

# Market Impacts from Commercializing Round-Up Ready® Wheat: Spring 2005 Update\*

Monsanto researchers have developed a genetically modified type of hard red spring wheat that resists Round-Up® herbicide. This herbicide is a broad-spectrum chemical that controls most weeds, including certain grasses that in some areas can be a problem in wheat production. Round-Up® also is a commonly used herbicide in the production of conventional no-till wheat. Because of concern about foreign consumer market acceptance of genetically modified (GM) foods, Monsanto in May 2004 announced it had decided to indefinitely delay commercialization of this type of wheat.

The GM technology involves insertion of a gene from a totally unrelated organism into wheat to create resistance to the herbicide. Similar technology has been in widespread use for soybean and cotton production in the U.S., soybeans in Argentina, and in canola production in Canada for the last five years. It is also available for corn in the U.S., but is less widely used than for soybeans.

## Summary of our 2003 findings

Our 2003 report<sup>1</sup> concluded that commercialization of genetically modified wheat in the U.S. at that time or in the next few years would create a high risk of loss of one-third to one-half of the U.S. hard red spring wheat exports and an even larger percentage of durum wheat exports. Durum wheat would be at risk due to potential co-mingling with hard red spring wheat. Significant risk also would be involved with white wheat from the Pacific Northwest because of potential co-mingling in marketing facilities. ***We projected these market losses to occur due to the likely total loss of the EU market for U.S. hard red spring and durum wheat, along with losses of from one-fourth to one-half of the non-EU markets for these two classes of U.S. wheat.*** Market losses of this magnitude would risk pushing hard red spring and durum wheat prices down to feed wheat levels, as normally exported supplies would be diverted into domestic feed markets in competition with corn and other feed grains. Negative effects on wheat prices would have negative economic consequences for wheat growers, rural communities and businesses, and for local governments through diminished tax receipts. Increased government program payments would only partially offset lower wheat prices.

While some observers use U.S. GM corn and soybean exports as indicators of likely foreign market impacts from commercializing GM wheat, there are important differences. Hard red spring wheat is a food grain, and would be readily identified in food products through foreign food labeling programs. At this writing, approximately 46 countries have food labeling programs that require foods to be identified as containing GMO ingredients if the percentage of GMO ingredients exceeds a prescribed level. U.S. corn is mainly processed through livestock in industrialized countries rather than being consumed directly as human food. Since it is processed through livestock and poultry, the Round-Up Ready® gene in most corn and soybean products would not be detected in the food labeling programs. When GM corn is processed to manufacture starch, corn oil, or corn sweeteners, the GM protein is removed and has allowed such foods in most cases to avoid GM food labels. Similarly, soybeans are largely processed into soybean meal for animal and poultry feed, and for soybean oil. In both cases, for many

---

\*By Dr. Robert N. Wisner, University Professor, Department of Economics, Iowa State University, March 29, 2005.

countries, the Round-Up Ready® gene would not be detectable for the food labeling program. *Despite these differences between feed grains and food grains, the U.S. corn industry has lost essentially all of the EU market for its corn. The U.S. soybean industry has faced a declining share of the EU soybean market and a sharp decline in soybean meal exports to EU.*

*Another important difference between wheat markets and those for corn and soybeans is that the U.S. produces a much smaller portion of the world wheat crop than either the corn or soybean crops. A third difference is that the U.S. corn industry has enjoyed rapid growth in processing of corn for fuel ethanol. Growth in this market has offset loss of exports. Wheat exports represent a much higher percent of total demand than for corn, and wheat does not have an alternative rapid-growth sector paralleling that of the ethanol industry to offset loss of export markets.*

Important new potential wheat competitors include several former Soviet republics whose climates are well suited to raising winter and spring wheat. These countries likely will expand production significantly in the years ahead. *A price differential between GM and non-GM wheat created by market segregation costs would provide further incentive for these countries to expand non-GM wheat production to meet the needs of nearby consumers.*

#### **Indicators of Foreign Market Acceptance**

*Surveys released in early 2004 by the United States Department of Agriculture's Foreign Agriculture Service, and in the previous two years by U.S. Wheat Associates and the Canadian Wheat Board, showed very widespread potential foreign market resistance to Round-Up Ready® wheat, not only in Europe but also in many other foreign markets important to U.S. and Canadian spring wheat.* Responses from important foreign millers and some U.S. wheat millers indicated processors of wheat would be forced to be sensitive to the desires of final consumers of wheat products, to maintain integrity of their brands.

