

Definitions & Glossary

Definitions and Terms Commonly Associated with Oilseed Products or Processing

A

Acidulated soapstock: The product that results from the complete acidulation and thorough settling of soapstock. Contract grade should contain no less than 85% total fatty acid.

Activated earth: Bleaching earth that has been treated with acid to increase its capacity for pigment adsorption from oil.

Aflatoxin: A naturally occurring mycotoxin produced by two types of mold, *Aspergillus flavus* and *Aspergillus parasiticus*, that grow on a variety of crops. Aflatoxin is listed as a possible carcinogen, and has been shown to cause liver damage, some of which may be cumulative, in many mammals. The USDA provides aflatoxin testing for corn, sorghum, wheat, soybeans, rice, popcorn, corn meal, corn gluten meal, corn/soy blend, and other processed products. Additionally, all corn exported from the United States is required to be tested for aflatoxin. *USDA FGIS*

Alpha-linolenic acid (ALA): An essential fatty acid, the major omega-3 fatty acid found in food. Present in flaxseed, canola, and soy.

Amino acids: The chief components and determinants of the characteristics of a protein, the building blocks of living tissues. Eighteen different amino acids commonly occur in food, and eight of them are considered essential because the body cannot produce them. Soybeans contain all eight of these amino acids.

Anticarcinogen: A substance or agent that counteracts the effect of a carcinogen. A 1990 National Cancer Institute workshop identified five different chemical classes of anticarcinogens in soybeans: phytosterols, phytates, saponins, protease inhibitors and isoflavones. *USB*

Antiestrogen: A substance or agent that can prevent the full expression of estrogen. In soy, weak estrogen-like isoflavones can take the place of estrogen and connect with receptors in estrogen-sensitive tissues, like breast tissue. By competing with estrogen for the limited number of estrogen receptors, the isoflavones prevent estrogen from binding to the receptors and may block proliferation of hormone-dependent cancers by interfering with the growth of estrogen-dependent tumors. *USB*

Antioxidant: Any naturally occurring or manufactured material whose incorporation into fat provides a greater stability than that shown by the fat alone. The antioxidant increases stability by preventing or retarding reaction of the fat with oxygen, thus slowing rancidity development. Antioxidants for food fats must be nontoxic and edible.

Asian soybean rust: A subtropical fungus (*Phakopsora pachyrhizi*) first discovered in Japan at the beginning of the 20th century. It spread slowly through Asia, but in recent years it has reached Africa, Brazil and Paraguay. Since its spores can be spread on upper atmospheric wind currents, there is little chance of regulating the spread of soybean rust. The most common symptom is the appearance of reddish-brown lesions on the underside of the leaves of soybean plants. Soybean rust causes premature defoliation of the plant and leads to lower yields in affected plants.

B

B100 or "neat fuel": Pure, 100 percent biodiesel fuel.

B20: See "Biodiesel blend."

Bacillus thuringiensis (Bt): A naturally occurring soil bacterium that creates a toxin poisonous to a variety of crop-destroying caterpillars, but is harmless to people and animals. Bt insect-resistant crops currently on the market include corn (primarily for control of European corn borer), cotton (for control of tobacco budworm and cotton bollworm) and potatoes (for control of Colorado potato beetle). *USB*

Bean curd: See "Tofu."

Bioavailability: A measure of the efficiency of a substance in being absorbed by, or having physiological effect on, a living organism.

Biodegradability: Capacity of a material to decompose by natural biologic processes.

Biodiesel: Ester-based oxygenated fuels made from renewable sources including soybean oil, other vegetable oils and animal fats, for use in compression-ignition (diesel) engines. Biodiesel fuel is safe for human health and environmentally sound. It can be used instead of petroleum diesel in cars, mass transit, and boats without any modifications to the conventional gas tank or engine. Biodiesel is registered with the U.S. Environmental Protection Agency (EPA) as a fuel or fuel additive, and is a legal fuel for commerce. Also see "Methyl esters." *USB*

Biodiesel blend or Bxx: Biodiesel fuel blended with petroleum diesel. Blends are referred to as Bxx, with the xx signifying the percentage of biodiesel in the blend, e.g., a B20 blend is 20 percent biodiesel and 80 percent petroleum diesel. *USB*

Bioethanol: An alcohol derived from plant sugars. Bioethanol is being developed as a renewable fuel and oxygenate. In some contexts, bioethanol refers to ethanol derived from cellulosic biomass (corn stover, oil palm waste, etc.) rather than grain. See also "Ethanol."

Biofuel: Any fuel derived from living organisms or their byproducts. Biodiesel and ethanol are two biofuels that have enjoyed increasing popularity in recent years.

Biopharming: Process of using plants, including commercial crops such as corn and soybeans, as living factories to produce pharmaceuticals or industrial chemicals. The drugs are refined from the harvested plants. Also called "pharming." See also "Bioprocessing."

Bioplastic (Biodegradable plastic): Material made from plant sources to mimic petroleum-based polymers. Bioplastics are increasing in popularity because of their biodegradability (see also) and use of renewable feedstocks. Sometimes also called "biopolymers." See also "Polylactic acid (PLA)," "Polyhydroxyalkanoate (PHA)" and "Thermoplastic starch."

Bioprocessing: The use of living organisms to produce new products. See also "Biopharming."

Biotechnology: The science of using living things, such as plants or animals, to develop new products or make modifications to existing ones. Current methods include the transfer of a gene from one organism to another. Also see "Genetic engineering" and "Transgenic."

Bleaching: Treatment of a fat or oil with a material such as activated charcoal or diatomaceous (or "Fullers") earth (see also) which removes or reduces the amount of coloring materials normally present. The bleaching process may be carried to the degree desired depending upon the color required by the eventual usage of the processed oil.

Bleaching earth: Mined special earths or clays that, when added to hot oil at about 1%, have the ability to adsorb unwanted pigments.

Boll: The pod or capsule of certain plants, especially flax or cotton. See also "Cotton boll." *AAFCO, 2004*

Bowman-Birk trypsin inhibitor: A class of soybean trypsin inhibitors that has low molecular weight, many disulfide links, and great stability to denaturation.

Bran: Pericarp of grain. *AAFCO, 2004*

Break material: Flocculent material (precipitate) that appears in and can be separated from crude vegetable oil that has been rapidly heated to temperatures between 250°C and 300°C (482°F and 572°F). It is very high in ash content; it is rich in phosphorus, calcium and magnesium. Break material is presumed to be derived from phospholipids that are thermally decomposed at these high temperatures. Break material is sometimes referred to as "foots."

C

- Cake:** The fibrous, solid mass resulting from the pressing of seeds, meat, or fish in order to remove oils, fats, or other liquids. *AAFCO, 2004*
- Canola:** The seed of the species *Brassica napus* or *Brassica campestris*, the oil component of which seed contains less than 2% of erucic acid and the solid component of which seed contains less than 30 micromoles of any one or any mixture of 3-butenyl glucosinolate, 4-pentenyl glucosinolate, 2-hydroxy-3-butenyl glucosinolate, and 2-hydroxy-4-pentenyl glucosinolate per gram of air dry, oil free solid. The term is derived from combining the words “Canadian” and “oil” and is a registered trademark of the Canola Council of Canada.
- Canola oil:** Oil obtained by a direct solvent or prepress solvent extraction process from the whole seeds of the species *Brassica napus* or *Brassica campestris*. Canola oil is high in monounsaturated fatty acids, and low in saturated fatty acids.
- Canola oil, high oleic (high stability):** Oil obtained from the whole seeds of special varieties of the species *Brassica napus* or *Brassica campestris*. High oleic canola oil does not need to be hydrogenated, so trans fatty acids are not created.
- Canola meal:** Meal obtained after the removal of most of the oil by a direct solvent or prepress solvent extraction process from the whole seeds of the species *Brassica napus* or *Brassica campestris*. *AAFCO, 2004*
- Canola protein isolate:** The major proteinaceous fraction of canola produced as a food and feed component from defatted canola meal.
- Catalyst:** Any material that speeds up a chemical reaction without taking part directly in the chemical changes involved. For instance, in the presence of nickel catalyst, oil may be hardened and stabilized by the chemical addition of hydrogen.
- Checkoff programs:** Research and promotion programs authorized by law and financed by assessments. Specified industry members such as producers, importers and handlers pay for the programs. In 2001, the United Soybean Board, for example, is funded by a mandatory assessment of 0.5% of the net market price for a bushel of soybeans. Governed by the Agricultural Marketing Service and the United States Department of Agriculture, a producer poll is conducted every five years to determine if producers favor the continuation of the program. *USB*
- Choline:** A nutrient linked to the health of cellular walls and maintenance of the nervous system. Although produced by the body, a 1998 Institute of Medicine panel recommended an adequate intake standard of 550 mg/day for men and 425 mg/day for women. In 2001, Central Soya won the right to health claim labeling for choline, which, as an integral part of lecithin, is found prominently in soy and sunflower.
- Coconut:** Fruit of the *Cocos nucifera*. Consists of mesocarp (fibrous covering), endocarp (shell), exocarp (the smooth outer skin) and copra meat or flesh. Immature nuts contain an edible milky juice. Mature nuts are consumed as such or processed for copra or desiccated coconut. The flesh, from which coconut oil is extracted, constitutes 40-70% of the weight of the husked coconut (without the mesocarp). About 36% of the flesh is oil.
- Coconut, desiccated:** Dried shredded flesh of coconut processed for human consumption. It retains most of the oil and proteins of the fresh nut and is mainly used in confectionery and baking.
- Coconut flour:** Flour made by grinding the fresh or dried flesh of the coconut.
- Coconut meal:** See “Copra meal.”
- Coconut methyl esters (CME):** Methyl esters derived from copra and used as the basis for biodiesel. See also “methyl esters.”
- Coconut milk (Indonesian: santen; Thai: ga-ti; Vietnamese: nuoc dua):** Liquid extracted from the grated white flesh of the coconut. The grated coconut is soaked and kneaded in hot water and the liquid drained off and squeezed out. The process is done twice; the first batch of liquid extracted is thick coconut milk (Thai: hua ga-ti), the second batch is thin coconut milk (Thai: hahng ga-ti). The fat rich layer that forms on the top of thick coconut milk after a couple of hours in refrigeration is coconut cream. Coconut milk is perishable and will stay fresh in refrigeration for only a couple of days.
- Coconut oil:** Oil removed from the dried flesh of the coconut (copra) by mechanical or solvent extraction. The oil is further processed by being refined, bleached and deodorized for commercial sale.
- Coconut oil, virgin:** Oil removed from fresh flesh of the coconut by mechanical extraction.
- Coconut water:** The substance (technically, liquid endosperm) found inside a coconut.
- Coconut water, tender:** The water inside an immature coconut. Reputed to have myriad healthful properties, tender coconut water has lately been the focus of many commercialization efforts.
- Codex (codex alimentarius):** A multi-volume food standards manual that lists international food trade principles, codes, commodity standards, labels, additives, irradiated foods, contaminants and toxins in foods. It is produced by the Codex Alimentarius Commission, a United Nations food safety agency representing 163 nations worldwide.
- Cold test:** A test that determines how readily oil will separate into liquid and solid portions at low storage temperatures. In such a test, the oil sample is held in an ice water bath (32°F) and the time required for the first appearance of cloudiness is noted as “Cold Test Hours.”
- Commodity:** A product (usually one used in manufacturing consumer goods) for sale or trade, the price of which is subject to the forces of supply and demand. Agricultural commodities are often traded through commodity exchanges.
- Conservation tillage:** Any tillage and planting system (such as minimum tillage, mulch tillage, ridge tillage, and no-till) that leaves at least 30% of the soil surface covered by residue after planting. Conservation tillage maintains a ground cover with less soil disturbance than traditional cultivation, thereby reducing soil loss and energy use while maintaining crop yields and quality. Conservation tillage techniques are often implemented in conjunction with the planting of glyphosate-tolerant soybean varieties. *USB*
- Continuous screw press:** Equipment for expressing oil from oilseeds, composed of an auger moving through a slotted barrel from which oil can drain. Also known as “mechanical screw press,” “expeller.”
- Cooking oil:** A refined, bleached, and deodorized oil which has not been further processed to remove the higher melting point portions of the oil. Cooking oils tend to crystallize or set up semisolid at temperatures much below 70°F. For this reason, heating coils should be installed in storage tanks for cooking oils (in contrast to salad oils, which usually require no heating coils).
- Cooperative:** An enterprise or organization owned by and operated for the benefit of those using its services. In agriculture, such an organization is owned and used by farmers mainly to handle the off-farm part of their businesses: buying farm supplies, marketing their products, furnishing electric and telephone service, and providing business services at cost. Essential features are democratic control, limited return on capital, and operation at cost, with distribution of financial benefits to individuals in proportion to their use of the services made available by the cooperative (called patronage refunds). *USB*
- Copra:** The dried flesh of coconut from which oil is extracted.
- Copra meal:** The ground residue remaining after removal of most of the oil from the dried flesh of the coconut by mechanical or solvent extraction.
- Corn (Maize):** *Zea mays L.*, a cereal crop, a member of the grass family. One of the world's most widely used food staples, corn varieties are directly used for food and feed, processed to make food/feed ingredients, such as lysine, and for industrial uses such as ethanol and polylactic acid (PLA).
- Corn bran:** The outer coating of the corn kernel, which contains little or none of the starchy part of the germ. *AAFCO, 2004*
- Corn, cracked:** Ground or chopped corn kernels containing no more than 4% foreign material. *AAFCO, 2004*
- Corn feed meal:** The fine siftings obtained from screened cracked corn, with or without its aspiration products added. *AAFCO, 2004*
- Corn flour:** The fine sized hard flinty portions of ground corn containing little or none of the bran or germ. *AAFCO, 2004*
- Corn germ meal (wet milled):** Ground corn germ from which most of the solubles have been removed by steeping and most of the oil removed by hydraulic, expeller, or solvent extraction processes. Corn germ meal is a by-product of the wet milling of cornstarch, corn syrup, or other corn products. *AAFCO, 2004*
- Corn gluten feed:** The part of the commercial shelled corn that remains after the extraction of the larger portion of the starch, gluten, and by the processes employed in the wet milling manufacture of corn starch or syrup. It may or may not contain one or more of the following: fermented corn extractives, corn germ meal. *AAFCO, 2004*

