

cialty-grain production does not have to be based on unique plant genetics or production methods to result in the unique trait. Instead, entering the specialty-crop market may just depend on the producer's ability to find a buyer who will pay a higher price to guarantee a supply for the alternative use. Grains sold for specialty purposes are sometimes referred to as *product commodities*, as opposed to the *grain commodities* sold in the traditional marketplace.

Value-added production — A general and comprehensive term that describes the production of commodities that sell for a price premium. The term can also refer to the marketing of traditional commodities that increases their value or the producer's returns, such as food-grade soybeans or processing corn for ethanol.

Vegetable oil

- **Vegetable oil** — Oil obtained from plants. Vegetable oil consists primarily of large molecules called triglycerides.
- **Triglycerides** — The primary constituent of vegetable oils composed of three fatty acid molecules attached to a single glycerol molecule.
- **Fatty acids** — An organic acid consisting of a chain of four or more carbon atoms.
- **Saturated fatty acids** — Fatty acid molecules with no double bonds. All of the carbons in the chain have been *saturated* with hydrogens. Oils with relatively large amounts of saturated fatty acids are solid at room temperature. Consumption of saturated fatty acids is believed to increase the level of serum cholesterol and LDL cholesterol. Palmitic, stearic, and lauric acids are saturated fatty acids.
- **Unsaturated fatty acids** — Fatty acid molecules with at least one double bond in the carbon chain.
- **Monounsaturated fatty acids** — Unsaturated fatty acids that have only one double bond in the

carbon chain. Petrosellenic, oleic, erucic, and ricinoleic acids are monounsaturated fatty acids.

- **Polyunsaturated fatty acids** — Unsaturated fatty acids that have two or more double bonds in the carbon chain. Linoleic and linolenic acids are polyunsaturated fatty acids.
- **Trans-fatty acid** — Hydrogenation of vegetable oils results in a conversion of some unsaturated molecules to the *trans* configuration (straight versus kinked). Trans-fatty acids are thought to behave similarly to saturate fatty acids in increasing serum and LDL cholesterol.
- **Hydrogenation** — Results in an oil that is less susceptible to oxidation, thus extending the shelf-life of oil-containing foods. Liquid oils can be hydrogenated to form solid fats used in margarine or shortening. Partial hydrogenation of liquid oils produces trans fatty acids.
- **Oxidation** — A naturally occurring process where oxygen in the air reacts with fatty acids at the double bond sites. The process results in the production of breakdown products, which produce off-flavors and rancidity. Many oils are hydrogenated in order to reduce oxidation.
- **Extraction** — The process of separating the oil from the protein meal of an oilseed. The most common process is solvent extraction. A continuous pressing or expeller process is also used.
- **Crude oil** — This is the oil product from the extraction process. Crude oil contains a number of undesirable compounds that are removed in the refining process.
- **Refined oil** — Oil that has had undesirable compounds such as free fatty acids, carbohydrates, metals, proteins, and other compounds removed from crude oil using caustic agents, washing, and centrifugation.

Food grade corn

- **Food grade corn** — Corn with traits that are desirable for dry milling and masa production. Corn grits from dry milling are used in breakfast cereals, corn snacks, and beer production. Masa is used for making corn chips and tortillas.
- **Yellow corn** — Corn that is yellow in color due to the presence of beta-carotene and xanthophyll pigments in the starchy endosperm.
- **White corn** — Corn that lacks yellow pigments found in yellow corn, resulting in a white endosperm and kernel appearance.
- **Red corn** — An open-pollinated corn with a red colored aleurone layer covering a white starchy endosperm.
- **Blue corn** — An open-pollinated corn with a blue colored aleurone layer covering a white starchy endosperm.
- **Masa** — The raw material from which corn tortillas, corn chips, tortilla chips, taco shells, tamales, and other Mexican-style food are made. Masa is produced by alkaline cooking, steeping, and washing corn, and then stone grinding to produce a soft dough. The masa dough can be used directly or dried to produce masa flour.
- **Dry masa flour** — Masa dough dried and ground into flour. It is sold to chip and Mexican-style food manufacturers that reconstitute the flour into dough.
- **Corn dry milling** — The process of mechanically breaking and separating corn into physical component parts. Steps in the process include tempering (by adding water), degerming (separating the germ and pericarp from the endosperm), and roller cracking the remaining endosperm. The products of dry/wet milling include germ, various particle size grits, various particle size meals, corn flour, and hominy feed.