Conclusions in our 2003 report were based on this information and on European Union surveys of consumer attitudes, widespread consumer reaction against GMO rice in Japan, and several other key indicators of market acceptance. Consumer acceptance appeared to be closely related to perceptions about adequacy of government regulatory, testing, and approval mechanisms, long-term food safety, and long-term environmental concerns. It was beyond the scope of our report to address the validity of these concerns. However, the report strongly emphasized that consumer perceptions are the driving force in markets where labeling allows consumers to distinguish between GM and non-GM foods. In late 2003, approximately 38 nations had labeling programs identifying foods that contained more than a specified percentage of ingredients that were genetically modified, and this number has increased in the past year. Unlike the U.S. marketing system, these labeling programs allow foreign consumers to express their preferences about GM food to the food industry. The industry, in turn, is able to send market signals back to wheat producers and the seed industry about preferences for GM vs. non-GM wheat.

Additional information incorporated in our analysis included major challenges in segregating the GMO vs. non-GMO wheat in seed, commercial wheat production, and wheat marketing channels. Difficulties in segregation cause potential problems for organic wheat producers as

well as others. A number of important legal issues are raised relating to who is responsible and who pays damages if another producer or firm's wheat is reduced in market value because of comingling. Most indicators pointed to high costs of segregation at the level needed to meet foreign labeling requirements, with these costs being passed on to buyers who prefer non-GMO wheat. This cost differential would create an incentive for foreign wheat producers to increase production and exports of non-GM wheat and capture part, but not all, of the premium that would have to be paid for segregating non-GM U.S. spring wheat. ***A closely related concern, maintaining the genetic integrity of the non-GM seed wheat supplies, was identified by Canadian researchers. Since our 2003 report was completed, there have been no technological developments that would significantly reduce market segregation costs.***

## **Post-2003 Developments With Potential to Alter Market Impact of Round-Up Ready® Wheat**

Nine months after the decision to indefinitely delay commercialization of Round-Up Ready® Spring Wheat, a number of GM policy changes have been implemented in the EU that affect food imports and processing. The EU has ended its 6-year moratorium on approval of additional GM crops. ***Despite the government policy changes, consumer attitudes there and in most other important foreign markets for U.S. hard red spring and durum wheat do not appear to have changed significantly since our 2003 report.***

However, there are two developments that to some degree may affect potential economic impacts of commercializing Round-Up Ready® Spring Wheat. ***They are (1) emergence of a moderate market for U.S. hard spring wheat in China in 2004 and (2) availability of Clearfield non-GMO herbicide-resistant hard red spring wheat that can be used to combat goat grass<sup>2</sup>.*** Goat grass is a weed targeted by developers of Round-Up Ready® Spring Wheat.

**U.S. Access to the Chinese Wheat Market:** The Chinese market for hard red spring wheat accounted for 8 percent of all U.S. hard red spring wheat export sales in the 2003-04 marketing year<sup>3</sup>. Through March 17, 2005, U.S. sales to China make up 12 percent of all U.S. hard red spring wheat export sales for the June 1, 2004-May 31, 2005 marketing year<sup>4</sup>. China has regulations mandating that GM foods be labeled as containing GMO ingredients, but it is not clear how effectively the regulations are enforced. China is a major importer of GMO soybeans from the U.S. Imported soybeans are processed into soybean meal for livestock and poultry feed, and soybean oil for human consumption. The GMO issue has not adversely affected the Chinese market for U.S. soybeans, except for limited periods when purchases were halted until details of regulations were worked out. Whether Chinese consumers would turn away from food made with GMO wheat is uncertain. A study by Curtiss, McCluskey, and Wahl (2004) found Chinese consumers willing to pay a premium of up to 16% for GM soybean oil and 38% for GM rice products.<sup>5</sup> Results from the Curtiss, et.al. study are in sharp contrast to another study by Hu and Chen (2004) showing that consumers in Beijing were skeptical about GM food and reluctant to purchase GM vegetable oil.<sup>6</sup> Curtiss, et. al., findings also are in sharp contrast to a recent study in Norway (in 2003) indicating consumers there were unwilling to purchase GM wheat unless it had a price discount of at least 49.5 percent vs. non-GM wheat.<sup>7</sup> A similar study in the United Kingdom (2001) found that male and female shoppers were willing to pay premiums of 26 percent and 49.3 percent respectively to avoid GM foods.<sup>8</sup>