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Corn gluten meal: The dried residue from corn after removal of the larger part of the starch and germ, and the separation of the bran by the process employed in the wet milling manufacture of corn starch or syrup, or by enzymatic treatment of the endosperm. It may contain fermented corn extractives and/or corn germ meal. *AAFCO, 2004*

Corn grits: The medium-sized, hard, flinty portions of ground corn containing little or none of the bran or germ. May also appear in the ingredient list of a mixed feed as "hominy grits." *AAFCO, 2004*

Corn oil, crude: Oil extracted from corn germ by solvent and mechanical processes after the corn kernels have soaked in steepwater and been coarsely ground.

Corn oil, edible: Oil refined and filtered from crude corn oil. Corn oil has high polyunsaturated fatty acid content and oxidative stability. Its largest single use is in bottled oil, followed by margarine and industrial snack-frying operations. *USDA ARS*

Corn protein, hydrolyzed: The product resulting from complete hydrolysis of isolated corn gluten, and after partial removal of the glutamic acid. *AAFCO, 2004*

Corn refining: See "Wet milling."

Corn syrup: A sweetener made by processing corn starch with enzymes or acid to create a dextrose solution.

Corn syrup, high-fructose (HFCS): A corn syrup that has been further processed to increase its sweetness. Since HFCS is stable and cheaper to produce than ordinary sugar, it has largely replaced sugar in processed foods and soft drinks. Recent criticism from consumer advocates has targeted HFCS consumption as a cause of obesity.

Cosmeceuticals: Cosmetic products that claim medicinal benefits. A combination of the words "cosmetic" and "pharmaceutical."

Cotton: Cultivated cotton is a perennial shrub from the genus *Gossypium*. The flower of the cotton becomes the "fruit" or "cotton boll," which contains both fiber and seeds. Cotton is grown primarily for its fiber, which is used to make cloth, but the seed of the cotton plant has also proved useful as a source of edible oil and protein. See also "Cottonseed."

Cotton boll: The fibrous fruit of the cotton plant.

Cotton linters: See "Linters."

Cotton plant by-product: The residue from the ginning of cotton. It consists of cotton burrs, leaves, stems, lint, immature seeds, and sand and/or dirt. It shall not contain more than 38% crude fiber, or more than 15% ash. It must be labeled with minimum guarantees for crude protein and crude fat and maximum guarantees for crude fiber and ash. If it contains more than 6.5% ash, the words "sand" and/or "dirt" must appear in the product name. *AAFCO, 2004*

Cottonseed: The seed of the cotton plant, which is mechanically separated from the fiber of the cotton boll. Cottonseed is used to produce edible oil, animal feed ingredients, and ingredients for other industrial and consumer products.

Cottonseed flakes (or cottonseed cake), mechanically extracted: The unground product composed of the kernel and such portions of the lint, hull, and oil as remain after removal of most of the oil from cottonseed by a mechanical process. Cottonseed flakes must contain not less than 36% crude protein. *AAFCO, 2004*

Cottonseed flakes (or cottonseed cake), solvent-extracted: Product obtained by finely grinding the cake that remains after removal of most of the oil from the cottonseed by a solvent extraction process. Cottonseed flakes must contain not less than 36% protein. *AAFCO, 2004*

Cottonseed, glandless: Cottonseed that has been selected through plant breeding to eliminate, or reduce to the extent practicable, seed pigment glands. *NCPA, 2002-2003*

Cottonseed hulls: The outer covering of the cottonseed. *AAFCO, 2004*

Cottonseed meal, low-gossypol: Cottonseed meal in which the gossypol is not more than 0.04% free gossypol. *AAFCO, 2004*

Cottonseed meal, mechanically extracted: Product obtained by finely grinding the cake that remains after most of the oil is removed from the cottonseed by a mechanical extraction process. It must contain not less than 36% protein. *AAFCO, 2004*

Cottonseed meal, solvent-extracted: Meal obtained by finely grinding the cake that remains after removal of most of the oil from the cottonseed by a solvent extraction process. It must contain not less than 36% protein. *AAFCO, 2004*

Cottonseed oil: Once the edible oil standard in the U.S. (until the phenomenal rise of soy oil in the 1950s), oil extracted from the cottonseed kernel is still valued for its stability and bland taste. Cottonseed oil is rich in tocopherols and has a 2:1 ratio of polyunsaturated to saturated fatty acids. As an ingredient, it is often combined with other vegetable oils.

Cottonseed oil, crude: Oil produced from cottonseed by hydraulic, screw press, prepress solvent, or solvent extraction processes and before it is refined.

Cottonseed screenings: Material remaining after the delinting and processing of cottonseeds for planting purposes. It consists of lint, stems, leaves, small and immature seeds, sand and/or dirt. It must be labeled with minimum guarantees for crude protein and crude fat and maximum guarantees for crude fiber and ash. If it contains more than 6.5% ash, the words "sand" and/or "dirt" must appear in the product name. *AAFCO, 2004*

Cottonseed, mechanically extracted, whole-pressed: Material composed of sound, mature, clean, delinted and unhulled cottonseed, from which most of the oil has been removed by mechanical pressure. It must be designated as ground and sold by its crude protein content. *AAFCO, 2004*

Cotyledon: The part of a seed that develops into the first leaves of a young plant.

CPO: An acronym for "Crude Palm Oil," frequently used in commodity reportage. See also "Palm oil, crude."

Cracking: The breaking of the whole seed into several pieces to facilitate dehulling and flaking.

Crop rotation: The practice of growing different crops in recurring sessions on the same land. Crop rotation plans are usually followed for the purpose of increasing soil fertility and maintaining good yields. *USB*

Crop year: The 12-month period in which a crop is harvested. The crop year in the United States for corn and soybeans is from September 1 to August 31.

D

Daidzein: The second most plentiful isoflavone in soy after genistein.

Degermed: Having had the embryo of seeds wholly or partially separated from the starch endosperm. *AAFCO, 2004*

Degumming: The removal of phospholipids from vegetable oil by a water washing step.

Dehulled: Having removed the outer covering from grains or other seeds. *AAFCO, 2004*

Deodorizing: A process involving use of high vacuum and superheated steam in washing of fats and oils. Deodorization removes from fats and oils materials (originally present or introduced during previous processing) that would contribute objectionable flavors and odors to the finished product.

Desolventizer, toaster: Equipment for removing solvent from defatted flakes and for heating flakes sufficiently to overcome growth inhibition properties; the heating medium is steam.

Dewaxing: Removing liquid oil from solid fats through the application of pressure.

Dextrose: A monosaccharide, or simple sugar, made from corn or other starch. The starch is converted into dextrose by hydrolysis. Used widely in food processing as a sweetener, it is about 80% as sweet as sucrose (table sugar).

Diacylglycerol: A fat with two, rather than the more typical three, fatty acids attached to each molecule. Recent research indicates oils made up primarily of this type of molecule may be prevented from being stored in the body as fat.

Diatomaceous (Fullers) earth: A light soil made up of the fossilized remains of tiny aquatic creatures called 'diatoms.' A versatile product, diatomaceous earth is used not only to remove impurities from vegetable oils, but also as an insecticide and even as a filtering agent for swimming pools. Also called "fullers earth," as this substance was used to "full" woolen cloth, or remove lanolin and other impurities from the wool.

