheat gluten fluctuated between $0.60 and $0.65 per pound (in 100-lb. bags).

Trade Issues

The USITC, based upon a petition filed by the WGIC, recently charged the EU with dumping wheat gluten on the U.S. market, thereby damaging the domestic wheat gluten industry. According to the USITC's 1998 report, the 1997 imports of vital wheat gluten came from three primary sources: EU (51.5% of imports), Australia (35.3%), and Canada (8.9%). However, the industry trend that prompted intervention by the USITC was the increased share of imports from the EU over time. In 1985, the EU's share of U.S. gluten imports was a mere 2%, while Australia and Canada accounted for roughly 59% and 28% of the imports, respectively (Figures 1 and 2).

According to the WGIC, EU shipments of wheat gluten to the U.S. rose from roughly 32.7 million lbs. in 1993 to over 86.3 million lbs. in 1996 (Schroeder). Additionally, the price of EU gluten during this time period was roughly $0.04 per pound lower than domestic gluten, largely due to subsidized wheat starch/gluten processing in the EU. In fact, Balzer and Stiegert indicate that these subsidization levels prompted several EU corn wet-milling operations to renovate so that they may process wheat instead. Their report also suggests that the EU subsidization of wheat starch/gluten processing has given wheat starch a (price) competitive advantage over cornstarch in the EU, whereas cornstarch is generally the cheaper (worldwide) industrially-used starch.

As a result of the investigation into EU gluten dumping and its negative impacts on the domestic gluten industry, the USITC offered the following trade recommendations:

1. A presidentially-imposed, four-year quantitative restriction on wheat gluten imports. The total amount of imports during the first year of this quota would be 126 million lbs., to be increased by 6% in each subsequent year.
2. Separate quantitative restrictions for the EU, Australia, and "all other" non-excluded countries, taking into account the disproportional growth in the share of imports coming from the EU.
3. Exemptions for Canadian and Mexican wheat gluten imports. These two countries were not found to have negatively impacted the U.S. gluten industry according to

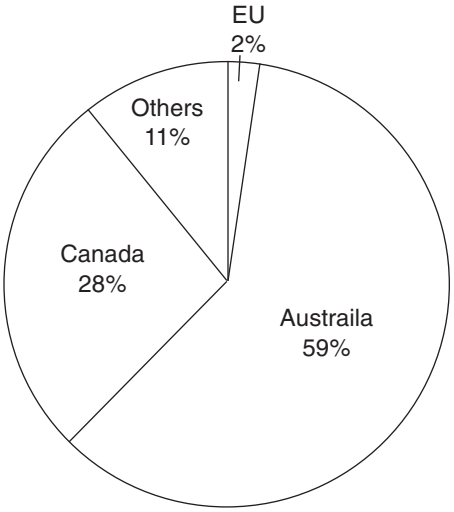

Figure 1. Shares of U.S. Wheat Gluten Imports by Country, 1985.

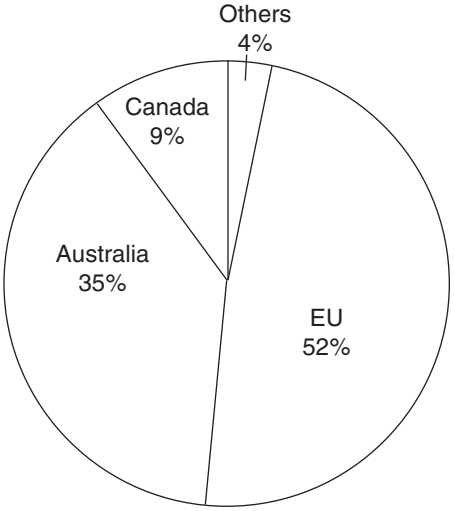

Figure 2. Shares of U.S. Wheat Gluten Imports by Country, 1997.

an evaluation performed under section 311 of the NAFTA Implementation Act.