Depending on attitudes of its consumers, the emergence of China as a market for U.S. spring wheat could temper but not eliminate the potential price impacts from commercializing hard red spring wheat that we estimated in our 2003 report. Consider the “best-case” scenario where Chinese consumers, with the introduction of Round-Up Ready® Spring Wheat, would not reduce purchases from current levels. ***The risk of a potential reduction in U.S. hard red spring wheat exports to all destinations would be expected to drop from our previously estimated 33 to 50 percent range to a 20 to 37 percent reduction.*** Either range would reflect a high risk of sharply lower exports to non-Chinese export markets, given the continuing negative attitudes in Europe and other higher income Asian markets. ***Potential losses of exports to these markets in turn would be expected to bring a sharp reduction in hard red spring and durum wheat prices. Any tempering effect from Chinese wheat purchases would not be expected to lower the market risk to durum from commercializing GMO spring wheat, since China is not a market for U.S. durum wheat.***

**Contrast of Soybean Oil vs. Wheat Demand:** Consumer responses to GM soybean oil are not necessarily a good indicator of potential consumer reactions to GM wheat. For soybean oil, as noted earlier, processing removes the GMO protein and in that way may reduce Chinese consumer concerns. For most consumer wheat products, the GMO protein would still be present and consumer attitudes might be different than for soybean products.

**New Soybean Varieties With Consumer Benefits:** Another development that may affect consumer attitudes toward GMO foods in the next few years is the development of a new type of soybeans with potential consumer health benefits. The new soybeans are lower in linolenic acid than conventional soybeans and will produce food products lower in trans fats, thus potentially reducing the risk of heart disease. U.S. food labeling laws are scheduled to be changed in 2006 to require labeling of trans fat content. The new type of soybeans is expected to be an important method for lowering trans fat content of foods in the U.S. and possibly in other countries. ***This type of soybean has been developed using conventional plant breeding technology, so the benefits cannot be credited to biotechnology***<sup>9</sup>. However, some versions of these soybeans will be available with GM Round-Up Ready® herbicide-resistant features in 2005. ***Accordingly, they will be one of the first GM food products with perceived consumer benefits. Products made from these soybeans are expected to be readily accepted by U.S. consumers, but acceptance in Europe is uncertain. It will be important for the wheat industry to closely monitor acceptance or lack of acceptance of this new type of soybean in foreign markets, as a possible leading indicator of changing consumer attitudes toward GM foods.*** It should be noted that low trans fat soybeans are not the only alternative for meeting the new U.S. food labeling requirements and the increased consumer demand for low trans fat foods that is expected to be created. Several firms have developed technologies for lowering trans fat content that involve processing methods and/or other ingredients such as rapeseed oil and palm oil.<sup>10</sup> ***With these alternatives, European consumers should be able to lower the trans fat content in their diets without being required to consume products from the new type of soybean.*** With the exception of Denmark, labeling of trans fat content has not yet been implemented in the European Union, and no date has been set for a change similar to that of the U.S. However, such a change is widely anticipated.

*Another GM crop currently in the development stage that may offer consumer benefits is fusarium-resistant wheat.* Industry sources indicate it will be several years before this crop becomes commercially available. So far, there is little information from which to gauge likely consumer acceptance if or when it becomes available in the future. The greatest potential benefits of fusarium-resistant wheat would likely go to the seed companies owning the patent, with additional benefits to producers and wheat processors if consumers readily accept the product. However, it is doubtful that most consumers perceive fusarium as a serious risk in current wheat-based foods. If not, foreign consumers may be reluctant to purchase products made from fusarium-resistant wheat.

