U.S. Soy: International Buyers' Guide

Preface

This Guide for International Buyers' of U.S. soybeans and soybean products is produced by the U.S. Soybean Export Council (USSEC), recognized in overseas markets as the American Soybean Association-International Marketing (ASA-IM). Headquartered in St. Louis, Missouri, USSEC is a non-profit, single commodity organization dedicated to developing markets for soybeans and soybean products around the world on behalf of U.S. soybean farmers and the U.S. soybean industry.

In the face of a dynamically changing global soybean industry, USSEC was founded in October 2005 to continue the American Soybean Association's long tradition of providing service and support to international markets. Continuing to work as ASA-IM in overseas markets, representatives work in more than 80 countries based out of nine offices located strategically around the world. ASA-IM offices are located in China, Europe, India, Mexico, Japan, South Korea, Singapore, Taiwan and Turkey.

ASA-IM maintains a close working relationship with soybean processors, refiners, exporters, importers, feed millers, animal producers, feed and food manufacturers, livestock, aquaculture and poultry trade groups, the scientific and research community, and government agencies both domestically and internationally. Their highly trained technical staff and consultants offer personalized information, education, and assistance to buyers and end-users of soybeans and soybean products globally. They accomplish this through on-site farm consultations, provision of educational materials, one-on-one management consultations, and on-site technical seminars for managers, nutritionists, and technicians for feed mills and integrated animal agriculture producers.

Working through its international offices, ASA-IM's animal nutrition experts have performed countless feeding demonstrations in many locations, demonstrating the benefits of using low cost, high protein soybean meal as a feed ingredient for fish, poultry, swine, cattle and other animals. The result is that U.S. soybean meal is now used around the world.

The global demand for soy protein for human consumption has been increasing since the U.S. Food and Drug Administration allowed the labeling of foods containing soy protein as being heart-healthy in 1997. This market growth is attributed not only to the proven and publicized health benefits and nutritional value of soy products but also to the functional properties and economic improvements brought about by inclusion of soy protein in staple foods. Soy-based industrial products, such as soy ink, plastics, textile fibers and biodiesel, also provide numerous environmental benefits.

The U.S. soybean farmer and the U.S. soybean industry are dedicated to providing the highest quality soybean and soybean products from production to the end-user. Overseas buyers look to the U.S. for their purchasing needs because of their confidence in the U.S. product and distribution system. The U.S. market for soybeans and soybean products is well established, with quality standards specified by government decree and industry-adopted trading rules. As a result of such an open and transparent system, the U.S. has the ability to provide a wide array of quality soybeans and soybean products specified by buyers with varied end-use requirements.

This guide will provide the buyer of U.S. soybeans and soybean products with the tools needed to reach an educated and knowledgeable conclusion when making their buying decisions. As further information is needed, please contact the USSEC world headquarters office or refer to the specific ASA-IM overseas office listed in the appendix.

U.S. Soybean Export Council
12125 Woodcrest Executive Drive, Suite 140
St. Louis, MO – USA 63141
314-985-0988 · 1-800-408-4993
E-mail: info@ussoyexports.org
Website: www.ussoyexports.org

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Chapter One: The Soybean, It's History, and It's Opportunities

Soybeans….The Miracle Crop

Soybeans are often called the "miracle crop." They are the world's foremost provider of vegetable protein and oil. The bushy, green soybean plant is a legume related to peas, groundnuts (peanuts) and alfalfa. Soybeans are included in the category of oilseed, which is a generic reference to crops with seeds that can produce edible and/or non-edible oil in economic quantities. The most versatile of the world's major crops, soybeans can be grown in a wider variety of soil and climatic conditions than any other major world crop. Consequently, soybeans are the most widely grown oilseed in the world. In the last 20 years, scientists have learned how to extract a much wider variety of byproducts from soybeans that are proving beneficial in animal feed, human food and industrial applications.

As early as 5,000 years ago, farmers in China grew soybeans. In 1804, a Yankee clipper ship from China brought soybeans to the U.S. And in 1829, U.S. farmers first grew soybeans. They raised a variety for soy sauce. During the Civil War, soldiers used soybeans as "coffee berries" to brew "coffee" when real coffee was scarce. In the late 1800s, significant numbers of farmers began to grow soybeans as forage for cattle.

In 1904, at the Tuskegee Institute in Tuskegee, Alabama, George Washington Carver began studying the soybean. His discoveries changed the way people thought about the soybean; no longer was it just a forage crop. Now its beans provided valuable protein and oil.

By 1929, U.S. soybean production had grown to 9 million bushels. That year, soybean pioneer William J. "Bill" Morse left on a two-year odyssey to China during which he gathered more than 10,000 soybean varieties for U.S. researchers to study. Some of these varieties laid the foundation for the rapid ascension of the U.S. as the world leader in soybean production.

Prior to World War II, the United States imported 40 percent of its edible fats and oil. At the start of the war, this oil supply was cut. Processors in the U.S. turned to soybean oil for their supply. By 1940, the U.S. soybean crop had grown to 78 million bushels harvested on 5 million acres.

In the early 1950s, soybean meal became available as a low-cost, high protein feed ingredient, triggering an explosion in U.S. livestock and poultry production. The U.S. soybean industry began to look at ways to expand export markets. In 1956, the American Soybean Association (ASA), in cooperation with the USDA-Foreign Agricultural Service, opened its first international office in Japan. Today, ASA-International Marketing promotes U.S. soybean and soy product exports in more than 80 countries.

In the past 30 years, the geography of U.S. soybean production and processing has changed. Production in the southern U.S. has declined due to a history of lower than average yields and competition from more profitable crops. This decline has been more than made up by expansion northward and westward, as new seed varieties requiring less growing time and tolerant of drier conditions were developed. Illinois and Iowa are the largest producing states. Northern states such as Minnesota, Nebraska, South Dakota and North Dakota, once considered too far north for soybean production, are now among the top 10 producing states.

Between 1976 and 2005, soybean plantings in the U.S. increased by 50 percent and national average soybean yields increased almost as much. Yield growth is attributed to improved seed varieties, new agronomic practices such as no-till farming and the impact of biotechnology-enhanced seeds that are tolerant of key herbicides.

The market for soybeans has gone global. Soybeans have long been used in food products in Japan. By the 1960s, a small but growing livestock industry in Japan began to use soybean meal as a protein and energy source. Rather than pay relatively higher ocean freight costs for the meal and soybean oil, a Japanese soy processing industry began to expand with imports of whole soybeans from the U.S.

Soybean use in Europe grew slowly in the 1960s and 1970s, but by the 1980s demand for soy meal and soy oil pushed growth in processing capacity. The largest concentration of capacity sprang up in the Rotterdam/Amsterdam/Ghent range that is the downstream terminus of Europe's inland waterway and river system. Products could move upstream by barge to feed manufacturers and edible oil users.

One characteristic of developing economies is that consumer demand for meat and poultry goes up as the population benefits from economic growth. So in the 1980s and 1990s, meat and poultry consumption in countries like China, South Korea, Mexico, Indonesia, Turkey and the Philippines climbed. And as local meat production struggled to keep up with the new consumers, demand for soybean products and capacity to produce them soared as well. Now, a thriving soybean processing industry has arisen throughout Asia and has spread to the Middle East, North Africa and throughout the Americas.

The use of soybean products for feed and food has continued to expand worldwide. China quadrupled its soybean processing capacity in just five years, beginning in 1998. Recent years have seen the increases in world soybean production and world soybean demand keep pace with one another.

Production and Processing Cycle of the Soybean

Production begins in the field with the soybean seed planted as early as April 15th or as late as July 15th. Planting dates vary depending on the latitude and geographic region. Classifications of soybean cultivars into maturity groups help U.S. farmers choose correct varieties for their regions. Farmers can potentially plant 6 to 10 different varieties of soybeans each growing season. Seeds develop in pods with each pod containing 1-5 seeds, but the most common varieties contain 2-3 seeds per pod.

Soybeans are considered mature when seed moisture reduces to less than 14% in the field. Harvesting date depends on the variety, growing regions, planting date, and local weather conditions. The most active harvest periods are during the months of October and November. In the United States, almost all soybeans are harvested by combines. The seeds are threshed out from pods into a hopper and moved into a transport truck. If moisture content is more than 14%, soybeans need to be dried. Once dried to the appropriate moisture content, seeds are transferred to storage facilities. Proper handling of the soybeans during harvest and storage is critical to protect the beans from damage.

Soybeans are stored at farms, elevators, and processing plants in various types of storage facilities before being channeled to the next destination. Local elevators will store and maintain dry conditions for the soybeans before selling and shipping to a soybean processor or export terminal. Farmers may also transport soybeans by truck to a regional transport facility such as a railroad or river terminal for shipment directly to a grain buying station, processing plant, or harbor facility for shipment overseas.

Once the soybeans are sold to local, national or international processors, they are crushed and refined into various products. The process of taking soybeans and turning them into their byproducts has changed over the years as technology has given processors more efficient methods of extraction. Oil and meal were originally extracted from soybeans by hydraulic crushing, a method that left from 4 to15 percent of the oil in the processed flakes. Today, nearly all U.S. and foreign processing plants use a solvent extraction method that leaves around 1 percent of the oil in the flakes.

The basic soybean processing plant has four primary structures: the elevator, preparation, extraction, and product load out. Some plants also have soybean oil refineries that further process the crude soybean oil into either industrial grade oil or edible oil products.

The elevator is where soybeans are unloaded from trucks, rail cars, and/or barges. They are stored until it is time for processing, and if necessary the soybeans can be dried further to reduce moisture content.

In the preparation phase, the soybeans are prepared for extraction by breaking them into small pieces, removing the hull (outer skin), heating, and rolling the bean into a thin flake.

In the extraction phase, the oil is separated or extracted from the flake by washing it with a hexane solvent. A distillation process removes the solvent and it is reclaimed for reuse. The resulting crude soybean oil can be processed by degumming, deodorizing and bleaching for edible use. The remaining material is referred to as defatted flakes.