4. Exemptions to wheat gluten import restrictions for Israel and those countries stipulated in the Caribbean Basin Economic Recovery Act and the Andean Trade Preference Act.
5. International negotiations (overseen by the President) to address the basic cause of increased EU wheat gluten exports to the U.S. and alleviate the source of injury to the domestic wheat gluten industry.

President Clinton agreed to these quantitative restrictions on June 1, 1998. Terms of the quota allow 126.812 million lbs. of wheat gluten to be imported during the first marketing year, which stems from June 1, 1998 through May 31, 1999. The affected countries will also be allowed to increase those imports at a rate of 6% per year for the remaining years.

The EU's share of wheat gluten imports was limited to roughly 54 million lbs. for the first marketing year of the quota. However, 62.4 million lbs. of EU wheat gluten had already been shipped into the U.S. by December 1, 1998 (Schroeder). Additional EU shipments since December 1 have prompted the WGIC and Ladd M. Seaberg (CEO, Midwest Grain) to file official protests regarding a violation of the import quota. As a result, the U.S. Customs Service and the Office of U.S. Trade Representative are considering financial penalties for both importers and exporters, as well as an appropriate reduction in the EU's second-year quota level (*Milling & Baking News, February 16, 1999*).

Conclusions and Outlook

The limitations placed upon the subsidized EU gluten imports and a growing domestic wheat gluten market have given domestic gluten processors encouragement for the next few years. It is predicted that 1999 capacity utilization will increase dramatically, with near-100% capacity being reached in the year 2000 — assuming that the imposed import quotas are enforced.

Even with increased domestic demand for wheat gluten and limitations placed upon imports, the U.S. wheat starch/gluten industry remains a relatively tight market. With a significant portion of the domestic processing capacity yet to be utilized and a four-firm concentration ratio of nearly 100%, the industry provides limited access for potential market entrants. Manildra, Midwest Grain, and ADM have vast capital bases that may allow these three companies to effectively squeeze smaller firms out of the market. Even Heartland, thanks to its financial backing from Farmland Industries, may have the "deep pockets" needed to survive a price war with any new industry participants.

As these four U.S. gluten suppliers prepare to meet a brightened market outlook, it must be remembered that Canada and Mexico may also benefit from the imposed trade restrictions. These two countries have no gluten marketing restrictions as a result of NAFTA and the USITC findings which clear them from any injury to the domestic industry. The Canadian wheat gluten industry, which has also increased capacity in recent years, may grab a larger share of the U.S. wheat gluten market. Because Canadian wheat gluten is more competitively priced with domestic gluten than subsidized EU imports, increased imports from Canada may dampen expected increases in U.S. wheat gluten prices.

References

"Seaberg points to EU gluten exceeding quota." *Milling & Baking News* (Feb. 16, 1999), Sosland Publishing Co., 1999.

Balzer, B., and K. Stiegert. *The European Union - United States Wheat Gluten Policy Dispute.* Kansas Agricultural Experiment Station report no. 99-117-J, Kansas State University, Department of Agricultural Economics.

Milling & Baking News, 1998-99 Reference Source. "Gluten Supplementation." Sosland Publishing Co., 1998.

Schroeder, E. "After the storm: domestic wheat gluten industry begins long road to recovery." *Milling & Baking News* (Dec. 1, 1998), Sosland Publishing Co., 1998.

United States International Trade Commission. "Wheat Gluten: Investigation No. TA-201-67." Publication 3088, March 1998.

The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Oklahoma State University, in compliance with Title VI and VII of the Civil Rights Act of 1964, Executive Order 11246 as amended, Title IX of the Education Amendments of 1972, Americans with Disabilities Act of 1990, and other federal laws and regulations, does not discriminate on the basis of race, color, national origin, gender, age, religion, disability, or status as a veteran in any of its policies, practices, or procedures. This includes but is not limited to admissions, employment, financial aid, and educational services.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Robert E. Whitson, Director of Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Vice President, Dean, and Director of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 20 cents per copy. 0607