Diglyceride: A chemical combination of fatty acids and glycerine in the proportion of two fatty acid units to one glycerine unit. A diglyceride may result from the combination of the units or by splitting off one fatty acid unit from a triglyceride during fat breakdown or hydrolysis.

Direct steam texturization: Process in which soy flour mixed with water is forced through a pressurized chamber at elevated temperatures.

Distillers grains: A co-product of ethanol production consisting of protein, fat, minerals and vitamins concentrated from the processed corn kernels for use (wet or dry) as livestock feed. About 30% of the corn by weight will become distillers grains. The various forms of distillers grains are listed below:

(1) **Condensed Distillers Solubles (CDS):**

Feed ingredient obtained after the removal of ethyl alcohol by distillation from the yeast fermentation of corn by condensing the thin stillage fraction to a semi-solid. *AAFCO, 2004*

(2) **Distillers Dried Grains (DDG):**

Feed ingredient obtained after the removal of ethyl alcohol by distillation from the yeast fermentation of corn by separating the resultant coarse grain fraction of the whole stillage and drying it. *AAFCO, 2004*

(3) **Distillers Dried Grains with Soluble (DDGS):**

Feed ingredient obtained after removal of ethyl alcohol by distillation from the yeast fermentation of corn by condensing and drying at least 3/4 of the solids of the resultant whole stillage. *AAFCO, 2004*

(4) **Distillers Dried Solubles (DDS):**

Feed ingredient obtained after the removal of ethyl alcohol by distillation from the yeast fermentation of corn by condensing the thin stillage fraction and drying it. *AAFCO, 2004*

DNA (deoxyribonucleic acid): The molecule that carries the genetic information for most living systems. DNA consists of four bases (adenine, cytosine, guanine, and thymine) and a sugar phosphate backbone, which are arranged in two connected complementary strands to form a double helix.

Dry milling: An industrial process in which corn is separated into flour, corn meal, grits and other products by soaking corn kernels in water, then removing the germ for processing into oil. The remaining parts of the kernel are ground and sieved into various fractions. See also "Wet milling."

Drying oil: An oil that is very easily oxidized and polymerized on exposure to air or oxygen. It is characterized by a shortage of hydrogen atoms in its fatty acid makeup and readily unites with oxygen to remedy this "unsaturation." The oxidation process results in formation of tough films or coatings of polymerized oil, which may be used to fix or set pigments, as in paints. *USB*

E

E85: A mixture of 85% ethanol and 15% petroleum gasoline blended for use in the internal combustion engine. It is designated an "alternative fuel" by the U.S. Department of Energy. See also "Ethanol."

Edamame (Japanese): See "Soybeans, green vegetable."

Emulsifier: A material capable of causing fat or oils to remain in liquid suspension. *AAFCO, 2004*

Endosperm: Starchy portion of seed. *AAFCO, 2004*

Equol: A soy isoflavone metabolite that may block the effects of the male hormone dihydrotestosterone (DHT), an androgen responsible for male pattern baldness and prostate cancer. Equol is produced in the intestines of some, but not all, people.

Eruic acid: A fatty acid that makes up 40-50% of the fatty acids in rapeseed. Concern over its toxicity led to the development of the canola plant.

Erythritol: A sugar alcohol commercially derived from corn starch and used as a sweetener. Erythritol is low in calories, has high digestive tolerance, and does not promote tooth decay (oral bacteria cannot metabolize it).

Essential fatty acids: Fatty acids necessary for human health that must be obtained from dietary sources because they are not produced by the human body. Soybean oil contains two essential fatty acids, linoleic and linolenic.

Esterification: The process of combining by chemical reaction an alcohol and an acid to form an ester. A natural fat is a special type of ester made from glycerine (an alcohol) and fatty acids.

Estrogen: The female sex hormone essential for the reproductive process and for the development of the uterus and breasts and other physical changes associated with puberty.

Estrogen receptor: A cellular protein that binds hormones, found on nearly all cell types, but particularly in estrogen-sensitive tissues like those in the uterus and the breast.

Ethanol: A clear, colorless alcohol (CH₃CH₂OH), a group of chemical compounds whose molecules contain a hydroxyl group, -OH, bonded to a carbon atom. Ethanol is fermented from sugar, and as such can be made from many natural source materials. When corn is used, the starch must first be broken down into sugar, which is then distilled and dehydrated. Ethanol melts at -114.1°C, boils at 78.5°C, and has a density of 0.789 g/mL at 20°C. It can be used as a fuel alone or in mixture with petroleum products. Also called "bioethanol." *American Coalition for Ethanol*

Expeller: A registered trademark of Anderson International (Cleveland, Ohio). See also "Continuous screw press."

Extraction, mechanical: Removal of fat or oil from materials by heat and mechanical pressure. Also known as: expeller extracted, hydraulic extracted, "old process." See also "Processing or extraction of oilseed." *AAFCO, 2004*

Extraction, solvent: Removal of fat or oil from materials by organic solvents. Also known as "new process." See also "Processing or extraction of oilseeds." *AAFCO, 2004*

Extruded: Feed or other material that has been pressed or protruded through orifices under pressure. See also "Extrusion." *AAFCO, 2004*

Extruder: A jacketed auger used as an economical cooker and as a means of texturizing soy flours, soy concentrates, other foodstuffs or animal feeds. Can also be used to treat oilseed flakes before solvent extraction.

Extrusion: A process for texturizing soy flours or other proteins using high pressures and temperatures in an extruder. Also known as "thermoplastic extrusion."

F

Fat: A substance composed chiefly of triglycerides of fatty acids, and solid or plastic at room temperature. *AAFCO, 2004*

Fatty acid: A chemical unit occurring naturally, either singly or combined, and consisting of strongly linked carbon and hydrogen atoms in a chain-like structure. A reactive acid group composed of carbon, hydrogen and oxygen, which is found at the end of the chain. This acid group permits reaction with glycerol to make the fatty acid a fundamental unit of the triglyceride fat molecule. A natural fat is a mixture of triglyceride fat molecules.

Feed/Feedingstuff: (1) Any substance, whether processed, semi-processed or raw which is intended for animal consumption (FAO/WHO draft Code of Practice for Good Animal Feeding, 1997); (2) edible material(s) which are consumed by animals and contribute energy and/or nutrients to the animal's diet. "Feed" usually refers to animal, not human, diets. *AAFCO, 2004*

Feed grade: Suitable for animal consumption. *AAFCO, 2004*

Feedstock: The raw material introduced to a processing plant from which finished products are made.

Fermented: Acted upon by yeasts, molds, or bacteria in a controlled aerobic or anaerobic process in the manufacture of products such as alcohol, acids, vitamins of the B-complex group, or antibiotics. *AAFCO, 2004*

FFB: An acronym for "Fresh Fruit Bunches," the commodity unit used to measure quantities of oil palm fruit.

Flaking: A process for converting typically dehulled oilseeds into thin flakes for solvent extraction or other processing.

Flaxseed/Linseed: The seed of the flax plant, *Linum usitatissimum*, which is high in alpha-linolenic acid, an omega-3 fatty acid, and lignans, a phytoestrogen. The seed may be used as a food or processed for its oil or use as a nutritional supplement.

Flaxseed meal/Linseed meal: Meal obtained by grinding the cake or chips that remain after removing the oil from flaxseed. It shall not contain more than 10% crude fiber. *AAFCO, 2004*

Flaxseed oil/Linseed oil: Oil produced by crushing flaxseed. A popular nutritional supplement, flaxseed oil contains high levels of omega-3 fatty acids. Lignans present in flaxseed are not preserved in the oil. An industrial formula, usually called "linseed oil," is not suitable for human consumption.

Flour: Soft, finely ground and bolted meal obtained from the milling of cereal grains, other seeds, or products. It consists mainly of the starch and gluten of the endosperm. *AAFCO, 2004*

Food grade: Suitable for human consumption or for processing into food products.

Fullers earth: See "Diatomaceous earth."

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Free fatty acid (F.F.A.): The amount of fatty acid, occurring naturally or produced in fat processing or usage operation, which exists in the fat or oil in the uncombined state as a chemical unit. The uncombined fatty acid may come from the breakdown of a fat (triglyceride) into its component fatty acid and glycerine units. A high free fatty acid level means a poorly refined fat or some fat breakdown after manufacture or use.

Fungicide: A chemical substance used as a spray, dust or disinfectant to kill fungi.

G

Genes: A unit of the cellular material, which is the physical basis for the transmission of the characteristics of living organisms from one generation to another.

Genetic engineering: Deliberate modification of the genome of cells by the addition of nucleic acids from the cells of one organism to the cells of another. This makes the modified cells capable of producing new substances or performing new functions. The transfer of DNA is done by various methods, such as direct injection of cells with DNA or shooting cells with DNA-covered particles from a special gun. Another widely used method is to insert the DNA into specially modified bacteria or viruses that carry it into cells they infect. A plant or animal modified by genetic engineering to contain DNA from an external source is called "transgenic."

Genetically modified organism (GMO): A living organism, the genetic makeup of which has been altered.

Genistein: One of the two primary soy isoflavones. Genistein is being studied for its ability to inhibit the growth of cancer cells. *USB*

Genome: The total hereditary material of a cell, which comprises the entire chromosomal set, found in each nucleus of a given species.

Genotype: Genetic makeup of an individual.

Germ: The embryo found in seeds and frequently separated from the bran and starch endosperm during the milling. *AAFCO, 2004*

Germplasm: Living tissue (usually a seed) that contains the genetic information from which new plants can be grown.

Ghee: See "Vanaspati."

Glyceollins: A class of nutrients in soy that have been found to have antiestrogenic effects.

Glycerine (glycerin): The commercial name for glycerol, a colorless, odorless, syrupy liquid - chemically, an alcohol - obtained from fats and oils and used to retain moisture and add sweetness to foods. It also helps prevent sugar crystallization in foods like candy. Glycerine is also used in cosmetics, inks and certain glues. It is produced as a by-product of biodiesel manufacture.

Glycerol: See "Glycerine"

Glycine: A non-essential amino acid, the simplest amino acid found in the body. It is also found in many foods high in protein, including soy.

Glycinin: The primary storage protein in soy.

Glycitein: The least abundant and least studied of the major isoflavones in soy (it comprises 5-10% of soy's total isoflavones). Recent research indicates that the estrogenicity and bioavailability of glycitein may be greater than either genistein or daidzein.