The defatted soybean flakes that remain after the extraction of the oil and solvent is toasted and ground into soybean meal containing approximately 44% protein. Removal of the soybean's hull prior to processing produces approximately 48% protein soybean meal, and is referred to as dehulled soybean meal (DHSBM). The soybean hull, essentially the skin of the soybean, is used as ruminant feed with a high energy and residual protein level of approximately 14%. The defatted soybean flakes can also be further processed into soy protein concentrate and other enhanced-value soy products.

In the final phase, product load out, the finished soybean meal, soybean oil and soybean products are temporarily stored, weighed, and loaded into trucks or rail cars for shipment.

Soybean processing has developed into a complex, efficient industrial process that draws on the benefits of economies of scale. A small soybean processing plant will

process at least 1,000 tons of soybeans each day. Average plants process 2,000 tons or more and some of the newest facilities have capacity approaching 5,000 tons of soybeans per day.

Soybean processing plants do more than simply separate the oil from the meal. They also function as a grain elevator that can rapidly unload trucks and rail cars, as well as barges if a plant is located on the U.S. Inland Waterway System. A plant should have soybean storage capacity for at least one or two weeks' worth of its crushing capacity, and the space and equipment to prepare soybeans for processing. A soybean plant must also have the capability to store at least several days' worth of meal and oil production, as well as facilities to load out the products to whatever type of transport conveyance is required to move products to customers.

Soybean Products and Their Uses

The best-known and most widely used products from soybeans are soybean oil and soybean meal. Soybean oil is the most widely used edible oil in the world and soybean meal is the leading protein and energy source for animal feeds.

Soybean oil is used as cooking oil and as the base for shortening, margarine, salad dressings and mayonnaise. Lecithin extracted from soy oil during the refining process performs as an emulsifying agent and when further processed is an important ingredient in confections, baked foods, dairy products and instant foods. Lecithin is also used in animal feed, health and nutrition products, cosmetics and industrial coatings.

A rapidly growing market for soybean oil is found in the manufacture of a variety of pharmaceuticals, such as vitamin E and other anti-oxidants, as inexpensive aids to good health. Soybean oil is also used for industrial applications such as a basic carrier in inks, varnishes, and paints. Many soaps, lubricants and sealants contain soybean oil. Soybean oil shows great potential as an environmentally friendly substitute for petroleum-based diesel fuel, referred to as biodiesel. For more information about biodiesel, refer to the National Biodiesel Board website at: www.biodiesel.org.

Soybean meal is considered a premium product because of its high digestibility, high energy content and consistency. Over 80% of the soybean meal produced in the U.S. is dehulled. Properly processed dehulled soybean meal is an excellent source of protein and is used extensively in feed for swine, poultry, fish, beef and dairy cattle, and specialty animals including pet food. Such feeds must be formulated to fit exact nutritional requirements for each stage of the life cycle.

Soybean meal is also used as the basis for a variety of soy protein products including soy flour, soy concentrate, soy isolates, and textured soy protein. Soy protein not only provides nutritional value and health benefits, but also offers many functional properties including emulsification, gelation, forming, and water holding capacity.

Soy flour is made from roasted soybeans ground into a fine powder containing 50 percent protein by weight. Soy flour comes in three forms: natural or full fat, defatted, and lecithinated. Natural or full fat contains natural oils found in the soybean. Defatted has the oils removed during processing. Lecithinated has lecithin added. Soy flour is gluten-free, so yeast-raised breads made with soy flour are dense in tex-

ture. Soy grits are similar to soy flour except that the soybeans have been toasted and cracked into coarse pieces.

Soy protein concentrates are made by removing a portion of the carbohydrates from defatted and dehulled soy flakes. Concentrates are a highly digestible source of amino acids that retain most of the beans' dietary fiber. By definition, it must contain at least 65 percent protein.

Soy protein isolates are prepared through a process using water extraction and minimum heat on soy flakes. The end product is nearly carbohydrate and fat-free, with no characteristic "beany" flavor. Soy protein isolates prepared this way are 90 percent protein by dry-weight, possessing the greatest amount of protein of all soy products. They are a highly digestible source of amino acids and because of the bland taste can be added to foods without jeopardizing flavor characteristics. Isolated soy proteins are widely used as a nutritional, functional or economic alternative to traditional proteins.

Textured soy protein (TSP) usually refers to products made from textured soy flour and textured soy protein concentrates. It is used as a meat extender or analog and can be added to a meal to increase its protein content. TSP has a texture similar to ground beef or other meat products and must be rehydrated with boiling water before use.

Textured soy flour is made by running defatted soy flour through an extrusion cooker. This allows for many different forms and sizes. It contains 50 percent protein as well as the dietary fiber and soluble carbohydrates from the soybean. When hydrated, it has a chewy texture and is widely used as a meat extender. Textured soy flour is sold dried in granular and chunk form and is bland in flavor.

Textured soy protein concentrates are made by extrusion and are found in many different forms and sizes. Textured soy protein concentrates typically contain 70 percent protein as well as the dietary fiber from the soybean. When hydrated, they have a chewy texture and contribute to the texture of meat products.

Soybeans do not always have to be cracked and flaked to have useful value, nor are they used the same way in all countries. Consumers enjoy roasted and flavored whole soynuts, soy-based milk, yogurt, cheese, protein bars, and cereals. Whole soybeans are used for traditional foods like tofu, miso, natto, tempeh, and edamame.

To learn more about food products developed from soy, refer to the U.S. Soyfoods Guide, available on the Internet at: www.soyfoods.com or contact the Soyfoods Association of North America at 202-659-3520 or visit www.soyfoods.org. In addition, the Soyfoods Council, whose membership represents all facets of the food industry, can be reached at 515-727-0796 or visit www.thesoyfoodscouncil.org.

Advantages of U.S Soybeans

Soybeans first achieved true commercial importance after the oilseed arrived in the U.S. This was due to the combination of available land, modern farming practices, a growing affluent population, large livestock and poultry populations that provided

demand, absence of any other competing and widely grown oilseed, a modern transportation and handling infrastructure and abundant natural resources.

All of these advantages are still actively in place. The U.S. system of handling and transporting soybeans from the point of production to domestic or international markets is emulated by the grain-producing world. An efficient and model rail system, combined with an extensive barge infrastructure and the world's most extensive highway system provide buyers and consumers easy and economical access to U.S. soybeans and soybean products. Soybeans are harvested, stored, handled and transported quickly, safely, efficiently and at a fraction of the cost required in most other producing countries. Modern infrastructure, both on the farm and in processing plants, ensures U.S. soybeans and soybean products are stored at low moisture levels to limit mold attack, heat and insect damage.

The U.S. market for soybeans and soybean products is well established with quality standards specified by either government decree or industry adopted trading rules. These U.S. quality standards are applied with consistency by the U.S. Department of Agriculture, Federal Grain Inspection Service (FGIS) to assure buyers know they are getting the quality for which they both contracted and paid. These quality standards are explained in detail in Chapter 2.

Commercial feed customers and integrated operations appreciate having U.S. dehulled soybean meal in their feed. A consistently improved animal growth rate and feed conversion efficiency will enhance the animal producers' profitability. Reduced susceptibility to disease is another real benefit of U.S. dehulled soybean meal as the meal is made from clean, dry, mold and mycotoxin- free U.S. soybeans. The higher digestibility of nutrients in U.S. dehulled soybean meal when compared to competitive meals enhances the ability of the animal to fend off disease. U.S. dehulled meal is available in any season and can be shipped anywhere in the world.

As the leader of the global soybean industry, it is hardly surprising that most of the technical innovations and advances in soybean production, such as no-till planting and biotechnology, have been developed in the U.S. In the 1990s, privately funded U.S. research led to the discovery that biotechnology could alter characteristics of soybean seeds by gene manipulation. Late in the 1990s, this process produced commercially available seed for soybeans capable of tolerating the most widely used benign and effective herbicide used to control weeds. These biotechnology-derived soybeans quickly became popular with U.S. farmers. From 1996 to 2004, plantings of biotech herbicide-tolerant soybeans rose from zero to 86 percent. After strenuous testing and scientific analysis, the U.S. Food and Drug Administration in cooperation with USDA determined that currently used biotechnology-enhanced crops were perfectly safe and foods made from them were equally safe. This is explained in more detail in Chapter 6 of this Guide.

It is important to understand that seed companies in the U.S. are not free to develop and release any biotechnology-derived soybean seed they choose. The U.S. government strictly regulates all biotechnology-derived seeds. New varieties are released only if the developing companies can prove that the new variety poses no risk to human or animal health or to the environment.

U.S. soybean growers have long practiced the best and most effective crop management systems available to them. Biotechnology-enhanced, herbicide-resistant soybeans provide yet another tool in crop management systems. This technology not only provides improved production, but does so in a proven and sustainable way that helps U.S. growers enhance both the value of their farmland, and the environment in which they work and live.

To meet ongoing customers' demands, the U.S. soybean industry is focused on developing new varieties of soybeans for niche markets. An identity-preserved (IP) system has been developed to assure buyers that the specialty beans they order are distinguished from the commodity bean flow. U.S. soybean farmers and grain handlers have become highly skilled in the IP process. Preferred products are delivered within very tight tolerances, complete with sufficient documentation to trace it back to the producing farm and seed supplier. The IP system will be explained in more detail in Chapter 6 of this Guide.

This industry-wide drive for efficiency and improvement from the farm field to the dinner table is keeping U.S. soybeans and soy products in the forefront of the world market place. It also explains why soybean users around the world prefer to buy and use U.S. soybeans.

Chapter Two: Quality Standards for U.S. Soybeans and Soy Products

Dependable Quality

One of the reasons for the dominant position of the United States in the world soybean market is the dependability and efficiency of the domestic and export markets. This is due, in part, to the U.S. marketing system's clear quality standards, which are governed by both contract specifications and a government-regulated system of guidelines that control the export inspection, sampling, grading and weighing of grain and oilseeds. The Federal Grain Inspection Service (FGIS) oversee these standards and inspection procedures.

FGIS is a division of the U.S. Department of Agriculture's (USDA) Grain Inspection, Packers and Stockyards Administration (GIPSA). FGIS establishes the Official Standards for Grain, which are used each and every day by sellers and buyers to communicate the type and quality of grain bought and sold.