**Brazilian Soybeans and EU GMO Food Attitudes:** *Brazil also will be a key country to watch in the next two or three years for signs of softening in EU consumer attitudes toward GMO crops and foods.* The Brazilian government in 2004 and 2005 has given temporary permission to its farmers to plant current stocks of GMO soybean seeds. Farmers in extreme southern Brazil have taken advantage of this opportunity. A high percentage of the crop in its two southern-most provinces reportedly are GMO soybeans. Parana, the third state up from Brazil's southern border, has chosen to remain non-GMO through actions of its state government. In a recent visit to Brazil, the author saw GMO tests being performed as soybeans were being marketed in Parana and Mato Grosso. Elevator management personnel also indicated that GMO soybeans are being rejected in the market. At the same time, seed company officials indicated in the 2004-05 growing season, they are producing GMO soybean seeds with the expectation that sales and marketing of such soybeans will be legalized nation-wide for the next growing season. Both grain elevator management and seed company officials indicated that Brazilian farmers are likely to quickly adopt Round-Up Ready® soybeans if they are legalized.

*Brazil is the last major source of non-GM soybeans available to the EU. A decision by Brazil to legalize GM soybeans would either force EU consumers to accept GM soy food products and meat produced with GM soybeans, or to pay a large enough premium to encourage Brazilian farmers to continue growing non-GM soybeans.* An alternative source of protein meal for animal and poultry feeds and vegetable oil for human consumption is not readily available in the quantities required by EU. Through its GM testing at the point of first sale and through established port segregation procedures, Brazil has the capability to offer EU buyers non-GM soybeans during the next two years. If widespread demand for non-GM soybeans does not develop during that time, its segregation capabilities likely will disappear. Whether Brazil uses its segregation capabilities in the next two years will depend heavily on whether EU consumers are willing to pay the necessary premium to encourage continued widespread non-GM soybean production. Because most of Brazil's non-GM soybean production reportedly is separated geographically from the region where GM soybeans are grown, segregation of Brazilian GM and non-GM soybeans appears to be much less costly than would be the case for U.S. spring wheat. However, as the GM soybean technology becomes more widely distributed throughout the country, segregation will become more difficult and more expensive.

**Other Indicators of Consumer Resistance to GM Products:** Another development that points to continued consumer concern about GM products is a recent decision by major Australian poultry producers to use non-GM feed.<sup>11</sup> Australia's three largest poultry suppliers in February 2005 agreed to eliminate GM ingredients from their poultry feed, in response to negative

consumer reactions toward GM food. These firms reportedly produce about 80 percent of Australia's chicken meat.<sup>12</sup>

Serious concern about environmental effects of an experimental variety of GM creeping bentgrass is another indicator of continuing concern about GM crops. The type of GM grass generating this concern is herbicide resistant, and was designed for golf courses and lawns<sup>13</sup>. Recent research by the U.S. Environmental Protection Agency found that its pollen has traveled as far as 21 kilometers and has cross-pollinated with wild grasses. These findings raise concern about the risk of the GM grass getting out of control and becoming a weed. While the grass is not a food crop, the findings may reinforce GM-related environmental concerns in Europe and other countries.

## **GMO Developments Since Spring 2004**

**EU Policy Changes:** Consumer resistance to GM crops has been strongest in the EU, although consumer concerns also are very significant in several important Asian markets for food grains. In the past year, EU policy toward GM crops has begun to change. Some see these changes as the beginning of a significantly more positive EU attitude toward GM foods. *However, when viewed from a consumer perspective rather than a government policy perspective, that conclusion appears to be premature, probably by several years.*

In late 2003, the U.S. government requested that the World Trade Organization (WTO) critically examine EU policies relating to biotech crops and food. The U.S. view is that EU policies are in conflict with WTO regulations and are trade restrictions that have caused a large loss of revenue to U.S. corn growers. One aspect of EU policies involved a six-year de facto moratorium on approval of new types of GM crops. Beginning last spring, the EU government has lifted its moratorium. Also, in mid-April 2004, the EU put in place a more restrictive GM food labeling program than was previously used, along with "traceability" features. The new labeling program has GMO thresholds of 0.9% for GM food ingredients and has been expanded to include processed products such as sweeteners and vegetable oils.<sup>14</sup>

Traceability features establish a mechanism allowing the source of the biotech ingredients to be identified if problems should develop in the marketing system or in food supplies. The EU already had a traceability system for marketing of livestock products. The GM traceability system appears to be consistent with the Global Biosafety Protocol, which has now been ratified by 151 nations. The U.S. has not ratified this Protocol.<sup>15</sup>

*A survey of supermarkets in EU in late July 2004 by Greenpeace found that very few foods with GM ingredients are being offered for sale in the EU. The survey was done slightly more than three months after the new labeling law took effect. This survey implies that the food industry would have a major challenge in marketing products made from GM wheat in the EU at this time.*<sup>16</sup>

The EU government has approved the importing and marketing, but not production, of a type of GM sweet corn developed by Syngenta, a Swiss firm. With the strict food labeling program and

given present consumer attitudes toward GM food, it likely will be difficult to market this product in the EU. In late July 2004, the EU also approved import of a GM corn event from a U.S. firm for feed and industrial uses, but not for food uses. It also has approved a type of GM corn for production in two countries that has been grown in Spain for the last few years.