Glyphosate: An organic solid of odorless white crystals. It is a non-selective herbicide used on many food and non-food crops including corn, soybeans and hay. Glyphosate herbicides are absorbed through leaves and interrupt the metabolic processes of the plant. RoundUp(tm) is Monsanto's popular brand of glyphosate herbicide. *EPA*

Glyphosate-tolerant soybeans (GTS): Soybeans enhanced through biotechnology to survive the application of herbicides with the active ingredient glyphosate, which kills weeds by interrupting their metabolism. See also "Roundup Ready soybeans." *USB*

GMO: See "Genetically modified organism."

Gossypol: A phenolic pigment in cottonseed that is toxic to some animals.

Grain: Seed from cereal plants. *AAFCO, 2004*

GRAS: Acronym for "Generally Recognized as Safe." GRAS refers to a list of food additives/ingredients that a panel of Food and Drug Administration (FDA) pharmacologists and toxicologists judge to be safe based on the data accumulated over time about each ingredient and the ingredient's extensive and common use in foods. *USB*

Grits: Coarsely ground grain from which the bran and germ have been removed, usually screened to uniform particle size. *AAFCO, 2004*

Groundnut: The name for "peanut" used primarily outside of North America. See also "Peanut."

Gumming: Formation and accumulation of a fat-insoluble sticky material resulting from continued heating of fats and oils. The gummy material is produced by oxidation and polymerization of the fat and represents fat breakdown products that collect on heating surfaces.

H

Hempseed: The seed of a variety of the species *Cannabis sativa L.*, the same species as the marijuana plant (hemp, however, contains only traces of the drug THC). Hempseed is a rich source of protein, as well as gamma linolenic acid and other essential fatty acids. Hempseed may also be pressed for its oil.

Herbicide: Any agent or chemical that kills plants. Herbicides are usually used to selectively destroy weeds.

Hexane: A colorless, volatile petroleum-based liquid used as a solvent in extracting the oil from oilseeds. See also "Processing or extraction of oilseeds"

Hilum: A morphological feature of a seed coat, it is the point of attachment of the seed to the pod.

Hulls: Outer covering of grain or other seed. *AAFCO, 2004*

Hydrogenated vegetable oil: Oil that has been subjected to hydrogenation to raise its melting point and improve stability.

Hydrogenization: The process of chemically adding hydrogen in the presence of heat and a catalyst (nickel or copper chromate) to the unsaturated "hydrogen short" portions of a natural fat. The hydrogen combines with the unsaturated fatty acids of the triglycerides with a resultant increase in the melting point of the oil. Addition of hydrogen also reduces the reactivity of the fat toward oxygen, thus reducing rancidity.

Hydrolysis (hydrolyzed, hydrolyzing): The process of splitting complex molecules into simpler units by chemical reaction with water, usually by catalysis. *AAFCO, 2004*

Identity preservation (IP): A process by which a crop is grown, handled, and delivered under controlled, verifiable conditions to assure the buyer that the product or crop has maintained its unique identity (variety, region or growing method) from farm gate to end user.

Insecticide: An agent or chemical used to kill, deter, or control insects.

Isoflavones: A subclass of the more ubiquitous flavonoids. The basic structural feature of flavonoid compounds is the flavone nucleus, which is comprised of two benzene rings (A and B), linked through a heterocyclic pyrane C ring. The position of the benzenoid B ring divides the flavonoid class into flavonoids (2-position) and isoflavonoids (3-position). In contrast to the flavonoids, isoflavones have a very limited distribution in nature. The primary isoflavones in soybeans are genistein (4', 5, 7-trihydroxyisoflavone) and daidzein (4', 7-dihydroxyisoflavone) and their respective β -glycosides, genistin and daidzin (sugars are attached at the 7 position of the A ring). Isoflavones are considered to be phytoalexins, toxic compounds that can accumulate in plants after infection and provide a natural mechanism against microbial attack. Isoflavones also function as key regulators of soil bacteria that enable soybeans to utilize (fix) atmospheric nitrogen gas. Isoflavones are often classified as phytoestrogens because of their ability to bind to estrogen receptors and in some cases, to affect estrogen-responsive genes.

Isolated soy protein: Soy protein that has been removed and greatly concentrated from the soybean by chemical or mechanical means. It is generally produced by extracting protein from white flakes or flour with water or a mild alkali. Isolates usually have a protein content of at least 90%. *AAFCO* defines "soy protein isolate" as "the major proteinaceous fraction of soybeans prepared from dehulled soybeans by removing the majority of non-protein components."

Interesterification: The process of changing the triglyceride melting point and crystallization behaviors of an oil by rearranging the fatty acids either chemically or using enzymes. Unlike hydrogenation, interesterification does not create trans fatty acids. In chemical interesterification, the fatty acids of the triglycerides are randomly shifted by means of a chemical catalyst - usually sodium methylate (methoxide) or sodium ethylate (ethoxylate). Enzymatic interesterification uses a lipase catalyst to rearrange the fatty acids in the 1- and 3-positions. This process allows for more precision and control over achieving specific melting profiles.

K

Kunitz trypsin inhibitor: A class of soybean trypsin inhibitors believed to be primarily responsible for growth inhibition from raw soybeans.

L

Lauric oils: Common term for fats and oils that contain a large percentage of lauric acid, a saturated fatty acid. The most common lauric oils are coconut oil and palm kernel oil.

Lecithin: The mixed phospholipids obtained from a variety of vegetable oils by the degumming process. This emulsion contains not only lecithin, but also cephalin and inositol phosphatides, glycerides, traces of tocopherols, glucosides and pigments. It is designated and sold according to conventional descriptive grades with respect to consistency and bleaching. The dehydrated emulsion of mixed phosphatides and vegetable oil is further processed to produce the commercial grades which may be described as follows: plastic or firm consistency, soft consistency, fluid, unbleached, bleached, and double bleached. High quality commercial lecithin contains 60% to 65% phosphatides.

Legumes: A family of plants including such valuable food and forage species as soybeans, peanuts, clovers, alfalfas, and beans.

Lignan: An antioxidant and phytoestrogen found most prominently in flaxseed. It contains omega-3 fatty acids.

Linoleic acid: One of the two polyunsaturated fatty acids found in soybean oil. Dietary polyunsaturated fatty acids can lower blood lipid levels and thus lower cholesterol. Approximately 50% of soybean oil is this essential fatty acid. *USB*

Linolenic acid: An omega-3 polyunsaturated fatty acid found in fish oil and many seed-derived oils such as soybean oil.

Linters: The residual fibers removed from cottonseed by mechanical processes. Also known as "cotton linters."

Lipoxygenase: An iron-containing enzyme in soybeans that catalyzes hydroperoxide formation in unsaturated fatty acids. This is the enzyme primarily responsible for creating the "beany" flavor in soy milk.

Lunasin: A soy peptide that has been studied for its chemopreventive properties. This peptide may also be derived from barley.

Lysin: An essential amino acid that can be derived from corn. It is used for human and animal nutrition.

M

Maize: See "Corn."

Malto dextrins: The purified concentrated aqueous solution of nutritive saccharides, or a dried product derived from said solution, derived from starch, having a dextrose equivalent of less than 20. *AAFCO, 2004*

Margarine: A water-in-oil emulsion similar to butter in appearance and composition, it is widely used as a butter alternative. Invented by Mege Mourié in France in 1869, originally made from oleo oil (beef fat).

Maturity groups: Twelve groups of seed cultivars based on how flowering responds to dark periods. Maturity groups are selected for the proper latitude so that flowering is timed for maximum yield.

Meat analogs: Material usually prepared from vegetable protein to resemble specific meats in texture, color and flavor.

Meat extenders: Soy or other vegetable proteins used as partial substitutes for meat in processed items such as patties, chili, casseroles, etc.

Melting point: Usually the temperature at which a natural or processed fat becomes perfectly clear and liquid or at which a disc of the fat assumes a spherical shape under prescribed conditions of raising the temperature of the fat sample. The greater the degree of unsaturation the lower the melting point. Hydrogenation raises the melting point.

Methyl esters: The material used as biodiesel fuel and in the manufacture of fatty alcohols, alkanolamides, antibiotics and defoamers. Fatty methyl esters are produced in the reaction of fats with methyl alcohol in the presence of an alkaline catalyst. Glycerine is released as a by-product. The reaction is called transesterification or alcoholysis. Methyl esters can also be produced by reacting fatty acids with alcohol in which case no glycerine is produced. In either case, the product can be simply distilled or fractionally distilled for higher purity.

Miso (Japanese): A fermented, whitish-brown, brown, or red-brown seasoning paste made from soaked, steam-heated soybeans which are inoculated with cultures of microorganisms grown on rice or barley and then allowed to ferment. Typical microorganisms are *Aspergillus oryzae*, *Aspergillus sojae* and *Rhizopus oligosporus*. In the "natural brewing process" the soybeans are allowed to ferment for approximately nine months; in the "quick brewing process" miso is produced in a short time by reducing the length of time for processing (heating) the soybeans and the fermentation. Both sweet and salty varieties are produced.

Mono alkyl esters: The chemical name for biodiesel.

Monoglyceride: A chemical compound of one fatty acid unit with one glycerine unit. May result from the combination of fatty acids and glycerine or from breakdown of di- and triglycerides. Monoglycerides contain two types of chemical groups, one tending toward fat solubility and the other toward water solubility. Presence of these two groups lends to the monoglyceride emulsifying properties assisting the mixture of oil and water. Used as an anti-foaming agent in food processing.

Monounsaturated fatty acids: A type of unsaturated fatty acid in which the chain of carbon atoms is missing one pair of hydrogen atoms. Monounsaturated fat is found mostly in vegetable oils such as soybean, olive, canola, and peanut. Because it aids stability, oils high in monounsaturated fatty acids are good for frying applications. Soybean oil contains approximately 24% monounsaturated fatty acids. When substituted for saturated fat, monounsaturated fat helps lower LDL cholesterol levels while leaving HDL cholesterol levels unchanged. *USB*

Mukimame: See "Soybeans, green vegetable"

Mycotoxin: Any of a group of toxins produced by fungi. Mycotoxins such as aflatoxin (see also) can seriously impact the usability of a grain crop.

N

Natto (Japanese): A whole soybean product produced in Japan by fermenting cooked soybeans with *Bacillus natto* until they develop a sticky, viscous coating.

Nigari: A coagulant for tofu, a mixture of magnesium chloride and magnesium sulfate that is traditionally made from sea water.

NuSun: See "Sunflower oil, mid-oleic."

Nutraceutical: A product isolated or purified from foods that is generally sold in medicinal forms not usually associated with food. A nutraceutical is demonstrated to have a physiological benefit or provide protection against chronic disease. Examples are the isoflavone compounds found in soybeans. Synonyms for nutraceuticals are "functional foods" and "designer foods." *USB*

O

Oil: A substance generally composed chiefly of triglycerides of fatty acids and liquid at room temperature. *AAFCO, 2004*

Oil palm: A tree of the species *Elaeis guineensis* that is cultivated for the edible oil in its fruit. Almost all of the world's palm oil production comes from plantations in Malaysia and Indonesia, although plantations may also be found in India, the Philippines and parts of Africa. See also "Palm oil."