The principal functions of FGIS are:

- Establish and maintain official U.S. standards for grain and oilseeds.
- Inspect and weigh grain and oilseeds for export and domestic commerce.
- Establish standard testing methods and procedures and approve equipment used in such inspection and weighing.
- Create a national inspection and weighing system that applies grading and weighing procedures in a uniform, accurate and impartial manner.
- Monitor grain handling practices to prevent fraud, deception and intentional degradation of grain quality by illegal introduction of foreign material or other non-grain material.

Throughout its history, FGIS has performed these functions remarkably well, and it has earned a well-deserved worldwide reputation while doing so. The existence of the system of official U.S. grading standards and an independent, impartial agency to perform the inspection and weighing functions are a distinct advantage for U.S. soybeans over other origins.

Grading Standards for Soybeans

The U.S. Grain Standards Act requires specific standards to identify and measure the important physical characteristics and quality factors for most U.S. grains and oilseeds. The grades, classes and conditions reported on official certificates are determined according to the factors defined in these standards. A grade certificate for each lot or shipment is issued with other conditions, such as insect infestation and noxious odors, noted.

There are three classes of measurements in the U.S. system of grades: grade determining factors, non-grade standards, and informational criteria. Current grading standards list six grade-determining factors for yellow soybeans. These are test weight (bulk density), splits, total damaged soybeans, heat damaged, foreign material and soybeans of other colors. Moisture is a non-grade standard and is determined on each lot with the results appearing on all official inspection certificates. Oil and protein analysis is informational criteria and will be performed upon request.

Grade determining factors use maximum or minimum limits to assign a numerical grade to a sample. The specific grade standards for soybeans are contained in the following table:

Soybean Grade and Grade Requirements

Grading Factors	Grades U.S. Nos.			
	1	2	3	4
Minimum limits of				
Test weight lbs/bu	56.0	54.0	52.0	49.0
Damaged kernels:				
Heat (part of total)	0.2	0.5	1.0	3.0
Total	2.0	3.0	5.0	8.0
Foreign Material	1.0	2.0	3.0	5.0
Splits	10.0	20.0	30.0	40.0
Soybeans of other colors 1/	1.0	2.0	5.0	10.0
Maximum count limits of:				
Other materials				
Animal waste	9	9	9	9
Castor Beans	1	1	1	1
Crotalaria seeds	2	2	2	2
Glass	0	0	0	0
Stones 2/	3	3	3	3
Unknown foreign substance	3	3	3	3
Total 3/	10	10	10	10
U.S. Sample grade soybeans that: • Do not meet the requirements for U.S. Nos. 1, 2, 3, 4; or • Have a musty, sour, or commercially objectionable foreign odor (except garlic odor); or • Are heating or of distinctly low quality.				
1/ Disregard for Mixed soybeans. *2/ In addition to the maximum count limit, stones must exceed 0.1 percent of the sample weight.* *3/ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stone, and unknown foreign substances. The weight of stones not applicable for total other material.*				

One of the most significant factors in grade requirements is foreign material (FM). Foreign material is defined as all material that readily passes through an 8/64 inch (3.2 mm), round-hole, perforated sieve and any material other than soybeans remaining atop the sieve. The limitation in U.S. #2 soybeans is two percent. FM levels at the first point of sale in the U.S. are commonly one percent, however, each handling of the soybean lot can generate more FM because of breakage of the soybean seeds, especially when the moisture content is low. The presence of foreign material in soybeans adversely affect storability and drying/aeration efficiency, and, unless removed prior to processing, will affect the quality of both the oil and the protein meal.

A second significant factor in grade requirements is damaged kernels, specifically heat damage. Damaged kernels have an effect on oil quality such as higher acid values, higher peroxide values, higher non-hydratable phosphatides, off color and reduced shelf life. FGIS defines damaged kernels as soybeans and pieces of soybeans that are badly ground-damaged, badly weather-damaged, diseased, frost-damaged, germ-damaged, heat-damaged, insect-bored, mold-damaged, sprout-damaged, stinkbug-stung, or otherwise materially damaged. Stinkbug-stung kernels are considered damaged kernels at the rate of one-fourth of the actual percentage of the stung kernels.

Test weight is a measure of weight per unit volume and expressed in pounds per volume bushel. There is no correlation of test weight to quality factors such as protein and oil and is only useful for determining the relationship between weight and volume when calculating storage space or processing capacity.

Splits are broken soybeans, with one-quarter or more of the seed missing, generally half-pieces, but otherwise undamaged. A 10/64-inch by ¾-inch (4.0 mm by 19.0 mm) slotted screen is used to separate splits for grade determination. Splits can impact oil quality.

There are two classes of soybeans, yellow soybeans and mixed soybeans. Yellow soybeans have a yellow or green seed coat and are yellow in a cross section. They may not contain more than 10 percent of seeds of other colors. Mixed soybeans are any that do not meet the standard for yellow soybeans.

Moisture content is not part of the grade determining factors but is mandatory information in official inspections. Proper moisture specification and storage management are the keys to successful long-term storage of soybeans. Dependent on end use and ambient storage condition, there is a range of recommended moisture contents considered safe for storage. For direct food use, or for use as seed, moisture at or below 11% is recommended. For solvent extraction, 12.5-14% moisture is suggested if processed within a year. Average moisture beyond 13%, widely divergent moisture lots, or storage conditions that lead to moisture migration and accumulation can often result in serious quality deterioration in a relatively short time span. In most years, U.S. exports of soybeans contain moisture well below 13%.

Protein and oil content are not part of the U.S. Grades but is an important informational factor in quality standards. FGIS will perform an analysis of protein and oil upon request. This analysis is recommended as it provides significant information to determine value or end use preference. Results are reported to the nearest tenth percent on a standard 13% moisture basis or other moisture basis, if desired. The long-term average for soybeans produced in the U.S. is 35% protein and 19% oil on a 13% moisture basis. Soybean protein can be as low as 25% and as high as 50%, although a range of 30% to 40% is common in commodity-type soybeans. Oil content can range from 13% to 25%, with a commodity-range of 16% to 23%.

Grades and quality determination are conducted by FGIS personnel or by other independent inspectors and agencies specifically trained and authorized by FGIS. The inspections follow specified standard procedures. This process assures foreign and domestic buyers that the quality of the U.S. soybeans they receive is what they expected as determined by an independent inspection conducted by trained and unbiased inspectors.

Grade standards do not change by the season or the year or due to a quality problem that may be prevalent in a certain year. They can be and are changed when market practices or commercial realities clearly make the old standards out of date. U.S. government requirements call for a cautious and deliberate rule-making process that relies heavily on public comment and debate. Such changes are infrequent and usually more than a year is required to make changes to grade standards. This provides the interested public notice and time for input before any change in grading standards is officially made.

If an importer of U.S. soybeans believes there is a discrepancy between the grade determined at loading and the quality received at discharge, the importer can file a complaint with the agricultural counselor or attaché at the U.S. Embassy or with the Agricultural Trade Office if there is not an agricultural office at that Embassy. The Embassy forwards the complaint to FAS in Washington, D.C., who submits the complaint to FGIS. Since FGIS keeps file samples from every export shipment for 90 days, the chances are good that the points of the complaint can be compared with that sample. Sometimes, the receiver of the cargo draws a sample at discharge and submits it along with the complaint. If so, it is also examined by FGIS personnel. After collecting all available information, FGIS sends the information and its response back to the Embassy to be passed on to the complainant. FGIS is not empowered to change its original grade certificate, nor will it place itself between buyer and seller as an arbitrator.

Weighing and Inspection Procedures

FGIS is also responsible for the system of weighing grain and soybeans to determine and officially certify exactly the quantity that has been loaded and shipped. Official weighing under FGIS supervision is mandatory for all export shipments of soybeans and grains. Most weighing is done on an electronic weighing system that has been installed and operated under FGIS supervision. This equipment is checked and tested regularly. For export shipments, the complete weighing process is officially supervised from the start of loading until it is completed.

Official U.S. quality inspections are required on most grain and soybean shipments exported from the U.S. Official inspections of domestic shipments of grain and soybeans are not required unless requested by a party with contractual interest in the shipment. Usually, either the shipper or the receiver of domestic grain requests an official inspection to ensure contract terms are met unless both parties are part of the same organization.

If an importing country has phytosanitary regulations prohibiting the entry of certain pests, exporters must determine if that country requires certification that the commodity meets regulations. If so, the cargo is examined by the Animal and Plant Health Inspection Service (APHIS), who then issues the actual phytosanitary certificate stating that the cargo meets the regulations of the importing country. For additional information regarding phytosanitary importing regulations, contact APHIS at 301-734-8537.

The official grain inspection and weighing system serves producers, handlers, processors, exporters, importers and end-users of U.S. soybeans by providing consistent and professional inspection and weighing services. The system includes federal, state, and private agencies authorized by FGIS to provide these services to the domestic and export grain trade. For additional information about U.S. grading, sampling and inspection standards, contact:
USDA, Grain Inspection, Packers and Stockyards Administration
Federal Grain Inspection Service
Stop 3601, 1400 Independence Avenue
Washington, D.C. 20250-3601
Phone: 202-720-5091
Fax: 202-205-9237
Website: http://www.usda.gov/gipsa

Quality Determination for Soybean Meal and Oil

Soybean meal and soybean oil are considered processed products or by-products; therefore, governmental standards have not been established to describe those products. In U.S. domestic markets, the quality specifications and trading rules adopted by the National Oilseed Processors Association (NOPA) serve as "de facto" standards for soybean meal and soybean oil. NOPA is a private trade association consisting of nearly all U.S. oilseed processors. A complete copy of the NOPA trading rules is available at: http://www.nopa.org/.

NOPA stresses and makes clear that their specifications and trade rules are not an effort to enforce mandatory rules on contracting parties. Rather, they are only guidelines. Changes can and should be negotiated by contracting parties if desired, or they can be ignored altogether if buyer and seller agree.

Standards for soy protein products, including soy flour, soy concentrates and soy isolates, as well as further processed specialty soy protein products, do not have established quality standards. However, the processor or manufacturer will have product specifications available upon request for review prior to purchase. Certificates of Analysis (COA) should accompany each shipment of the product to verify the actual analysis results for the purchased product.

Soybean Meal

NOPA standards for soybean meal state that it shall be of fair merchantable quality, conforming to the following standard definitions and standard specifications of the association, as set forth in the NOPA trading rules.