**New EU GM Food Labeling and U.S. Soybeans:** At this writing, the new EU regulations that apply to soybean products have been in place about ten months. *For the 2003-04 marketing year which ended August 31, 2004, U.S. soybean exports to the EU declined by 38% from the previous year, while exports to non-EU markets fell by 12%. U.S. exports of soybean meal to EU fell by 79%, while exports to non-EU markets fell by 27% in response to drought-restricted U.S. supplies.* With very plentiful supplies from a record crop, U.S. export sales of 2004-crop soybeans to the EU from September 1 through March 17, 2005 were up 26 percent from the year-ago level. U.S. soybean meal export sales for the same period had more than doubled from the very low level of a year earlier but were equivalent to the meal from only 0.06 percent of the 2004 U.S. soybean crop. The EU is not a significant importer of U.S. soybean oil. For decades, it was the largest export market for U.S. soybeans and often was the nation's largest soybean meal export market. U.S. exports of both products to EU have declined in the last several years, after the start of commercialization of GM soybeans.

**EU enlargement:** In 2004, the EU added 10 central and eastern European nations to its membership. The additions bring these countries into the EU policy regime for GM crops and foods, and create an economic block of 25 nations. While the transition is not yet complete, it creates the potential for increased production of non-GM wheat in the newly added member countries. Eastern Europe historically has been an important grain producing region.

**EU consumer attitudes toward GM crops and foods:** EuroBarometer completed its latest survey of consumer attitudes toward biotechnology, GM foods, and GM crops in 2002 and published the results in late March 2003. It was summarized by the researchers as follows: "A majority of Europeans do not support GM foods. These are judged not to be useful and to be risky for society. For GM crops, support is lukewarm, while they are judged to be moderately useful they are seen as almost as risky as GM foods."<sup>17</sup> The survey was from a representative sample of 16,500 individuals representing every EU nation. We are not aware of any developments that have led to significant changes in EU consumer attitudes toward GM foods since the survey was taken. CORDIS (Community Research & Development Information Service, EU, *Focus*) writes in mid-October 2004 that in a recent survey, 68 per cent of Italians were found to distrust GM fruits and vegetables.<sup>18</sup>

**Indicators of minimal change in global consumer attitudes toward GM crops:** We are not aware of any indicators that would suggest consumer attitudes toward GM wheat in higher income Asian countries have changed from those indicated in our 2003 report. Another indicator comes from a recent meeting in southeastern Asia. On October 10, 2004, Consumers International met in Bangkok, Thailand to initiate a global campaign against GM crops. The organization indicated it will work to halt the spread of GM crops unless internationally agreed regulations are established and implemented, and clear evidence of benefits to consumers, farmers and the environment becomes available. Consumers International, an international organization of consumer groups, indicated it plans to focus on four areas: (1) insuring that all

GM foods are subjected to rigorous, independent safety testing; (2) insuring that GM foods are adequately labeled, (3) insuring that a traceability mechanism permits tracing of GM ingredients back to their origin; and (4) insuring that producers are held liable for environmental or health damage caused by producing GM crops.<sup>19</sup>

**Emerging GM crops with potential benefits for consumers:** U.S. food labeling laws in 2006 will require labeling for the content of trans-fatty acids in foods. As noted earlier, Monsanto has developed a type of low-linolenic soybean that will decrease the need for partial hydrogenation of soybean oil for certain types of foods.<sup>20</sup> That in turn is expected to help processors reduce the trans fatty acid (trans fats) content of food products, and may be perceived by consumers as having health benefits. These low-linolenic soybeans were produced by conventional plant breeding, but reportedly will be available with Round-Up® herbicide resistance. A herbicide-resistant gene would make it one of the first commercial GM crops with potentially significant consumer health benefits. DuPont's Pioneer Hybrids International also has developed a low-linolenic soybean variety that will be available with Round-Up® herbicide resistance. It will be processed by Bunge.<sup>21</sup> A similar type of soybean has been developed in a non-GM version at Iowa State University and is being used to generate a commercial seed supply. Small amounts of these various varieties of soybeans are expected to be available to processors in 2005. In 2006 and beyond, supplies may be much larger.