Oilseed: Any of a class of plant seeds from which lipids can be extracted.

Oilseed crops: Soybeans, peanuts, cottonseed, sunflower seed, canola and rapeseed, as well as other crops used to produce edible and/or non-edible oils. *USB*

Oilseed rape: See "Rapeseed"

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Okara (Japanese): Soybean pulp that remains after the production of soymilk (aqueous extraction of the soybean). It consists primarily of the insoluble fiber of the soybean, along with some residual fat and protein.

Oleaginous: Containing or producing oil.

Oleic acid: A monounsaturated fatty acid that contributes to stability, rancidity resistance, and increased shelf life in oils. *USB*

Oleochemicals: Chemicals, such as fatty acids and methyl esters, produced from natural (plant or animal) oils.

Oligosaccharides: See "Soy oligosaccharides."

Omega-3 fatty acids: A type of polyunsaturated fatty acid that has been recognized as having health benefits, including helping to regulate blood pressure and blood lipid levels. Omega-3 fatty acids also may help to lower the risk of heart disease, help prevent cancer, and may be essential for brain development in infants. They are found primarily in fish oils but are also found in a few plant sources, such as soybeans. *USB*

Omega-6 fatty acids: Essential polyunsaturated fatty acids found in many plant oils including soy, sunflower and corn. Omega-6 fatty acids have numerous proven health benefits, including heart-health, and appear to function best in combination with omega-3 fatty acids.

Organic: Describes the methods and materials used to create a certain product. The principal guidelines for organic production are to use materials and practices that enhance the ecological balance of natural systems and that integrate the parts of the farming system into an ecological whole. See also "Organic farming."

In the U.S., "organic" is a labeling term governed by the Organic Foods Production Act, which was enacted in 1990, and amended with new regulations that went into effect on October 21, 2002. The term "organic" may now be used in the U.S. only to refer to agricultural products or ingredients produced in accordance with this law. The exact rules determining the use of "organic" are available from the USDA (www.ams.usda.gov).

Organic farming: Organic farming is a production system that avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, growth regulators, and livestock feed additives. To the maximum extent feasible, organic farming systems rely on crop rotation, crop residues, animal manures and mechanical cultivation to maintain soil productivity and till, to supply plant nutrients, and to control weeds, insects and other pests. *USB*

Oxidation: A chemical reaction involving the addition or combination of oxygen with the other reacting material. Oxidation in fats or food products containing fat eventually results in development of rancidity and its accompanying objectionable flavors and odors.

Oxygenate: An organic chemical compound whose molecular structure contains oxygen in addition to carbon and hydrogen. Certain oxygenates, such as MTBE, ethanol, and methanol, may be added to motor gasoline to reduce carbon monoxide (CO) emissions in automobile exhaust.

P

Palm kernel oil: Oil obtained from the kernel of the oil palm fruit, which is chemically quite different from that of palm oil, which is obtained from the flesh of the fruit. Palm kernel oil is lauric type oil, similar to coconut oil.

Palm kernel olein: The liquid component of fractionated palm kernel oil. Palm kernel olein is similar to refined coconut oil.

Palm kernel stearin: The more saturated and solid component of fractionated palm kernel oil. Palm kernel stearin is used as a cocoa butter substitute.

Palm oil: Oil derived from the mesocarp, or flesh, of the fruit of the oil palm species *Elaeis guineensis*. In Malaysia, the most common cultivated fruit form is the high yielding hybrid of *Dura X Pisifera* known as *Tenera*.

Palm oil, crude: The product produced by crushing the fruit of the oil palm. Before further refining it is a rich source of carotenoids. See also "Palm oil."

Palm oil, natural (red): The oil produced by crushing the fruit of the oil palm, without further processing such as refining, bleaching and deodorizing. Natural palm oil retains a rich, red color because of its high level of carotenoids.

Palm olein: The liquid, more unsaturated fraction separated from palm oil after crystallization at a controlled temperature. The olein consists of a more homogeneous mixture of triglycerides than the original oil and has different properties and uses.

Palm stearin: The more saturated and solid fraction obtained by fractionation of palm oil after crystallization at a controlled temperature. It is a co-product from the production of palm olein.

Palmitic acid: A very stable saturated fatty acid, which is used for frying.

Peanut: The edible seeds of a legume, *Arachis hypogaea*, which are high in protein and fiber. Peanuts are produced in the U.S. mostly for food and confection uses, but more than 50% of the worldwide production is crushed for its oil.

Peanut hulls: The outer hull of the peanut shell.

Peanut meal: The ground product of shelled peanuts, composed principally of the kernels, with such portion of the hull, or fiber, and oil, as may be left in the ordinary course of manufacture by a mechanical or solvent extraction process. If solvent-extracted, it must be so designated. *NCPA, 2002-2003*

Peanut oil: Oil expressed from the seed of the peanut plant. It is composed of mixed glycerides and contains a high proportion of unsaturated fatty acids, in particular, oleic (18:1) and linoleic (18:2). As a cooking oil, especially in deep-fat frying, groundnut oil is excellent since it has a smoke point of 229.4° C. *USDA ARS*

Peanut skins: The outer covering of the peanut kernel, exclusive of the hull.

Pellets: Agglomerated feed formed by compacting and forcing material through die-cut openings by a mechanical process. Also known as: "pelleted feed," "hard pellet." *AAFCO, 2004*

Peptone: Any of the water-soluble compounds formed by hydrolysis of a protein. Soy proteins are commonly used in the production of peptones.

Pesticide: A substance used to kill, control, repel or mitigate any pest.

Phosphatidylcholine: A bioactive component of lecithin that has been used to control cholesterol. It is used in some cosmetic applications.

Phosphatidylserine: A phospholipid found in the cell membrane. Commercial phosphatidylserine supplements have generally been made from animal sources, but soy-based products are now available. It is marketed as a supplement to support cognitive function, but studies have so far been inconclusive.

Phospholipids: Essential building blocks of the cell membrane, phospholipids are made up of fatty acid chains adhered to a hydrophilic polar head group. Found in all organic material, these nutrients are commonly derived from lecithin.

Phytic acid: The storage form of phosphorus, which reduces the bioavailability of certain minerals in the body. Its natural presence in soy protein has led researchers to experiment with different methods (including genetic engineering) of reducing its effect.

Phytochemicals: Bioactive compounds found in plants, including soy. Many of these non-nutritive substances have potent biological activity and may help to lower risk for many chronic diseases. Soybeans contain a variety of phytochemicals and are the only food source with nutritionally significant amounts of the phytochemical group isoflavones. Also called "phytonutrients."

Phytoestrogens: Weak, estrogen-like substances found in plants, especially soy. Phytoestrogens are associated with a lowered risk of many diseases, including heart disease, osteoporosis and breast cancer.

Phytosanitary regulation: Official rule to prevent the introduction and/or spread of quarantine pests, or to limit the economic impact of regulated non-quarantine pests, including establishment of procedures for phytosanitary certification. [*FAO, 1990; revised FAO, 1995; CEPF, 1999; ICPM, 2001*]

Phytosterols: One of the five chemical classes of anticarcinogens found in soy. Phytosterols are also believed to reduce cholesterol levels by inhibiting cholesterol absorption, thus reducing the risk of heart disease. *USB*

PMP: Acronym for "Plant-Made Pharmaceuticals." See also "Biopharming."

Polyhydroxyalkanoate (PHA): A biodegradable polymer made by the bacterial fermentation of sugars from corn, palm oil fatty acids, and other renewable sources. PHAs may be made into a variety of products, including adhesives and packaging film.

Polyactic acid (PLA): A starch-based polymer. Corn, the most common PLA feedstock, is processed for its dextrose, which is fermented to create lactic acid. After further processing, PLA can be made into a wide range of products, from disposable cups to clothing.

Polymerase: Group of enzymes that synthesize nucleic acids.

Polymerase Chain Reaction (PCR):

Technique for amplifying target DNA sequences by multiple rounds of amplification cycles. Oligonucleotides with sequences complementary to the DNA that flanks the target region are added to the test DNA. The DNA is heated to separate the complementary strands and then cooled to allow the oligonucleotides to anneal to the matching sequences. A heat stable DNA polymerase is then used to synthesize the targeted sequence. This reaction cycle is allowed proceed numerous times and can amplify the target DNA one billion times.

Polymerization: An undesirable change in the composition of a food fat involving agglomeration or clumping of the normal chemical units of fat and its decomposition products into larger and insoluble chemical units that are characteristic of the gummy residue of frying fats. Rapid polymerization is desirable in drying oils used as vehicles for pigments in paints. In frying fats such reaction coincides with undesirable foam development.

Polyphenols: A category of micronutrients, found in plants, which have antioxidant properties.

Polyunsaturated fatty acids: A type of unsaturated fatty acid in which the chain of carbon atoms is missing two or more pairs of hydrogen atoms. Polyunsaturated fatty acids are found in nuts and vegetable oils such as soybean, safflower and sunflower, and in fatty fish oils.

Precision farming: Agricultural use of Global Positioning System (GPS) technology, involving satellites and sensors on the ground and intensive information management tools to understand variations in resource conditions within fields. Farmers use this information to more precisely apply fertilizers and other amendments and to more accurately predict crop yields. *USB*

Processing or extraction of oilseeds: One of three commonly used processes used in the separation of the oil and the protein meal (also called “crushing” or “oil mill” operations). These processes are:

(1) **Solvent extraction** - The process using hexane to leach or wash (extract) the oil from flaked oilseeds. This method reduces the level of oil in the extracted flakes to 1% or less. Most oilseed processing is by solvent extraction.

(2) **Continuous pressing** - A process performed at elevated temperatures, using screw presses to express the oil from ground and properly conditioned oilseeds. The resulting press cake is reduced to between 4% and 6% oil content by this method. Though products made with this process are sometimes referred to as “expeller” products, this is incorrect, since “expeller” is a registered trademark referring to screw presses manufactured by Anderson International (Cleveland, Ohio).

(3) **Hydraulic or batch pressing** - An intermittent pressing operation carried out at elevated temperatures in a mechanical or hydraulic press after the oilseeds have been rolled into flakes and properly conditioned by heat treatment. It is the oldest known method of processing oilseeds.

Protease inhibitors: One of the five chemical classes of anticarcinogens found in soy. Protease inhibitors protect against the damaging effects of radiation and free radicals, which can destroy DNA.