Standard Definitions:
Soybean cake is the product after the extraction of part of the oil by pressure or solvents from soybeans. A name descriptive of the process of manufacture, such as expeller, hydraulic or solvent extracted shall be used in the brand name. It shall be designated and sold according to its protein content.

Soybean meal is ground soybean cake, ground soybean chips or ground soybean flakes. As with soybean cake, a name descriptive of the process of manufacture, such as expeller, hydraulic or solvent extracted shall be used in the brand name. It shall be designated and sold according to its protein content.

Soybean mill feed is the by-product resulting from the manufacture of soybean flour or grits and composed of soybean hulls and the offal from the tail of the mill. A typical analysis is 13 percent crude protein, 32 percent crude fiber and 13 percent moisture.

Soybean mill run is the product resulting from the manufacture of dehulled soybean meal and is composed of soybean hulls and such bean meats that adhere to the hull in normal milling operations. A typical analysis is 11 percent crude protein, 24 percent crude fiber and 13 percent moisture.

Soybean hulls is the product consisting primarily of the outer covering of the soybean. A typical analysis is 13 percent moisture and varying degrees of protein and fiber.

Solvent extracted soybean flakes is the product obtained after extracting part of the oil from soybeans by the use of hexane or homologous hydrocarbon solvents. It shall be designated and sold according to its protein content.

Standard Specifications:

Soybean Flakes and 44% Protein Soybean Meal are 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 as follows:

Protein	Minimum	44.0%
Fat	Minimum	0.5%
Fiber	Maximum	7.0%
Moisture	Maximum	12.0%

Soybean Flakes and High Protein or Solvent Extracted Soybean Meal are produced by cracking, heating, and flaking dehulled soybeans and reducing the oil content of the conditioned flakes 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 as follows:

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.)

Any of the above meal products may contain a non-nutritive, inert, nontoxic conditioning agent to reduce caking and improve flowability in an amount not to exceed that which is necessary to accomplish its intended effect and in no case to exceed 0.5 percent or 10 pounds per ton by weight of the total meal product. The name of the conditioning agent must be shown as an added ingredient.

Soybean Oil

Soybean oil like soybean meal is not covered by governmentally prescribed standards. There are a number of standard specifications for soybean oil that could be used in international trade. For the domestic market, NOPA has generated export trading rules for three types of soybean oil; i.e., crude degummed, once refined and fully refined. For crude degummed and once refined oils only NOPA trading rules are in common use in the U.S. For fully refined oils there are two other standard specifications issued by governmental agencies that do not carry the weight of an "official" U.S. standards and are not widely used in private trade. In practice, end users have their own specifications for fully refined oils and only use NOPA trade rules as the absolute minimum values on which to build their own more stringent requirements.

NOPA defines the standard of quality for soybean oil as a designated type of pure soybean oil of fair average quality based on the season's production, which must conform to standard specifications of the Association, must be made a part of NOPA

trading rules and are subject to modification from time to time as conditions may warrant and upon recommendation of the technical committee. Current NOPA trading rules are available at: http://www.nopa.org.

NOPA defines the types of crude soybean oil and says that edible crude soybean oil is any of the following designated types:

- Expeller pressed
- Expeller pressed degummed
- Hydraulic pressed
- Hydraulic pressed degummed
- Solvent extracted (state solvent used)
- Solvent extracted degummed (state solvent used)
- Mixtures of any of the above types. (In which case the seller should specify that the analysis be made corresponding to one of the specific types.) (State solvent used.)

The primary traded soybean oil in the U.S. is crude degummed soybean oil. It is defined as the product resulting from the removal of phosphatides from crude soybean oil and should contain no more than 0.02 percent of phosphorous determined by the American Oil Chemists Society (AOCS) Official method, Ca 12-55. Crude soybean oil is sold as a degummed oil because of the tendency of gums to settle out during transportation, which can cause numerous difficulties with emptying and cleaning the transportation equipment.

The grade and quality of crude soybean oil sold under this rule are to be any of the above designated types and conform to the following specifications:

- Not more than 0.5 percent moisture and volatile matter.
- A refined and bleached color not darker than 6.0 Red.
- A neutral oil loss not exceeding 7.5 percent.
- Not more than 1.5 percent unsaponifiable matter (exclusive of moisture and insoluble impurities).
- A flash point not lower than 250 degrees Fahrenheit.

For crude degummed soybean oil, the specific standards are:

Analytical Requirements	Maximum	Minimum	Method
Unsaponifiable Matter	1.5%		Ca 6a-40 (97)
Free Fatty Acids, as Oleic	0.75%		Ca 5a-40 (97)
Moisture and Volatile Matter and Insoluble Impurities	0.3%	M&V	Ca 2d-25(97) Ca 3a-46(97)
Flash Point		250 Degrees F	Cc 9c-95(97)
Phosphorous	0.02%		Ca 12-55(97)

The chemical analysis to determine quality includes the qualitative test for fish oil and marine animal oils as prescribed by the AOAC Method No. 28.121 and should be negative.

Only the following are allowable with discounts to apply as shown:

Free Fatty Acids

0.76-0.85%	0.2% of contract price
0.86-0.95%	0.4% of contract price
0.96-1.05%	0.6% of contract price
1.06-1.15%	0.8% of contract price
1.16-1.25%	1.2% of contract price

Phosphorous

Shipment up to 0.025 percent permitted with the following discounts for excess over 0.020 percent:

0.021%	0.2% of contract value
0.022%	0.4% of contract value
0.023%	0.6% of contract value
0.024%	0.8% of contract value
0.025%	1.2% of contract value

To be pure soybean oil, its physical requirements are that it be crude degummed soybean oil sold for export. It is to be produced from fair average quality crude soybean oil from which the major portion of the gums naturally present have been removed by hydration and mechanical or physical separation. It is to be in equal quality to soybean oil produced for domestic consumption. Crude degummed soybean oil not meeting the above specifications is rejectable and should be sold by sample only.

Once refined oil is not a commonly traded commodity since most buyers are interested in doing their own refining to finished product and will buy crude degummed or have no refining capacity and would buy fully refined (refined, bleached and deodorized, RBD). However, for those interested, refer to the NOPA trading rules.

In the definitions of grade and quality of export oils, all quality determinations shall be made from a composite sample of the shipment. NOPA regulates the determination of grade and quality by methods and sampling rules.

NOPA has also developed a standard for inspection, sampling and measuring procedures for bulk shipment and transfers of soybean oils. This standard may be incorporated in sales contracts.

It is very important that buyers and importers of U.S. soybeans and soybean products realize that any quality specification can be subject to modification through negotiations between buyer and seller and that any modification agreed to would replace any so-called “standard” specification as a term of the contract. Standards established by FGIS or NOPA regarding quality specifications, grades or terms are negotiable. Any change that is physically possible to achieve can be made part of any contract between a buyer and seller if both parties agree to the change and to whatever adjustment in the contract price and other contract terms that may be necessary to accommodate a change in quality specifications.

Impact of Quality and End Results

Quality vs. Price

The most important considerations in purchasing soybeans are all related to economics. When several sources of a raw material are available with different price and quality characteristics, a decision must be made to select the best value for the company. In the end, this will depend not only on the price and quality of the ingredients in question but also on the prices and nutritional levels of other ingredients and the demand for nutrients in each formula required.

In the processing of feed for use in aquaculture, poultry, swine, and cattle, the quality of soybean meal can have a profound effect on animal performance and profitability. Soybean meal must be toasted to denature certain proteins with antinutritional properties such as trypsin inhibitors. Too little toasting results in a meal with low digestibility. Too much toasting also results in a meal with low digestibility as amino acids can be denatured. Perfectly toasted meal is best for high animal performance and profit. The nutrients most sensitive to heat damage are the amino acids lysine and cystine. However, other amino acids and energy may also be affected by excess toasting.

The protein solubility test (KOH) and protein dispersibility index in water (PDI) have been found useful in estimating the degree of toasting and damage in soybean meal. Meals with a KOH between 73 and 88% are considered acceptable quality. However, the best meals within this KOH acceptable range can be determined using protein dispersibility index (in water) of PDI. Soybean meal tested to have PDI between 20% and 35% with urease levels between 0.3 delta pH units (but above 0.01) gives the best animal performance.

The energy content factor is often overlooked because it is expensive to test. Soybean meal supplies approximately 25% of the energy to animal feeds. Dehulled soybean meal, such as that produced in the U.S., not only has higher protein (48% vs 44%) but also higher energy content as compared to non-dehulled meal. Removal of indigestible hulls increases the level of all nutrients in the meal, not just protein. Hulls have relatively little protein, amino acid or energy content for poultry, swine or fish. Depending on the residual fiber content and other factors, dehulled soybean meal contains about 150 kcal/kg more energy than soybean meal with hulls.

Following is an economic case for purchasing dehulled soybean meal.

Table 1 defines the units of protein contained in several differing qualities of soybean meal. Meal A, purchased on a 44% "pro-fat" contract contains 40.5% protein; Meal B contains 44% protein; and Meal C is dehulled soybean meal containing 48% protein.

Amount of Protein Contained Per Ton in Soybean Meals of Varying Quality Specifications

Sample	*Type of Soybean Meal*	*Total Protein (kg/MT)*
Meal A	44% Profat (40.5% Protein)	405
Meal B	44% Protein	440
Meal C	Dehulled (48% Protein)	480

To determine the cost per unit of protein, the total price at the feed mill is divided by the amount of protein received. While the price per metric ton will vary at the F.O.B. port, the cost for ocean freight and local transportation will be the same. Import duty and other taxes are normally based upon landed tonnage or value. These duties may vary. Table 2 compares the three types of soybean meal based on cost per unit of protein delivered.

Table 2
Economic Comparison of Cost Per Unit of Protein
Of Three Types of Soybean Meal ($US)

Cost Factor	*40.5 % Protein*	*44% Protein*	*48% Protein*
Price $US/MT FOB	$228	$235	$245
Ocean Freight	40	40	40
Unloading, local freight	10	10	10
Cost at Feed Mill	278	285	295
Price ÷ Kg of Protein	$278/405 Kg	$285/440 Kg	$295/480 Kg
Price per Kg of Protein at Feed Mill	$0.686	$0.648	$0.615

Based on the comparative costs presented in Table 9 it is obvious that the logical choice should be dehulled (48% Protein) soybean meal. Although it costs $17/MT more than 44% profat and $10 more than 44% protein soybean meal, its price per unit of delivered protein is decidedly lower.