*Because the U.S. does not have GM food labeling laws, the Round-Up Ready® version of this new type of soybean is expected to be readily accepted by U.S. consumers. Prospects for international acceptance, however, are less clear.* The wheat industry will have an important stake in monitoring foreign consumer acceptance of soybean oil and other processed food products made from these new varieties of soybeans, especially in the EU. Acceptance or lack of acceptance of GM low-linolenic acid soybeans may be the first indicator of whether products with consumer benefits will change attitudes of foreign consumers toward GM foods.

*Another crop in the development stage that offers potential benefits to consumers is Syngenta's fusarium-resistant GM wheat.* Industry sources indicate it may be up to six years before this type of wheat will be available for commercial production.<sup>22</sup> Fusarium-resistant wheat, if successfully developed, could help farmers control a serious fungus problem in wheat. Fusarium reduces yields and can create a toxin that makes wheat unfit for human consumption. Efforts to develop fusarium-resistant wheat involve both conventional and GM plant breeding technology. At this writing, it is not clear which type of breeding may create wheat resistance to fusarium. Human consumption of fusarium-contaminated wheat products can cause vomiting and other serious consequences. *For now, the question of consumer acceptance of GM fusarium-resistant wheat is unanswerable and is not yet relevant to the current market situation, but it may become an important question in the years ahead.* The EU food labeling system would probably make it difficult to market such wheat in Europe if it were currently available. The industry's careful monitoring of the fusarium problem and diversion of contaminated wheat from food channels appear to have minimized consumers' concern over possible fusarium contamination of food products. Accordingly, it is not clear that consumers would perceive direct benefits from a GM fusarium-resistant wheat, but EU regulations and consumer attitudes may change in future years.

## References

- 
- <sup>1</sup> Wisner, Robert N., “Round-Up Ready<sup>®</sup> Spring Wheat: Its potential short-term impacts on U.S. wheat export markets and prices”, *Economics Staff Report*, Iowa State University Department of Economics, Ames, Iowa, July 1, 2004. A similar report is available at [www.worc.org](http://www.worc.org).
- <sup>2</sup> Montana Grain Growers Association Monthly Publication, January 2005.
- <sup>3</sup> U.S. Department of Agriculture, Foreign Agriculture Service, *Export Sales*, February 17, 2005.
- <sup>4</sup> Ibid.
- <sup>5</sup> Curtis, K.R., McCluskey, J.J., & Wahl, T.I. (2004). Consumer acceptance of genetically modified food products in the developing world. *AgBioForum*, 7(1&2), 70-75. Available on the World Wide Web: <http://www.agbioforum.org>.
- <sup>6</sup> Hu, W., & Chen, K. (2004). “Can Chinese consumers be persuaded? The case of genetically modified vegetable oil”. *AgBioForum*, 7(3), 124-132. Available on the World Wide Web: <http://www.agbioforum.org>
- <sup>7</sup> Grimsrud, K., McCluskey, J.J., Loureiro, M., & Wahl, T.I. (2003). *Consumer attitudes toward genetically modified food in Norway* (IMPACT Center technical working paper). Pullman, WA: International Marketing Program for Agricultural Commodities & Trade.
- <sup>8</sup> Burton, M., Rigby, D., Young, T., & James, S. (2001). Consumer attitudes to genetically modified organisms in food in the UK. *European Review of Agricultural Economics*, 28, 479-498.
- <sup>9</sup> NUTRAingredients.com, “Cargill-Monsanto bring trans-fat alternative to market”, <http://nutraingredients.com/news/news-NG.asp?n=55146-cargill-monsanto-bring-10/05/04>.
- <sup>10</sup> “Loders builds on trans fat alternatives”, 2/05/04, <http://nutraingredients.com/news/news-NG.asp?n=49642-loders-builds-on-05/10/2004> Partos, Lindsey; “Cargill and Bayer bring trans fats alternative oil to market”, 2/01/2005, NUTRA Ingredients.com <http://nutraingredients.com/news/ng.asp?id=57746&n=dh32&c=cybgdmvllwwvczo> , and “Loders expands palm oil-based ingredients position”, 7/23/04, <http://nutraingredients.com/news/news-NG.asp?n=53738-loders-expands-palm>
- <sup>11</sup> “Shoppers have GE-free poultry win,” Gene Ethics Network, Australia, 2/11/05
- <sup>12</sup> Ibid.
- <sup>13</sup> foodnavigator.com, Traceability concerns as GM grass blows far, 9/23/04, <http://foodnavigator.com/news/news-NG.asp?n=54907-traceability-concerns-as>