Protein: A naturally occurring combination of amino acids containing carbon, hydrogen, oxygen, nitrogen and usually sulphur. Protein is one of the essential constituents of all living things and of the diet of animal organisms.

Proteinaceous: Composed of or resembling protein.

Pulses: Annual leguminous crops yielding from one to 12 grains or seeds of variable size, shape and color within a pod. They are used for both food and feed. The term “pulses” is limited to crops harvested solely for dry grain, thereby excluding crops harvested green for food (green peas, green beans, etc.) which are classified as vegetable crops. Also excluded are those crops used mainly for oil extraction (e.g. soybean and peanuts) and leguminous crops (e.g. seeds of clover and alfalfa) that are used exclusively for sowing purposes.

In addition to their food value, pulses play an important role in cropping systems because of their ability to produce nitrogen and thereby enrich the soil. Pulses contain carbohydrates, mainly starches (55-65% of the total weight); proteins, including essential amino acids (18-25%, [much higher than cereals]); and fat (1-4%). The remainder consists of water and inedible substances.

Production data should be reported in terms of dry clean weight, excluding the weight of the pods. Certain pulses can be skinned and partially crushed or split to remove the seed coat, but the resulting products are still considered raw for classification purposes. *FAO*

R

Raffinose: A soluble trisaccharide found in soybeans that frequently causes flatulence. See also “Soy oligosaccharides.”

Rancidity: The stage in fat oxidation that is characterized by development of easily recognized sharp, acrid and pungent off-flavors and odors. True rancidity is a description of sensory reactions and may be determined only by flavor and odor. Chemical tests may roughly denote the progress of oxidation but usually cannot accurately predict the onset of undesirable flavor and odor.

Rapeseed (Oilseed Rape): *Brassica napus*, a member of the mustard family that has been grown in Europe for its oil-containing seeds for thousands of years. Concerns over its high levels of erucic acid and glycosinolates led to the development of canola in the 1950s. See also “Canola.”

Rapeseed meal, mechanically extracted: Meal from the seed of the rapeseed plant (*Brassica*), which is obtained by grinding the cake remaining after removal of most of the oil by mechanical extraction. It must contain a minimum of 32% protein and a maximum of 12% crude fiber. *AAFCO, 2004*

Rapeseed oil: Oil expressed from the seeds of the rape plant. Due to high levels of erucic acid, some varieties are used today only for industrial purposes such as lubricants and biodiesel. Other varieties continue to be used as cooking oils.

Recombinant DNA (rDNA): DNA formed by the joining of genes or genetic material into a new combination.

Red palm oil: See “Palm oil, natural (red)”

Refining, chemical: Treatment of natural or processed fats to remove impurities by mixing the fat with caustic soda, centrifuging, washing with water and centrifuging again. The separated refined fat or oil is dried by heating under vacuum.

Refining, physical: A means of separating free fatty acids from edible oil through the use of heat, pressure and/or distillation rather than hexane. See also “Refining, chemical.”

Refractive index (R.I.): A numerical expression of the ratio of the speed of light in a vacuum to the speed of light in the substance. For practical measurements the scales of instruments indicate refractive indices relative to air rather than vacuum. The R.I. is characteristic within limits for each kind of oil, but it is related to the degree of saturation and is affected by other factors such as free fatty acid, oxidation and heat treatment. The R.I. of a substance increases during frying and oxidation.

Ribonucleic acid (RNA): Molecule similar to DNA that functions primarily to decode the instructions for protein synthesis that are carried by genes.

Rolled: Having changed the shape and/or size of particles by compressing between rollers. It may include tempering or conditioning. *AAFCO, 2004*

Roundup Ready soybeans: The brand name for the Monsanto Company's soybeans enhanced through biotechnology to withstand the effects of the herbicide glyphosate (see also), the active ingredient in Roundup brand herbicide. *USB*

Rust, soybean: See “Asian soybean rust.”

S

Safflower: A minor oilseed crop, *Carthamus tinctorius* L., that is cultivated mainly for edible oil and birdseed applications. About half of the world's safflower is grown in India, with the United States, China, Mexico, Ethiopia, Argentina and Australia producing most of the remainder.

Safflower oil: A colorless, mild oil extracted from the seeds of the safflower. Safflower oil is popular as a cooking oil, but it also has industrial uses.

Salad oil: A refined, bleached and deodorized edible oil that has been submitted to a chilling process before packaging. The chilling causes solidification of the higher melting point portions of the fat and permits removal of this material, which would otherwise solidify and cloud in packaged oil stored at lower climatic temperatures. A good salad oil will have a high Cold Test--i.e. will withstand holding for many hours at 32°F before showing any signs of clouding. Some oils are natural salad oils and do not require winterization.

Salt coagulation: The process for making tofu, which consists of texturizing soy protein with salt or acids.

Saponification: The chemical reaction of fatty acid esters with an alkali (sodium or potassium hydroxide), producing soap and a glycerol.

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Saponins: One of the five chemical classes of anticarcinogens found in soy. Saponins are a large family of modified carbohydrates found in many vegetables and herbs. So far, researchers have identified 11 different saponins in soybeans alone. In addition to being anticarcinogens, there is evidence that some of these substances lower circulating levels of certain lipids. *USB*

Saturated fatty acids: Saturated fats are among the most common fats in our diet. They are found predominantly in animal foods like meat, poultry and full-fat dairy products, and in tropical oils like palm and coconut. Diets high in saturated fats are associated with higher risks of heart disease, certain cancers and stroke. Soybean oil has a low saturated fat content of 15%. *USB*

Segregation: A farming practice of separating crops and harvested agricultural produce and grains for discrete delivery based on a category, class or grade. *USB*

Shortening: A plastic or semisolid fat used in the production of bread, cakes and other bakery products. It is also used for frying, as it becomes liquid when heated much above 100°F. It derived its name from its effect in making the baked product short and tender.

Shoyu: See “Soy sauce.”

Soapstock: The by-product that results from the alkali refining of any vegetable oil; about 6% of the volume of crude oil refined is soapstock. It is sometimes referred to as “foots” since it accumulates at the bottom (foot) of the refining tank. Contract grade soapstock should contain no less than 50% total fatty acid.

Solvent-extracted: A product from which oil has been removed by solvents. *AAFCO, 2004*

Solvent extraction: See “Processing or extraction of oilseeds”

Sorbitol: A sugar alcohol found naturally in a number of fruits and vegetables and commercially manufactured from corn.

Soy complex: Generally, a futures trading term used to refer collectively to the soybean as well as its major commodity components, meal and oil.

Soy flakes, defatted: Soybean flakes produced by the nearly complete removal of oil from soybeans. Defatted soy flakes are the basis of a variety of soy protein products including soy flour, soy concentrates and soy isolates.

Soy flakes, solvent-extracted: The product obtained after extracting part of the oil from soybeans by the use of hexane or homologous hydrocarbon solvents. It is designated and sold according to its protein content. *NOFA, 2003-2004*

Soy flour: The finely powdered material resulting from the screened and graded product after removal of most of the oil from selected, sound, cleaned and dehulled soybeans by a mechanical or solvent extraction process. It must contain no more than 4.0% crude fiber. *AAFCO, 2004*

Soy flour, defatted: Flour produced by the nearly complete removal of the oil from soybeans by the use of hexane or other homologous hydrocarbon solvents; defatted soy flour usually contains about 1% fat.

Soy flour, enzyme-active: Full-fat soy flour that has been minimally heat-treated in order not to neutralize its natural enzymes. It is used as a bleaching agent in commercial baking.

Soy flour, full-fat: Ground whole soybeans containing all of the original oil, usually 18 to 20%. The flour may be enzyme-active, or it may be heat-processed or toasted to minimize enzyme action. See also “Soy flour.”

Soy flour, high-fat: Flour produced by adding a desired level of soy oil (usually between 10 and 20%) to defatted soy flour, with or without the addition of lecithin. See also “Soy flour.”

Soy flour, lecithinated: A type of low-fat or high-fat soy flour in which lecithin is added to defatted soy flour to a specified level, usually up to 15%.

Soy flour, low-fat: Flour produced either by partial removal of the oil from soybeans or by adding soy oil and/or lecithin to defatted soy flour to a specified level, usually between 5% and 6%. See also “Soy flour.”

Soy flour, textured: Soy flour that has texture imparted to it either 1) by spinning a fiber and combining the fiber in layers, or 2) by thermoplastic extrusion. See also “Extrusion”

Soy grits: The granular material resulting from the screened and graded product after removal of most of the oil from selected, sound, clean and dehulled soybeans by a mechanical or solvent extraction process. It must contain not more than 4.0% crude fiber. *AAFCO, 2004*

Soy lecithin: Lecithin obtained from the degumming of soybean oil. See also “Lecithin.”

Soy oil, cold pressed: Oil produced from undamaged, mature, cleaned yellow soybeans by mechanical processing and filtering, without the application of heat.

Soy molasses: A thick, liquid by-product of soy protein concentrate manufacture composed mainly of soy sugars (such as oligosaccharides and disaccharides). Soy molasses is used primarily as an animal feed ingredient; isoflavones can also be refined from soy molasses.

Soy oil, crude: Unrefined oil produced by any one of the procedures described for the extraction of oil from soybeans. It is customary to filter the oil and/or allow it to settle after being processed from the soybeans as required by the standard trade specifications. Crude soy oil is a mixture of triglycerides composed of unsaturated fatty acids (oleic, linoleic, linolenic) and saturated fatty acids, together with usually not more than 1.5% of free fatty acids and from 1.8% to 3.2% of phospholipids (depending on the quality and kind of soybeans and the procedure used in processing). Also referred to as “crude raw soybean oil.”

Soy oil, degummed: The product resulting from washing crude soy oil with water and/or steam or another degumming agent for a specified period of time, and then separating the oil-and-water mixture, usually by centrifugation, to remove the phosphatides. Also referred to as “crude degummed soy oil.”

Soy oil, edible crude: Soy oil of any of the following designated types produced from mature yellow soybeans: (1) continuous screw pressed, (2) continuous screw pressed degummed, (3) hydraulic pressed, (4) hydraulic pressed degummed, (5) solvent extracted, (6) solvent extracted degummed and (7) mixtures of any of the above-described types. When the oil is produced by solvent extraction, the name of the solvent used in the process must be given.

Soy oil, edible refined: Crude or degummed soy oil that has been subjected to special refining processes to adapt it for use in food products. Processes may include treatment with alkali, bleaching, partial hydrogenation and/or winterization. The oils are classified as salad oils, cooking oils or shortening.

Soy oil, fully refined: The edible oil produced from crude or degummed soy oil that has been treated with dilute alkali solution (caustic refining) or neutralization, treated with absorbent clay materials (bleaching) and subjected to steam distillation at high temperatures under vacuum (deodorizing). Such oil may also be produced by a process called physical (steam) refining which consists of degumming, bleaching and neutralization by deodorizing.