As demonstrated in Table 3, the variation in protein content between 40.5% and 44% protein soybean meal is not 3.5%. In fact, 44% protein is more than 6% higher than 40.5% (3.5 + 41.5). The far right column demonstrates the added value of purchasing 48% protein soybean meal versus 44% profat. That is, at the feed mill even after paying the higher price for 48% protein soybean meal the feed mill receives 8.25% more value by purchasing 48% meal.

Further advantages of dehulled soybean meal are not reflected in the above analysis. These factors include lower fiber, higher metabolizable energy, and lower coefficients of variability. This latter attribute enables the feed miller to make lower allowances for variations, translating into less over formulating and better utilization of the protein.

Table 3
Variation in Quantity and Value of Soybean Meals of Differing
Protein Contents to supply 10,000 MT of Protein

Type of Soybean Meal	*Variation in Protein (%)*	*MT Soybean Meal*	*Variation in Value (%)*
44 Profat (41.5)	0	24,096	0
44% Protein	6.02	22,727	3.31
Dehulled (48%)	14.77	20,833	8.25

Based on the foregoing quality considerations and economic analyses, it is recommended that the soybean meal buyer specify at a minimum soybean meal quality characteristics as shown in Table 4.

Table 4
Recommended Purchase Contract Specifications
For US Soybean Meal

Factor	*Specification*
Protein	Minimum 48%
Fat	Minimum 0.5%
Fiber	Maximum 3.3%
Moisture	Maximum 12%
Urease Activity	pH rise between 0.12 and 2.0 units

Buyers should specify quality no lower than that contained in NOPA domestic trading rules, and that a minimum specification for proper heat treatment also be incorporated into the contract. This presumes that the purchaser will buy dehulled soybean meal and that the meal will be fed to non-ruminants.

Chapter Three: Procuring U.S. Soybeans and Soy Products

One of the most important components of procuring soybeans is understanding the requirements of the end user and articulating that information to the seller. A buyer with a clear understanding of the end use requirements of the soy product will be able to more clearly express all the various quality and delivery characteristics required and determine the best financing options available. In return, the seller will take the request for bid seriously and provide proposals that fulfill the buyer's criteria.

Finding a Supplier

There are many sources a buyer can access to locate the names of potential soybean and soybean product suppliers. As explained in Chapter 1, the cycle of production starts with the soybean farmer but all purchases of soybeans and soybean products are negotiated through a soybean processor or export company, except in the case of Identity-Preserved soybeans that are grown for a specific buyer or end-use.

When contacting a potential supplier for a price quote, a buyer must be prepared to provide the following information:

- Contact Information (name/title/business/country/address/phone/fax/e-mail)
- Type of buyer (examples: merchandising company, broker, feed manufacturer, industrial further processor, government buying agency, etc.)
- Quantity (specific metric ton requirement)
- Quality and specifications desired (be specific)
- Shipment details (FOB, CIF, port of shipment/destination, etc.)
- Date bids due and delivery (shipment) period
- Financing/credit considerations (examples: user of U.S. government credit programs, private financing, specific financial needs)
- U.S. and international bank references

The following entities can assist buyers with contact information for soybean suppliers.

U.S. Soybean Export Council (USSEC)
A private, non-profit organization, the USSEC works to develop and expand markets for U.S. soybeans and soybean products worldwide. Based in St. Louis, the USSEC, recognized internationally as the American Soybean Association-International Marketing, works in more than 80 countries served by nine worldwide offices. A listing of suppliers is available on the USSEC website: http://www.ussoyexports.org.

National Oilseed Processors Association (NOPA)
NOPA represents thirteen regular member firms engaged in the actual processing of oilseeds, and twelve associate member firms that are consumers of vegetable oil or oilseed meal, including some refiners and mixed feed manufacturers. A listing of their members is available at: http://www.nopa.org.

North American Export Grain Association (NAEGA)
NAEGA is a trade association with members consisting of private and publicly owned companies and farmer-owned cooperatives that are involved in and provide services to the bulk grain and oilseed exporting industry. NAEGA members can be contacted by completing the Trade Lead Form available at: http://www.naega.org.

U.S. Agricultural Attaches and Commercial Officers
The U.S. Embassy or consular office in most countries contains an agricultural attaché or commercial officer who is the overseas representative of the Foreign Agricultural Service (FAS) of the U.S. Department of Agriculture (USDA). The agricultural attaché can offer the local buyer a broad range of information regarding U.S. government-assisted export programs as well as assistance in finding U.S. suppliers of soybeans and soybean products. Locations of the overseas posts are available on the USDA-FAS website: http://www.fas.usda.gov.

USDA-Foreign Agricultural Services (USDA-FAS)
The USDA-FAS is another good source of information for potential buyers of U.S. soybeans and soybean products. The USDA-FAS website, http://www.fas.usda.gov, provides both exporter and importer assistance, trade leads, information about export credit programs, data about the U.S. and world soybean market and much more.

Soya and Oilseed Bluebook
Another excellent source of information is the "Soya and Oilseed Bluebook," published by Soyatech, Inc. This annual directory contains names and contact information for more than 3,000 companies worldwide that provide products, services, equipment or technology for the soybean industry. More information on this resource can be found at http://www.soyatech.com/.

Negotiating a Purchase

After establishing contacts and assembling potential U.S. soybean product suppliers, the buyer will either seek offers through direct, private negotiations or through a more public and formal invitation for bids (IFB). Most exports of U.S. soybeans are arranged between private commercial entities, however the IFB is commonly used among soybean processing associations and government entities in some Asian countries. Entities using the IFB method of procurement almost always buy the least expensive offer from those presented with no negotiation. Direct negotiation allows the seller to suggest alternatives or options to the buyer that may significantly reduce the buyer's purchase price.

Regardless of the method of negotiation used in the procurement process, standard form contracts are a part of any U.S. export transaction. Potential buyers should become familiar with these contracts and understand them thoroughly before initiating any discussions with potential trading partners.

Following are important aspects of any transaction involving the export/import of U.S. soybeans on which the buyer and seller must agree and must therefore be included in the contract of purchase and sale:

- The legal identity and address of the buyer and seller.
- Identification of the commodity (e.g. U.S. soybeans) contracted for, including the minimum U.S. numerical grade and class.
- Any minimum or maximum quality specifications that deviate from or are not included in the U.S. standard for the numerical grade and class

- When, where and by whom is the quality to be determined. In most cases, it will be the official U.S. grade rendered by a licensed inspector at the time and place of loading.

- The quantity to be delivered, identifying any tolerance allowed and at whose option.

- Who determines what quantity has actually been loaded, as well as where and when that determination is to be made. The quantity is normally determined by using official U.S. weights determined by a licensed inspector at loading.

- The shipping period. This is the specific time frame in which the buyer can tender a vessel to load; alternatively, if the seller is providing ocean freight, during what period of time must loading of the freight take place. If it is to be the seller's freight, the minimum number of days of pre-advice of the vessel's impending arrival at the load port, often called "loading notice," required from the buyer.

- The method of delivery.
  - √ FAS (Free Alongside Ship...named port of shipment)--Under this term, the seller quotes a price for goods that includes charges for delivery of the goods alongside a vessel at the port. The seller handles the cost of unloading and wharfage; loading, ocean transportation, and insurance costs are left to the buyer.

  - √ FOB (Free on Board...named port of shipment)--Under this term, the seller quotes a price for goods that includes the cost of loading onto the transport vessel at the designated point. Ocean transportation and insurance are left to the buyer's account.

  - √ CFR or C&F (Cost and Freight...named port of destination)-- For shipments to designated overseas port of import, the seller quotes a price for the goods that includes the cost of transportation to the named point of debarkation. The buyer is responsible for the cost of insurance. The cost of unloading cargo at the port of destination is paid for by the seller, to the extent that they are included in the freight charges. If the charges are separate then they fall to the account of the buyer.

  - √ CIF (Cost, Insurance, Freight)--Under this term, for shipments to designated overseas port of import, the seller quotes a price for the goods, including insurance costs and all transportation and miscellaneous charges, to the point of debarkation from the vessel or aircraft. The seller pays for the cost of unloading cargo at the port of destination to the extent that they are included in the freight charges. If the charges are separate then they fall to the account of the buyer.

- Determine who is responsible for the cost of stowing and trimming the cargo onboard the vessel once the commodity leaves the loading spout.

- Determine the time when the soybeans or soy products pass from the seller to the buyer.

- Determine the price, including the currency of the payment. The price should be expressed in an exact amount per metric ton, per bushel, per

kilo or any other agreed measurement of the quantity. A price per metric ton is the most commonly used measurement. If by mutual agreement, the price is not fixed when the buy/sell agreement is reached, it must be clearly specified as to how and when the price is to be fixed.

- Payment terms, including:
  - √ When and how payment is to be made,
  - √ What documents are required of the seller (i.e. commercial invoice, grade certificate, weight certificate, phytosanitary certificate, bill of lading, certification of origin, etc.)?
  - √ Where and to whom the documents are to be presented.

  Payment terms can vary based on the seller's previous experience with the buyer, plus the buyer's financial standing and creditworthiness. For a buyer of good standing and worthy credit, payment is often made by wire or electronic transfer of funds directly from the buyer's bank to the seller's bank upon the seller's presentation of proper loading documents. This is the fastest method of payment.

  Payment is also made by an irrevocable letter of credit (L/C) in favor of the seller. The L/C is opened and confirmed, normally by a U.S. bank or another first class bank outside the U.S., at the instructions of the purchaser prior to loading the vessel. (When a bank opens this type of L/C, it cannot be canceled without seller's approval.) When the bank confirms the L/C, it fully assumes the obligation of paying the seller against presentation of the required documents. Thus, any risk of non-payment is shifted from the buyer to a bank that presumably is very capable of providing the necessary funds to the seller. This form of payment carries the least amount of risk for the seller. Buyers need be aware that sellers will estimate the length of time between loading and payment and will include interest on the cargo's value accordingly in the price they seek during negotiation.