Food grade soybeans

- **Food grade soybeans** — Soybeans with traits that are desirable for certain food uses including high-protein products produced from soy milk and fermented food products.
- **Natto** — A high protein food consisting of sticky, fermented whole soybeans cooked in *Bacillus natto*. Its unusual aroma and strong flavor make it useful as a food condiment or relish in Japan. Natto soybeans are typically very small-seeded (5,000 seeds per pound or more) varieties with light-colored hila and very round seeds. These soybeans are high in carbohydrates and low in calcium in order to maximize fermentation.
- **Miso** — A fermented soybean paste with a consistency that is slightly softer than peanut butter. It is a high protein, low caloric product that is used as a brine seasoning base in many soups and sauces in Asia. Miso soybeans are typically medium to large-seeded varieties with a clear hila and a bright yellow seed coat. These soybeans should have high carbohydrate content and low oil and calcium content.
- **Tofu** — A soft, white soybean curd made by coagulating soybean milk. High in protein and oil, it is widely used in Asian cultures. Tofu soybeans are typically large-seed (less than 2,000 seeds per pound) varieties with gray pubescence and a clear or imperfect black hila. These soybeans are high in protein (greater than 42%) and usually have very little yellow-colored seed coats.
- **Edamame** — Large, green, fresh soybean pods which are harvested prior to maturity. Seeds are cooked in the pod and then removed prior to serving them as a fresh vegetable or snack in Japan.
- **Nimame** — Dry beans which are cooked in Japan with vegetables and meat in much the same way as pinto or navy beans are cooked. Nimame

soybeans typically are very large-seeded (less than 1,800 seeds per pound) varieties with a gray pubescence and a clear hila. High protein (greater than 42%), rounded seeds, and good visual appearance are important traits for this soybean.

- **Lipoxygenase** — An enzyme that causes soybean and some soy foods to have an undesirable beany or grassy flavor. Reducing the activity of this enzyme results in soy foods that have a milder, more desirable flavor.
- **Low lipoxygenase soybean** — Varieties of soybeans that are lacking one or more of the three known lipoxygenase enzymes. These soybeans have a *nutty* flavor as compared with normal soybeans which have a *beany* or *grassy* flavor.

Modified starch

- **Corn wet milling** — The process of chemically or biochemically separating corn into chemical components using water, grinding, and centrifugation. The most important separation is between the endosperm starch and protein. Primary products of wet milling include starch, gluten meal, gluten feed, and oil. Starch can be further processed into high fructose corn syrup, glucose, fructose, ethanol and other products.
 - **High fructose corn syrup (HFCS)** — A product of corn wet-milling formed when starch is enzymatically broken down to fructose and related sugars. HFCS serves as a substitute for sugar in food manufacturing.
 - **Corn gluten meal** — A high protein by-product of corn wet-milling used for livestock feed and sold commercially as 41 percent and 60 percent protein.
 - **Corn gluten feed** — A by-product of corn wet-milling used for livestock feed. Commercially sold as 21 percent protein.
 - **Amylopectin starch** — Used as a thickening agent in puddings, pie fillings, and sauces.
 - **Amylose starch** — Used in sticky candies like orange slices and in some biodegradable plastics.
 - **Waxy corn** — Corn with 100 percent of its starch as amylopectin starch. About 70 percent of the starch in normal corn is amylopectin. Wet millers use waxy corn for the production of certain specialty starches that are used for food and non-food products.
 - **High amylose corn** — High amylose corn typically contains 50 to 70 percent amylose starch compared with 30 percent for normal corn.
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