Soy oil, once-refined: Oil produced from crude soy oil that has been subjected only to the dilute alkali solution (refining) treatment or a comparable chemical treatment.

Soy oil, technical grade refined: A wide variety of soy oils specially refined and processed to meet requirements for a specific industrial use.

Soy oligosaccharides: Prebiotics, or non-digestible food ingredients that stimulate the activity of *Bifidobacterium* bacteria in the colon, which are found in soy. The two principal soy oligosaccharides are trisaccharide raffinose and tetrasaccharide stachyose.

Soy peptide: A soy protein component (formed by the linking of amino acids) that is becoming an increasingly popular ingredient because of its bioactive properties. Soy peptides may be helpful in lowering blood pressure and cholesterol, preventing cancer and obesity.

Soy protein concentrate: A product of not less than 65% protein (on a moisture-free basis) prepared from high quality sound, clean, dehulled soybean seeds by removing most of the oil- and water-soluble non-protein constituents. *AAFCO, 2004*

Soy protein concentrate, textured: Soy protein concentrate that has texture imparted by spinning a fiber and combining the fiber in layers (or by thermoplastic extrusion) to achieve the desired texture.

Soy Protein Health Claim: The statement that consuming 25 grams of soy protein per day can lower LDL cholesterol and reduce the risk of heart disease (approved by the FDA in November 1999). Health claims are statements characterizing the relationship between any nutrient or substance in a food and a disease or health-related condition. In order for a health claim to be used on a food label, the product must meet specific criteria for that particular health claim and be supported by significant research.

Soy protein, hydrolyzed: Protein made from soybean flours, concentrates or isolates, treated with an acid, base or enzyme and then dried. *AAFCO, 2004*

Soy protein isolate: See “Isolated soy protein.”

Soy protein, textured: Soy protein that has texture imparted by spinning a fiber and combining the fiber in layers to achieve the desired texture; or, by a thermoplastic extrusion process.

Soy sauce/Shoyu/Tamari Shoyu (Japanese): A seasoning sauce of soybeans (whole soybeans, soybean meal or soy protein), sometimes mixed with wheat flour, resulting from the action of molds, yeasts and bacteria as prepared by the Asian method (with *Aspergillus oryzae*); or by being hydrolyzed with hydrochloric acid. The fermentation or enzymatic action is permitted to progress for up to one and a half years, at which time the extract is heated and processed to produce the liquid for edible purposes. It is used as a seasoning in the preparation of foods and as a table condiment.

Soy sprouts: Whole soybeans that have been sprouted (germinated) for up to six days.

Soy wax: A non-toxic, clean-burning wax made by hydrogenating soy oil.

Soya, Soy: A legume, *Glycine max (L) Merrill*. “Soya” (“Soy” in the United States), may be used to describe the entire plant, crop or category of products derived from soybeans. This is different from the term “soybean,” which is used to describe the actual seed of soya. It is a summer annual varying in height from less than a foot to more than six feet. Soya has been grown for centuries in the Orient and was first introduced to the United States early in the 19th century. Soya grows best in areas having hot, damp summer weather but can be grown under a great variety of climatic conditions. See also “Soybean.”

Soybean: Seed of the soy plant, *Glycine max (L) Merrill*. Soybeans are borne in pods that grow in cluster of three to five with each pod usually containing two or three or more seeds. The oil content of the soybean varies from 13% to 26% (average 18% to 22%) and from 38% to 45% protein (on a moisture-free basis).

Soybean cake: Product resulting from the extraction of part or all of the oil by pressure or solvents from soybeans, sold according to its protein content and further described by its process of manufacture.

Soybean curd: See “Tofu.”

Soybean fatty acids: The product obtained when glycerine is split off from the triglycerides in soy oil by any method of hydrolysis. In industrial usage, soybean fatty acids are usually further classified according to the treatment to which they are subjected after hydrolysis.

Soybean feed, solvent-extracted: The product remaining after the partial removal of protein and nitrogen-free extract from dehulled solvent extracted soybean flakes. *AAFCO, 2004*

Soybean flakes, 44% protein soybean meal: The material produced by cracking, heating, and flaking soybeans and then reducing the oil content of the conditioned product by hexane or homologous hydrocarbon solvents. The extracted flakes are cooked and marketed as such or ground into meal. Standard specifications are: Protein, minimum 44%; Fat, minimum 0.5%; Fiber, maximum 7.0%; Moisture, maximum 12.0%. *NOPA, 2003-2004*

Soybean flakes, high-protein or solvent-extracted soybean meal: Material produced by cracking, heating, and flaking soybeans and reducing the oil content of the conditioned product by the use of hexane or homologous hydrocarbon solvents. The extracted flakes are cooked and marketed as such or ground into meal. Standard specifications are Protein, minimum 47.5%-49.0%*; Fat, minimum 0.5%; Fiber, maximum, 3.3% -3.5%*; Moisture, maximum 12.0% (* as determined by buyer and seller at time of sale). *NOPA, 2003-2004*

Soybean hay, sun-cured, ground: The ground soybean plant including the leaves and beans. It must be reasonably free of other crop plants and weeds and must contain not more than 33% crude fiber. *AAFCO, 2004*

Soybean hulls (or seed coats): Soybean hulls consist primarily of the outer covering of the soybean. Hulls typically contain 13% moisture. *AAFCO, 2004*

Soybean meal: Ground soybean cake, ground soybean chips or ground soybean flakes, sold according to its protein content and further described by its process of manufacture. Typical composition: Protein 44.0% minimum, Fat 0.5% minimum, Fiber 7% maximum, and Moisture 12.0% maximum. High protein soybean meal contains: Protein 47.5-49.0% minimum, Fat 0.5% minimum, Fiber 3.3-3.5% maximum, and Moisture 12.0% maximum. *NOPA, 2003-2004*

Soybean meal, dehulled, solvent extracted: Meal obtained by grinding the flakes remaining after removal of most of the oil from dehulled soybeans by a solvent extraction process. It must contain not more than 3.5% crude fiber. *AAFCO, 2004*

Soybean meal, ground: Product obtained by grinding whole soybeans without cooking or removing any of the oil. *AAFCO, 2004*

Soybean meal, kibbled: Product obtained by cooking ground, solvent-extracted soybean meal under pressure and extruding it from a mechanical pressure device. It must be designated and sold according to its protein content and shall contain not more than 7% crude fiber. *AAFCO, 2004*

Soybean meal, mechanically extracted: The product obtained by grinding the cake or chips that remain after removal of most of the oil from soybeans by a mechanical extraction process. It must contain not more than 7% crude fiber. *AAFCO, 2004*

Soybean meal, solvent-extracted: The product obtained by grinding the flakes that remain after removal of most of the oil from soybeans by a solvent extraction process. It must contain not more than 7% crude fiber. *AAFCO, 2004*

Soybean mill feed: Feed composed of soybean hulls and the offal from the tail of the mill that results from the manufacture of soy grits or flour. It must contain not less than 13% crude protein and not more than 32% crude fiber. *AAFCO, 2004*

Soybean mill run: Meal composed of soybean hulls and such bean meats that adhere to the hulls that result from normal milling operations in the production of dehulled soybean meal. It must contain not less than 11% crude protein and not more than 35% crude fiber. *AAFCO, 2004*

Soybean processor: An individual or group of individuals whose primary business is the separation of the oil and meal in soybeans. The activities of a processor may also include refining and/or distribution of the oil as well as distribution or further production of soybean meal or soy protein.

Soybean protein product, chemically modified: A soybean product that has been processed primarily to modify the natural protein structure by utilizing acids, alkalies or other chemicals without removing significant amounts of any nutrient constituent. *AAFCO, 2004*

Soybean rust: See “Asian soybean rust.”

Soybean seeds, extruded, ground: The meal product resulting from extrusion (by friction heat and/or steam) of whole soybeans without removing any of the component parts. It must be sold according to its crude protein, fat and fiber content. *AAFCO, 2004*

Soybean seeds, heat processed: The product resulting from heating whole soybeans without removing any of the component parts. It may be ground, pelleted, flaked or powdered. The maximum pH rise using standard urease testing procedure should not exceed 0.10 pH units. It must be sold according to its crude protein, crude fat and crude fiber content. *AAFCO, 2004*

Soybean solubles, condensed: The product resulting from the washing of soy flour or soybean flakes with water and acid; water, alkali and acid; or water and alcohol. The wash water is then concentrated to a solids content of not less than 50%. *AAFCO, 2004*

Soybean solubles, dried: The product resulting from the washing of soy flour or soybean flakes with water and acid; water, alkali and acid; or water and alcohol. The wash is then dried. *AAFCO, 2004*

Soybeans, green vegetable/Edamame/Mukimame (Japanese): Soybeans picked green and commonly sold in the pods, shelled, canned or frozen. They may be eaten raw or cooked. In Japanese, green vegetable soybeans are referred to as “edamame” in the pod and “mukimame” when shelled.

Soyfoods: Term for edible soy-based products. These include traditional soyfoods such as tofu, soymilk, tempeh, soy sauce etc.; soy protein products produced after processing (as described previously) such as soy flour, soy concentrates and isolated soy proteins; soy oil products such as refined soy oil, hydrogenated soybean oil and soybean lecithin; and, other edible by-products such as soybean hulls and soy fiber. Also, “second generation” soyfoods, a term to describe consumer oriented products that use a soyfood as a primary ingredient, such as tofu or soymilk-based nondairy frozen desserts or tofu-stuffed ravioli.

Definitions & Glossary

Soymilk: A protein-rich, milky liquid typically obtained from the soaking and grinding of whole soybeans with water, or from hydrating whole, full-fat soy flour, cooking the resultant slurry, and filtering all or part of the soy pulp or fiber from the cooked liquid. Modern systems for soymilk production may vary in technique. Soymilk prepared in this manner can be spray-dried, sweetened or flavored (as a beverage) or used to make tofu. The Soyfoods Association of North America defines soymilk as: A liquid food obtained as a result of combining: (1) aqueous-extracted whole soybean solids and water; or, (2) other edible-quality soy protein solids, soybean oil, and water; to provide no less than 3.0% soy protein, no less than 1.0% soybean fat and no less than 7.0% total solids.

Soynuts, roasted: Whole soybeans that have been soaked in water and then baked until browned. They have a strong taste (similar to peanuts), a dry crunch and are a rich source of protein and isoflavones. Soynuts are available plain, whole or crumbled; they are also available flavored with a confectionery or seasoning coating. *USB*

Spinning: A process for texturizing soy protein isolate by forcing a concentrated solution of protein through a small opening into a coagulating bath.