---

<sup>14</sup> “New GM labeling rules kick off in April,” *FoodQualityNews.com*, April 22, 2004: <http://foodqualitynews.com/news/news-NG.asp?n=51566-gmo-rules-explained>.

<sup>15</sup> Cartagena Protocol on Biosafety, Montreal, 29 January 2000, Status of Ratification and Entry Into Force, January 2005, <http://www.biodiv.org/biosafety/signinglist.aspX?sts=rtf>

<sup>16</sup> “GM ingredients on EU labels rare, survey finds”, *FoodQualityNews.com*, July 27, 2004: <http://www.foodqualitynews.com/news/news.asp?id=1212>

<sup>17</sup> Gaskell, George \*; Nick Allum, and Sally Staes, *Europeans and Biotechnology in 2002 Eurobarometer 58.0, A report to the EC Directorate General for Research from the project 'Life Sciences in European Society' QLG7-CT-1999-00286* (2nd Edition: March 21, 2003). Methodology Institute, London School of Economics, London WC2A 2AE, UK), with Martin W. Bauer, Nicola Lindsay and Morag Brocklehurst (UK), Wolfgang Wagner, Helge Torgersen, Nicole Kronberger and Petra Grabner (Austria) Erling Jelsøe, Arne Mortensen, Jesper Lassen and Mercy Wambui Kamara (Denmark), Timo Rusanen and Maria Rusanen (Finland), Daniel Boy, Suzanne de Cheveigne, Julie Bardes and Jacqueline Chervin (France), Jürgen Hampel, Matthias Kohring and Joerg Matthes (Germany), Giorgos Sakellaris and Aglaia Chatjoulis (Greece), Agnes Allansdottir and Francesca Matteuci (Italy). Cees Midden, Annelees Meijnders and Jan Gutteling (Netherlands), Torben Hviid Nielsen and Siv Froydis Berg (Norway) Tomasz Twardowski and Andrzej Przystalski (Poland), Correia Jesuino, Carmen Diego (Portugal), Björn Fjæstad, Susanna Ohman and Anna Olofsson (Sweden), Heinz Bonfadelli and Urs Dahinden and Martina Leonarz (Switzerland). and North American associates, Edna Einsiedel and Robin Downey (Canada), Toby Ten Eyck and Susanna Priest (USA), The Eurobarometer survey was managed and organised by Directorate General Press and Communication, Public Opinion Analysis Unit.

<sup>18</sup> Cited by *FoodQualityNews.Com*, “Italy split over GMOs”, Oct 15, 2004, in: <http://www.foodqualitynews.com/news/news-NG.asp?n=55400-italy-split-over>

<sup>19</sup> “Consumer effort pushes for global GM moratorium,” October 11, 2004, <http://foodqualitynews.com/news/ng-nocache.asp?id=55288>

<sup>20</sup> “USA: Cargill to process Monsanto's low-linolenic soybeans”, *Just-food.com*, October 5, 2004, [http://www.just-food.com/search\\_site.asp](http://www.just-food.com/search_site.asp)

<sup>21</sup> “USA: Bunge, DuPont to introduce low linolenic soybean oil”, *Just-food.com*, October 11, 2004, [http://www.just-food.com/search\\_site.asp](http://www.just-food.com/search_site.asp)

<sup>22</sup> Fallding, Helen, “Syngenta tests new wheat in Manitoba”, *Winnipeg Free Press via Checkbiotech.org*, September 20, 2004: [http://www.checkbiotech.org/root/index.cfm?fuseaction=search&search=Syngenta&doc\\_id=8658&start=1&fullsearch=0](http://www.checkbiotech.org/root/index.cfm?fuseaction=search&search=Syngenta&doc_id=8658&start=1&fullsearch=0)