- Development of a clause outlining how contractual disputes between the buyer and the seller is to be settled. Most frequently, this is by arbitration that is usually conducted under the rules and practices of a specified, independent third party experienced in conducting arbitrations over trade disputes. In rare cases, disputes are referred to courts in the form of a legal action taken by one party against the other. In such cases, the court of jurisdiction and the applicable laws or commercial codes should be named.

Standard Contract Forms

Standard contract forms have been developed that can ease the burden of creating a lengthy and complex contract for buying and selling commodities internationally. These forms define contract terms using standard language that is likely to be included in any contract.

The principal contract form used for bulk grains and oilseeds, including soybeans and soybean meal, sold FOB through North American ports was created by the North American Export Grain Association and is known worldwide as NAEGA II. Any purchase of U.S. soybeans and soybean products will most likely use this contract form and thus the terms it defines.

For a copy of the current NAEGA II contract and addendums, please contact:

NAEGA
1250 I St., N.W., Suite 1003
Washington, D.C. 20005-3922
USA
Tel: 202 682-4030
Fax: 202 682-4033
Email: info@naega.org
Website: http://www.naega.org/

If an importer purchases soybeans on a C and F or CIF basis delivered to its port of choice, the most commonly used contract form was developed by the Grain and Feed Trade Association (GAFTA), an association of importers and exporters and other related parties headquartered in London. The two commonly used forms for bulk grains, soybeans and soybean meal, bought and sold with ocean freight to be supplied by the seller are the GAFTA 27, which is the form used for full cargoes, and GAFTA 30, which is used for quantities that are less than full cargoes (usually called parcels).

For more information on these contracts, please contact:

GAFTA
GAFTA House, 6 Chapel Place
Rivington Street
London EC2A 3SH, England
Tel: +44 20 7814 9666
Fax: +44 20 7814 8383
Website: www.gafta.com

The Federation of Oils, Seeds, and Fats Associations (FOSFA), also located in London, is the creator of the most commonly used contract forms used for bulk edible oils such as soybean oil. FOSFA 53 covers FOB sales terms, while FOSFA 54 covers CIF or C and F sales. Many of the FOSFA terms are similar to those found in NAEGA 2 and the GAFTA contract forms, but there are a number of terms pertinent to bulk edible liquid transactions.

For more information, please contact:

FOSFA International
20 St. Dunstan's Hill
London EC3R 8HL, England
Tel: +44 (0)20 7283 5511
Fax: +44 (0)20 7623 1310
E-mail: contact@fosfa.com
Website: www.fosfa.com

Potential importers of U.S. soybeans or soybean products should obtain copies of these contract forms and become familiar with their terms, as they were developed using commercial experience and contain the customs of the trade.

Since these forms are rather lengthy, it is common practice for the buyer and the seller to create a short contract form containing the variable elements of their transaction and include the appropriate contract simply by reference. A phrase such as "all other terms and conditions of the contract in accordance with NAEGA II," thereby creating what is effectively a NAEGA II contract, but with much less paperwork.

It is important for buyers to recognize that any standard contract form can be changed if both the buyer and seller agree to do so, and a new contract can be made. The purpose of the forms is convenience and it is up to the buyer and seller whether to use them.

Financing a Purchase of U.S. Soybeans

Letter of Credit

The most commonly used method of payment for international grain transactions is the letter of credit, a method that comes with a range of options. The letter of credit, (L/C or LC) is a written commitment by a bank to make payment at sight of a defined amount of money to a beneficiary (exporter) according to the terms and conditions specified by the applicant. The letter of credit should set a time limit for completion and specify which documents are needed to confirm the transaction's fulfillment.

There are four parties formally involved in the collection of payment using an L/C:

Applicant — The applicant (buyer) applies to its bank for the issuance of an L/C. The applicant must have a credit relationship with the issuing bank or pay cash.

Applicant's bank — The applicant's bank, or issuing bank, issues the L/C. The applicant's bank verifies that all documents comply with the terms and conditions of the L/C, and pays the seller.

Beneficiary's bank — The beneficiary's bank can act as an advising bank and/or confirming bank. An advising bank is the beneficiary's bank in the U.S. It verifies that the L/C is authentic and notifies the beneficiary of its receipt. The advising bank also receives the documents from the beneficiary and forwards them on to the issuing bank. However, the advising bank has no liability for payment of the L/C.

At the beneficiary's request, an advising bank can add its confirmation to the L/C. This means that the confirming bank adds its promise to pay the beneficiary for documents presented in compliance with the terms and conditions of the L/C. The confirming bank charges a fee for this service, based on its perception of the credit risk of the issuing bank. The beneficiary would request this service if it feels that there is a risk of not receiving payment from the issuing bank, due to country or bank risk issues.

Beneficiary — The seller is called the beneficiary. The beneficiary is responsible for the collection, presentation, and accuracy of the documents required by the L/C.

A confirmed irrevocable L/C follows these steps:

1. After the terms of sale have been agreed upon, the buyer/applicant arranges for its bank to open an L/C.
2. The applicant's bank prepares an irrevocable L/C that includes shipping instructions.
3. The issuing bank sends the L/C to a U.S. bank, requesting confirmation.
4. The confirming bank in the U.S. prepares a letter of confirmation and delivers it to the beneficiary along with the irrevocable L/C.
5. The exporter/beneficiary, and the beneficiary's bank and freight forwarder, carefully review the L/C. The beneficiary verifies with its freight forwarder that the shipping dates can be met. If any of the terms or conditions in the L/C cannot be met, the beneficiary contacts the buyer/applicant immediately.
6. The exporter makes arrangements with the freight forwarder for the goods to be delivered to the port or airport.
7. Once the terms of the L/C have been met, the freight forwarder completes the documents required by the L/C.
8. The beneficiary or freight forwarder presents the required documents to the confirming bank.
9. The confirming bank reviews the documents. If the documents are in order and fully comply with the L/C, the confirming bank forwards them to the issuing bank for review and transmittal to the buyer/applicant.
10. The buyer/applicant, or its customs broker, receives from the issuing bank the documents necessary to claim title to the goods.
11. The confirming bank pays the beneficiary as specified in the L/C.

For more information on L/Cs, consult a qualified international banker.

U.S. Export Guarantee Programs

The U.S. Department of Agriculture (USDA) has programs that can be used to finance purchases of U.S. agricultural commodities. Generally, these programs are used when buyers deemed by USDA to be creditworthy are unable to access credit at competitive terms from other sources. Buyers wishing to utilize these programs should first check whether the program is operable in the importing country and the remaining dollar allocation available for soybean products. This information is available on the USDA-Foreign Agriculture Service, Export Credit Guarantee Programs website http://www.fas.usda.gov/excredits/.

The following gives a brief description of the programs for which there is current legislative authority:

GSM-102: Under this program, USDA supplies credit guarantees to U.S. exporters to promote exports of designated U.S. commodities to specified destinations. The credits are usually at interest rates that otherwise would not be available to importers in the specified country. GSM-102 provides for credit terms between six months and three years.

USDA negotiates with a foreign government the specific type and amount of credit facility involved, as well as the commodities it can cover, with limited dollar amounts for each commodity. Then the Commodity Credit Corporation (CCC), an operating arm of USDA, negotiates credit lines with specific

banks in the recipient country that it considers risk worthy or alternatively, the country's central bank (which is the government in most recipient countries) must provide a Credit Guarantee Assurance (CGA) that effectively guarantees payment to CCC.

When these arrangements are in place and credit guarantees are operable, the buyer and seller then make an agreement on the terms and conditions of a purchase. When this is completed, the exporter applies to CCC for a credit guarantee, usually for 98 percent of the sale value. When CCC issues a guarantee commitment to the exporter, it ill assign the guarantee to a U.S. commercial bank. This effectively makes the transaction risk free for the seller, who will receive payment under an L/C.

Meanwhile, the buyer opens an L/C through one of the approved local banks in favor of the seller and advised by the U.S. bank holding the assigned credit guarantee. The L/C usually provides that the buyer make periodic repayments of principal and interest in U.S. funds, usually every six months.

Supplier Credit Guarantee Program: This program involves direct credit supplied by the seller to the importer of U.S. soybeans for which the exporter receives a guarantee for 65 percent of the value from CCC and assumes 35 percent of the risk as well. The term is usually 180 days or less. The CCC can require the exporter to produce evidence that the importer is credit worthy and this may constrain some potential buyers.

In recent years, the use of CCC credit programs has declined, partially because they have not been necessary to export U.S. soybeans and products and partially because CCC's standards for creditworthiness have tightened. For the latest information on credit program details, refer to the USDA-Foreign Agricultural Service website, http://www.fas.usda.gov/excredits/.

Export/Import Bank

The Export-Import Bank of the United States (Ex-Im Bank) is the official export credit agency of the United States. Ex-Im Bank's mission is to assist in financing the export of U.S. goods and services to international markets. Ex-Im Bank does not compete with private sector lenders but provides export financing products that fill gaps in trade financing. They assume credit and country risks that the private sector is unable or unwilling to accept. Ex-Im also help to level the playing field for U.S. exporters by matching the financing that other governments provide to their exporters. For more information refer to their website: http://www.exim.gov/

Commercial Credit

Large U.S soybean buyers of good standing may be able to arrange private credit from their suppliers or their local banks ranging from outright loans, deferred payment invoices, discounted invoices and a variety of other mechanisms. However, these options are likely to have higher interest rates. In addition, commercial lenders are reluctant to extend credit for six to 12 months on imported U.S. soybeans that will be consumed in 90 days or less.

Chapter Four: Transporting U.S. Soybeans to Export Markets

The handling and transportation infrastructure is what connects U.S. soybean growers to the overseas customers for U.S. soybeans and soybean products. This connection is important for both growers and importers of U.S. soybeans because both profit from the efficiencies with which the infrastructure operates. Efficient rail systems, combined with an extensive barge infrastructure and an extensive highway system give the U.S. producer and world consumers easy access to U.S. soybeans and their products. As a result, the average cost of moving U.S. crops from farm to vessel is the lowest of any major grain and oilseed exporting country.