Stachyose: A soluble tetrasaccharide found in soybeans that frequently causes flatulence. See also “Soy oligosaccharides.”

StarLink / Cry9C protein: StarLink brand corn is the Aventis-bred corn enhanced through biotechnology to contain the Cry9C protein. The Cry9C protein is one of a number of “Cry” proteins that are toxic when eaten by the European corn borer, southwestern corn borer, black cutworm, and some species of armyworm. *USB*

Steeping, steep-extraction: The step in corn wet milling (see also) in which kernels are soaked in water (often with a sulfur dioxide solution) to facilitate the separating of the corn kernels into their various components.

Steepwater: Water containing soluble materials extracted by steep-extraction, i.e., by soaking in water or other liquid (as in the wet milling of corn). *AAFCO, 2004*

Sterols: Solid cyclic alcohols that are the major constituents of the unsaponifiable portion of animal and vegetable fats and oils. Sterols are naturally found in the fatty tissues of plants and animals. Cholesterol is a sterol found only in animals.

Stover: Mature corn or other grain stalks, often used for animal feed.

Sunflower: A distinctive, flowering plant (*Helianthus annuus L.*), the seeds of which contain a valuable edible oil.

Sunflower hulls: The outer covering of sunflower seed. *AAFCO, 2004*

Sunflower meal, dehulled, mechanically extracted: Meal obtained by grinding the residue remaining after the extraction process. *AAFCO, 2004*

Sunflower meal, dehulled, solvent-extracted: Meal obtained by grinding the residue remaining after the extraction of most of the oil from dehulled sunflower seed by a solvent extraction process. *AAFCO, 2004*

Sunflower meal, mechanically extracted: Meal obtained by grinding the residue remaining after extraction of the oil from the whole sunflower seed using a mechanical extraction process. *AAFCO, 2004*

Sunflower meal, solvent-extracted: Meal obtained by grinding the residue remaining after extraction of most of the oil from the whole sunflower seed using a solvent extraction process. *AAFCO, 2004*

Sunflower oil: A light oil, extracted from oil-type sunflower seeds, that contains more Vitamin E than any other vegetable oil.

Sunflower oil, high oleic (HOSO): A patented sunflower oil providing excellent stability and a neutral taste. High oleic sunflower oil commonly contains at least 80% monounsaturated fats (oleic fatty acid).

Sunflower oil, linoleic: The original type of sunflower oil, it is high in polyunsaturated fats (linoleic fatty acid) and Vitamin E. It is used as a salad oil and may be hydrogenated, but it is susceptible to oxidation.

Sunflower oil, mid-oleic (NuSun): A stable sunflower oil developed by the National Sunflower Association, which owns the NuSun trademark. NuSun mid-oleic sunflower oil, which has superior stability for frying applications, has been in commercial production since 1999 and become increasingly popular as consumer demand continues to grow for products without trans fats.

Sunflower seed, confection: Also known as “non-oil” or “edible” sunflower (*Helianthus annuus L.*) these varieties of sunflower include seed for human consumption and bird food.

Sunflower seed, oil varieties: Cultivated sunflower seed (*Helianthus annuus L.*) that typically contains not less than 40% oil and not more than 10% moisture.

Super bugs: Slang term for insects, bacteria, or other small fauna that develop a resistance to the pesticides intended to eliminate them. *USB*

Super weeds: Slang term for weeds that breed with genetically engineered plants and develop a resistance to the herbicides intended to eliminate them. *USB*

Sustainable agriculture: An integrated system of plant and animal production practices having a site-specific application that will, over the long term: (1) satisfy food and fiber needs, (2) enhance environmental quality and natural resources, (3) make the most efficient use of nonrenewable resources and on-farm resources, (4) integrate natural biological cycles and controls, (5) sustain the economic viability of farm operations and (6) enhance the quality of life. *USB*

T

Tamari: See “Soy sauce.”

Tempeh: A soyfood product developed in Indonesia in which soybeans are soaked overnight and then cooked for a short time; the cooked soybeans are inoculated with the fungus *Rhizopus oryzae* and allowed to stand for 24 hours at 88°F (31°C) to permit optimum growth of the mycelium of the organism. The finished product resembles a pressed soybean cake. Tempeh can be eaten as is or cooked by frying or roasting.

Textured vegetable protein: Soy protein (or soy in conjunction with other vegetable proteins such as pea, wheat or rice) has been textured either by spinning it into a fiber and then combining the fiber in layers to achieve the desired texture, or by a thermoplastic extrusion process. TVP® is a registered trademark of ADM.

Thermoplastic extrusion: See “Extrusion.”

Thermoplastic starch: Starch that has been extruded in the presence of plasticizers and may be further processed as a biodegradable polymer.

Tilth: The cultivation of land; tillage. *USB*

Toasting: The processes (moist) of cooking oilseed meal, flour or grits by atmospheric or pressure methods for the purpose of increasing the protein efficiency of these products, or improving their functional properties and/or improving physical texture.

Tocopherols: One of two main groups of Vitamin E compounds, tocopherols are antioxidants that support the immune system. See also “Vitamin E.”

Tocotrienols: One of two main groups of Vitamin E compounds, tocotrienols are antioxidants and anticoagulants. They also reduce cholesterol. Though less abundant in nature than tocopherols, they are present in palm, rice bran, and coconut oils. See also “Vitamin E.”

Tofu (soybean curd): Formed (or formed and pressed) curds, resulting from the coagulation of protein from soymilk by the use of calcium sulfate, magnesium chloride (nigari), calcium chloride or other suitable coagulating agent and then placed into forming boxes (or final package as in “silken tofu”). Weight may be applied to the tofu while being pressed to help in the removal of whey. After solidification and cooling, the tofu is cut into pieces for packaging. Typically, tofu can have a protein content ranging from 5 to 15%. Tofu can be eaten as is, or further processed by cooking as in frying or baking; or by fermentation. Tofu can also be spray-dried to create an ingredient for other food products, such as a dairy or meat substitute.

Traceability: A process by which end users are able to trace an agricultural product back to the producer and the production methods used. See also “Identity Preservation (IP)” *USB*

Traditional plant breeding (mass selection): An agricultural breeding technique where superior plants are saved or inferior plants are eliminated during a growing season to amass planting stock seeds intended for future seasons. *USB*

Trait: A characteristic of an organism, which manifests itself through physical attributes. *USB*

Trans fatty acids: Unsaturated fatty acids that have at least one double bond in the trans configuration. They are produced by hydrogenation, in which a vegetable oil is heated in the presence of a metal catalyst and hydrogen. These fatty acids are more saturated than natural vegetable oils and able to pack together more tightly. As a result, trans fatty acids are more solid at room temperature and behave more like saturated fatty acids. Recent research indicates that trans fatty acids – like saturated fats and dietary cholesterol – raise LDL (or “bad”) cholesterol. The U.S. FDA has mandated that, beginning January 1, 2006, labels on food sold in the U.S. list the amount of trans fatty acids found in each product.

Transesterification: Production of biodiesel through base-catalyzed reaction, the most economical and popular production method. The process involves a fat or oil reacting with an alcohol, such as methanol, in the presence of a catalyst to produce glycerine and methyl esters. The methanol is charged in excess to assist in quick conversion and recovered for reuse. The catalyst is usually sodium or potassium hydroxide, which has already been mixed with methanol. Beneficial characteristics of transesterification are low temperature (150° F) and low pressure (20 psi) processing, high conversion (9%) with minimal side reactions and reaction time, direct conversion to methyl ester, and no need for unusual construction materials. *USB*

Transgene: A modified or non-self gene that is introduced into an organism.

Transgenic: A plant or animal modified by genetic engineering to contain DNA from an external source. See also "Genetic engineering" and "Biotechnology."

Triacylglycerol: A fat molecule composed of a glycerol linked to three fatty acids. It is the most abundant lipid in nature. See also "Diacylglycerol."

Triglyceride: A technical term for a single, pure, fully neutral fat. A chemical unit composed of the reaction product of one unit of glycerine with three units of fatty acid. A typical fat or oil will be a physical mixture of many different triglycerides.

Trypsin inhibitors: Proteins in soybeans believed to be responsible for growth inhibition when raw soybeans are fed to animals. See also "Bowman-Birk Inhibitor" and "Kunitz Trypsin Inhibitor."

U

Unsaponifiable matter: Ether soluble material extractable after complete reaction with strong alkali. *AAFCO, 2004*

Unsaturation: A term descriptive of the carbon-hydrogen makeup of a material such as fat or oil. The term refers specifically to a shortage of hydrogen atoms in the oils structure. The less hydrogen, the greater the degree of unsaturation and the greater the reactivity with oxygen. Unsaturation in a fat or oil means easier formation of peroxides, easier development of rancidity and greater tendency to polymerize. See also "Monounsaturated fatty acids;" "Polyunsaturated fatty acids;"

V

Vanaspati (vegetable ghee): A 100% vegetable fat blend of palm oil and palm stearin formulated to act as a butter fat replacement for cooking. It is more granular in texture than regular butter or margarine.

Vitamin E: A fat-soluble antioxidant vitamin composed of two groups of compounds called tocopherols and tocotrienols. Vitamin E prevents cell damage that may lead to cancer. By inhibiting the oxidation of LDL cholesterol, it may also reduce the risk of heart disease. Vitamin E is found in the oils of such seeds as soybean, palm and sunflower. See also "Tocopherols;" "Tocotrienols."

W

Wet-milled: Corn steeped in water with or without sulfur dioxide to soften the kernel in order to facilitate the separation of the various component parts. *AAFCO, 2004*

Wet milling: An industrial process in which corn is separated into starch (syrup, ethanol, corn starch), germ (oil), and fiber and gluten (animal feed) by soaking corn kernels in water (and often sulfur dioxide) before separating them into the components above by grinding and centrifuge. See also "Dry milling."

Whole grain: The intact, ground cracked or flaked caryopsis (grain), whose principal anatomical components--the starchy endosperm, germ and bran--are present in the same relative proportions as they exist in the intact caryopsis. *AACC*

Winterized oil: Oil which has been treated to partially remove the saturated glycerides which have relative high melting points and are soluble only to a limited extent in the unsaturated glycerides. The process consists of chilling the oil slowly and then maintaining it at 5°C (41°F) for a specified period of time and removing the crystallized glycerides from the liquid fraction of the oil by the use of filter presses. Soy oil does not require winterizing unless it has been partially hydrogenated to increase stability.

Y

Yield: The number of bushels (or pounds, tons, metric tons) harvested per acre.

Yuba (Japanese): Product made by simmering soy milk at a near boil until a film forms, then lifting the film free and drying it.

Z

Zein: A corn protein that is used to make a clear, edible film for food uses. Recent research indicates that zein may have uses in nanotechnology and in creating a non-sticky chewing gum base.

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