U.S. Infrastructure

Interior Transportation

Farmers usually have a choice of markets, and generally, they move their production to those markets by truck over excellent "farm to market" roads. Many farmers own trucks capable of carrying up to 30 metric tons for that purpose. Farmers may truck soybeans directly to a processor or an export facility if there is one nearby. The most common practice for a farmer is to truck soybeans to a grain elevator where the soybeans are unloaded, combined with soybeans from other farms, and transferred to another mode of transportation.

One of the other transportation modes for moving commodities is rail. The U.S. has an extensive nationwide rail system capable of moving grain and soybeans to destinations throughout the U.S. Most soybeans and grains are moved in upwards of 40,000 large hopper cars that carry 80 to 90 metric tons each. To achieve maximum efficiency many rail shipments, especially those to export points, are in trains of 100 to 120 cars carrying approximately 10,000 tons that are loaded, moved and unloaded together as a single unit, then returned as a single unit to be loaded again. Many of these hopper cars are leased by exporters and dedicated to their use. There is also a large fleet of tank cars that can carry liquid cargo including bulk soybean oil.

The other transportation method for moving commodities is by barges that move over inland waterways. The U.S. has an extensive system of waterways that stretch from the Upper Mississippi River and its tributaries in Minnesota all the way to the Gulf of Mexico. The Mississippi River Basin waterway system includes almost 10,000 kilometers of navigable water on the Mississippi River, Minnesota River, Missouri River, Illinois River, Ohio River, Arkansas River, Tennessee River, White River, Cumberland River and the Alabama River. Despite the widespread U.S. soybean production area, an estimated 70 percent of U.S soybean production has access to waterways, as does a majority of U.S. soybean processing facilities. The variable costs of fuel, power and labor plus fixed asset costs of moving bulk commodities by barge via the inland waterway system is less per ton mile than by rail. For this reason, barge movement is the choice for moving soybeans from origin to destination when both are reasonably accessible by water.

The U.S. barge fleet contains about 11,000 covered barges used to carry dry bulk commodities including grain, soybeans, coal, salt, chemicals, fertilizers and ores. There are nearly 2,000 tow boats of varying capacity used to move barges downstream and back upstream again. The most powerful of these vessels can push 40 to 50 barges depending on river conditions with each barge carrying about 1,500 tons of grain or soybeans. This means that a single "tow" can easily contain enough soybeans to load a 50,000 ton panamax bulk carrier.

Along the waterway there are hundreds of river terminal elevators that receive soybeans by truck or rail and transfer the soybeans to barges. Most of these river elevators are not used to store soybeans longer than it takes to bring in the next barges to be loaded; they generally have limited storage capacity and are used mainly as transfer operations from land conveyances to barges.

A unique feature of the U.S. grain and soybean transport system is that the costs for performing the transport function are not fixed. Instead, rail and barge freight rates fluctuate, sometimes rather widely, based on supply and demand. Demand for transportation is high during and just after harvest when large movements of grain and soybeans often occur. At such times demand for rail and barge freight may be high, in which case the market price for transportation is likely to be bid up to relatively high levels. Late in a crop year when movement of those commodities may slow, demand for freight diminishes accordingly as do prices for freight.

Coastal Ranges

The U.S. is unique in terms of soybean export capability in that it has four different coastal ranges. These are the Gulf of Mexico, the Atlantic Coast, the Great Lakes and the Pacific Northwest. Almost every year some soybeans are exported from all four coasts, although by far the greatest volume of soybean exports are made from ports on the Gulf of Mexico.

Total annual exports of all grains and oilseeds from U.S. export terminals seldom reach much above 60 percent of estimated total capacity. As a result, vessel congestion at U.S. export elevators is minimal. Ocean vessels loading soybeans at U.S. ports seldom have to wait more than a few days to move into berth. By contrast, at some other soybean exporting countries, soybean vessels are often forced to wait 20 to 30 days in line to load. With daily costs for vessels ranging from $10,000 to $20,000 per day, the time a vessel spends waiting in line for its turn to load can prove very expensive. The buyer pays most of this cost directly to the vessel if he is the charterer, or in the form of a higher price for the soybeans if his purchase is on an FOB basis.

The Gulf Coast

The Gulf of Mexico is divided into three areas that are generally referred to as the East Gulf, Center Gulf and the Texas or West Gulf. The East Gulf refers to the ports of Mobile, Alabama and Pascagoula, Mississippi. The Center Gulf refers to the Mississippi River in the general vicinity of New Orleans, Louisiana, while the West Gulf refers to ports in Texas. Of these areas, the most important by far is the Center Gulf, which is located at the downstream terminus of the Inland Waterway. Soybean export shipments from the East Gulf each year are usually limited to locally grown soybeans for which the East Gulf represents the most convenient market.

There are 12 export grain elevators located alongside the Mississippi River in the general area of New Orleans, all under private operation. They are spread from Myrtle Grove at Mile 61 (61 miles from the mouth of the river) to Baton Rouge at Mile 229. Normally, there is between 38 and 42 feet of fresh water draft at these berths, allowing 50,000 ton or larger vessels to load. A number of these facilities can load more than 50,000 metric tons each day, and some have two berths and can load two vessels at once while, at the same time, discharging barges.

Thanks to the ability to efficiently access supplies by both barge and rail, the Center Gulf is the most important loading area for U.S. grain and oilseed exports. Total annual volume of U.S. grain and oilseed exports are usually in the range of 115 million to 120 million metric tons. On average, 60 percent of those exports are shipped from the Center Gulf each year. In a normal year, soybeans account for 35 to 40 percent of the grain and oilseeds exported from the Center Gulf.

Besides grain elevators, the Center Gulf contains several terminals specifically for the purpose of handling, storing and transferring soybean oil to tanker vessels for export. On the river there are also several floating elevators used to transfer soybean meal directly from barges to ocean vessels.

The Pacific Northwest

The Pacific Northwest (PNW) Coast has long been an important loading point for wheat and barley for Asian destinations. In more recent years, soybeans and soybean products have begun to enter the PNW export mix. This is a result of soybean production in the U.S. steadily moving north and west into Nebraska, Minnesota, and North Dakota and South Dakota.

With that new availability and some reductions in rail costs from the new producing region, the cost of moving soybeans to the PNW has declined and a large volume is exported to Asian buyers every year. A voyage from the PNW to most Asian destinations takes 18 to 20 days less time than from the Gulf. When strong demand pushes ocean freight rates higher, the discount for PNW ocean freight to Asia compared with rates from the Gulf widens, and shipment from the PNW becomes more competitive.

There are five active grain elevators at the PNW located in the Tacoma-Portland-Seattle range. There is also a relatively new terminal facility devoted mainly to loading soybean meal at the Port of Grays Harbor, Washington. This deep-water port facility is a day closer to the markets of the Pacific Rim than any other West Coast port. As U.S. soybean production moved north and west, soybean processors followed, and this has allowed soybean meal to reach the PNW at a lower cost.

The U.S. Atlantic Coast

The U.S. Atlantic Coast was once quite important to U.S. soybean exports. But the role of the Atlantic diminished when rail freight rates were deregulated. Under deregulation, railroads serving the Gulf faced severe competition from barges and water movement, but railroads serving the U.S. East Coast had no competition. That has kept rail rates high going east, so that the geographic freight advantage of a shorter voyage to European destinations is generally eaten up by the higher internal transportation costs. Except for local soybean production, all supplies must be railed in from the central United States, and eastern processors usually absorb the local soybean production to supply the region‘s huge poultry industry with soy meal and the populous East Coast with soybean oil.

Like PNW ports, the Atlantic Coast export volume tends to grow when ocean freight rates are relatively high, and the freight advantage to Europe from the Atlantic compared to the Gulf grows large enough to compensate for the cost of railing in Midwestern soybeans.

The Great Lakes

The U.S. Great Lakes along with the Welland Canal that bypasses Niagara Falls and the St. Lawrence Seaway comprise a fourth Coast for U.S. soybean and grain exports. Soybeans and other grain can be loaded to laker vessels at interior ports such as Duluth/Superior on Lake Superior, Chicago on Lake Michigan and Toledo on Lake Erie and moved through the Seaway to large grain elevators located in the province of Quebec along the Lower St. Lawrence River in Canada. There the cargo is discharged into the elevator and reloaded to ocean vessels. Alternatively, small ocean vessels can transit the Seaway inbound and load grain or soybeans for direct shipment with Europe or the Middle East so long as they do not exceed the maximum allowable fresh water draft of 26 feet. Vessels that would exceed that draft limit fully loaded can load partially in the Lakes, then complete loading at a St. Lawrence port.

When a U.S. soybean export shipment occurs from the St. Lawrence, the grades taken when the soybeans loaded at interior U.S. Lakes ports are generally final as to quality rather than a U.S. inspection done at the final loading at a Canadian port. Buyers and importers are usually willing to accept this.

Methods of Shipment

When transporting U.S. agricultural products overseas, the shipper ideally looks for the fastest and most efficient mode(s) of transportation that will deliver the shipment in perfect condition at the lowest possible cost. The actual selection will be a compromise among these factors. The mode(s) of transportation may be specified by the buyer or selected by a systematic approach in which the buyer's requirements, import regulations of the destination country, terms of sale, speed of delivery requirements, and destination and available routes determine the mode.

Bulk Shipments

Bulk carriers haul full shiploads or full hulls of dry or liquid bulk cargoes such as grain, fertilizer, and vegetable oil. Self-trimming bulk carriers (STBC) are the most commonly chartered vessels in the U.S. grain trade business. They are specially suited for grain transport because their bulkheads slope at an approximate 45-degree angle to the horizontal, preventing empty spaces from developing in the wings of the hold.

The self-trimming bulk carrier is the most economical vessel to charter because the holds are easy to clean and loading does not require special trimming, which would make stevedoring more expensive. Some vessels are referred to as PANAMAX type, which simply means the vessels can transit the Panama Canal. The term is typically reserved for bulk carriers in the 50,000 – 70,000 metric ton dead weight tonnage (DWT) range.

Containerized Shipments

Typically, modern liner carriers operate containerships that are designed to transport cargo stowed in 20-, 40-, or 45-foot ocean-shipping containers. The use of containers reduces many risks associated with moving a product, such as adverse temperatures, handling damage, and theft. The most common container sizes are 20-foot

equivalent units (TEU) and 40-foot equivalent units (FEU). A 40-foot container capacity is approximately 27,400 kg.

Supplying soybeans and soybean products in containers provide opportunities for buying direct from the farmer or from smaller exporters. This option is used most commonly for high-value or specialty soybean products, but in certain situations can also be utilized efficiently for soybeans and soybean meal.

Shipping by container allows buyers to purchase from farmer-owned or organized shipping entities. Soybeans are generally higher in quality because they are handled less and as such the amount of split and broken beans and foreign material levels are lower. In addition, containerized shipments provide flexibility to order soybeans and soybean products on a "just-on-time" basis, as opposed to taking positions for large deliveries of bulk commodities from vessel deliveries. In the event there are logistical problems, the demurrage for containers is much lower than that of vessels, thereby minimizing the overall financial risk.

Combination Cargoes

One important advantage to many importers of U.S. soybeans is the ability to combine part-cargoes of soybeans with parcels of other grains to be loaded separately on the same vessel. Because the U.S. is a major exporter of wheat and the predominant exporter of corn and grain sorghum, it is often possible for soybean buyers to combine their shipment with one or more buyers of corn or wheat going to the same destination or perhaps another discharge point close by. In such cases it is possible for buyers to band together and charter a larger vessel that each individual buyer could use. The per-ton cost of a single larger vessel will be lower than for two or more smaller ones thus creating a freight savings for each buyer. Cost-cutting combinations of this order are quite possible from the U.S., but rarely occur elsewhere where the diversity of available grain is not as wide as is the case in the U.S. The difference in freight rates between a 25,000 metric ton soybean vessel and sharing a 50,000 metric ton vessel with someone wishing to ship 25,000 metric tons of corn can lead to a savings of $2 to $4 dollars per metric ton for each buyer.

For more information on possible cargo combinations, please contact:

U.S. Grains Council
1400 K Street NW, Suite 1200
Washington, DC 20005
Phone: (202) 789-0789; Fax: (202) 898-0522
Email: grains@grains.org
Website: http://www.grains.org

U.S. Wheat Associates
1620 I Street, NW, #801
Washington, D.C. 20006
Phone: (202) 463-0999; Fax: (202) 785-1052
Email: info@uswheat.org
Website: www.uswheat.org

Transport Documentation

The specific documents required for any given shipment depend on U.S. Government regulations, destination country's import regulations, importer's requirements, terms of sale, method of payment, and mode of transportation.

U.S. Export Requirements - The United States Government requires export documentation for a number of different reasons including national security, control of products in short supply, compiling export statistics, administration of export laws, protection of endangered species, and to protect U.S. export markets by ensuring product quality of specific exports. The main document required by the United States government is the Shippers Export Declaration (SED).

Importing Country Requirements - Each country has different requirements regarding the documentation that accompanies any given import shipment. Importing countries require these documents for the administration of their import laws, assessment of taxes, and protection from hazardous pests and diseases. Some of the more frequently required documents are: commercial invoice, bill of lading, phytosanitary certificate (for plants or plant products), veterinary health certificate (for animals or animal products), packing list, and certificate of origin. Other import regulations that may affect a shipment are packaging and labeling requirements, and recycling laws.

Importer's Requirements - The buyer/importer may require documents in addition to the documents required by their government. An importer may need a specific document in order to receive an import permit from the local government, or to obtain financing from a financial institution. Possible documents requested are: pro forma invoice, inspection certificate for grade and condition, or a statement of processing methodology (depending on the level of processing involved).

Additional Documents - Additional documents are required based on the terms of sale, method of payment, and transportation mode. These documents could include a letter of credit, shipper's letter of instruction, certificate of insurance, dock receipt, mates receipt, bill of lading, and air waybill.

An experienced freight forwarder can assist exporters in determining what documents are required and can complete much of the documentation on the shipper's behalf. Additional sources for determining documentation requirements for any given shipment are: importer, bank, destination country's consulate, and
USDA's Foreign Agricultural Service (http://www.fas.usda.gov/),
Animal and Plant Health Inspection Service (http://www.aphis.usda.gov/),
and Food Safety and Inspection Service (http://www.fsis.usda.gov/).

Slight discrepancies or omissions in documentation may prevent goods from being exported, may result in the shipper not getting paid, or may even result in seizure of the goods by U.S. or foreign customs agents. Completion of much of the documentation is routine for freight forwarders or customs brokers, but the exporter is ultimately responsible for accuracy of the documentation.

Chapter Five: Risk Management and Commodity Markets

All business firms face risk; agricultural businesses more than most. Temperature and precipitation are largely beyond anyone's control, yet these factors are key in determining the supply of vital commodities such as soybeans, corn, wheat, oats, and rice. Global grain and soybean supplies fluctuate continuously, and market demand for these commodities varies constantly. As a result of these many uncertainties, commodity prices can vary substantially from day to day. Specialized institutions have been created and business practices developed to deal with agribusiness risk.

There exist three interrelated, but separate, markets for soybeans, soybean meal and soybean oil. The three markets are: the cash market, the market for futures contracts, and the market for options contracts. This chapter will provide an overview of each market and its role in managing risk.

Cash (Spot) Market

The cash market is where soybeans and soy products change hands in cash transactions. The majority of domestic transactions in the soy complex and for other agricultural commodities occur in the cash market. Buyers and sellers come together in an organized market, privately face-to-face, by telephone or fax, or by e-mail and the Internet, to negotiate a price with immediate delivery or future delivery. A contract for immediate delivery of the commodity is referred to as a *spot contract*. If delivery is taken at a future date, the buyer and seller may choose to establish a *cash forward contract*. For example, a feed manufacturer knows a month in advance that his company will need 100 tons of soybean meal delivered to his feedmill on a certain day. He cannot buy the meal today because no storage is available, but he is concerned that the price will increase before he actually makes the purchase. He calls the soy processor and agrees to buy the 100 tons of meal to be delivered one month later at a price set today. A formal contract is signed between the two parties. If soymeal prices rise during the month, the feed manufacturer's purchase is protected. However, if meal prices drop during the month, he still has to pay the agreed upon price.

The advantages of cash forward contracts are: the transfer price is locked in; there is protection from an adverse price move; and both buyer and seller are assured of the transaction. The disadvantages are: inability to benefit from a favorable price move; difficulty in reversing the agreement; and the other party may not perform.

A variation on the cash forward contract is the *un-priced trade* where buyer and seller agree to transfer ownership of a specific quantity of a commodity or product sometime in the future but do not set the exact price. They do agree on a formula for establishing the price on the day of shipment. Usually the formula is based on a premium or discount to the cash price or the price of a certain futures contract. For example, the formula could price the purchase of soybean meal on the day of shipment at $5.00 over the Chicago Board of Trade soybean meal October futures contract.

Futures Contracts

The Chicago Board of Trade (CBOT), which has been in existence since 1848, helped formalize grain trading by developing standardized agreements called *futures contracts*. These legally binding agreements to buy or sell a commodity sometime in the future are standardized according to the quality, quantity, and delivery time

and delivery location for each commodity. The only variable is price, which is discovered on a futures exchange. All contracts are ultimately settled either through liquidation by offsetting purchases or sales, or by delivery of the actual physical commodity.

The main economic functions of a futures Exchange, such as the CBOT, are price risk management and price discovery. The Exchange accomplishes these functions by providing a facility and trading platforms that bring buyers and sellers together. The Exchange also establishes and enforces rules to ensure that trading takes place in an open and competitive environment. For this reason, all bids and offers must be made through the Exchange either in a designated trading pit by open auction or through the Exchange's electronic order-entry trading system. Futures trades are made through a clearing organization (clearing house), which acts as the buyer to all sellers and the seller to all buyers. Therefore, if a futures contract is purchased through the clearing organization and then subsequently sold through the same organization, the transaction is offset and the contract is extinguished.

Traders that buy and sell through the futures market are not required to put up the entire value of a contract. Rather, they are required to post a *margin* that is typically between 2 percent and 10 percent of the total value of the contract. Unlike stock margins, margins in the futures markets are not down payments, but are performance bonds that are designed to ensure that traders can meet their financial obligations. When a futures trader enters in a futures position, he or she is required to post *initial margin* of an amount specified by the exchange or clearing organization. If a change in the futures price results in a loss on an open futures position from one day to the next, funds will be withdrawn from the customer's margin account to cover the loss. If a customer must deposit additional money in the account to comply with the margin requirements, it is known as *receiving a margin call.* If a price change results in a gain on an open futures position, the amount of gain will be credited to the customer's margin account.

Here is a simplified example of margin. If a trader buys one soybean contract (5,000 bushels) at $6.50 per bushel ($32,500 per contract), the required margin might be approximately $1,400 (approximately 4 percent of the contract value), or about 28 cents per bushel. So for $1,400 the trader can purchase a contract that has a delivery value of $32,500.

Futures market participants fall into two general categories: hedgers and speculators. Futures markets exist primarily for *hedging*, which is defined as the management of price risks inherent in the ownership and transaction of commodities. The word "hedge" means protection. In the context of futures trading, a hedge is a counter-balancing investment involving a position in the futures market that is opposite one's position in the cash market. Since the cash market price and futures market price of a commodity tend to move up and down together, any loss or gain in the cash market will be roughly offset or counter-balanced in the futures market. Hedgers can include farmers, livestock producers, food processors, feed manufacturers, exporters, or importers, all of whom are seeking protection against price fluctuations in the market.

Other market participants are *speculators* and help facilitate hedging by providing liquidity, or the ability to enter and exit the market quickly, easily, and efficiently. Speculators can be a part of the general public or a member of the exchange operating

in one of the trading pits. They are attracted by the opportunity to realize a profit if they prove to be correct in anticipating the direction and timing of price changes. Because of this a seller can, at almost any time, find a buyer at or near the most recently quoted price. Similarly, buyers can find willing sellers without having to significantly bid up the price.

The cash price the supplier quotes for a given commodity usually differs from the price quoted in the futures market. This price difference is referred to as *basis* (local cash price – futures price = basis). Because basis reflects local market conditions, it is directly influenced by several factors including: transportation costs; local supply and demand conditions, such as grain quality, availability, need, and local weather; interest/storage costs; and handling costs and profit margins. Because of the affect basis can have on the final price for a given commodity in a local market, it is a common practice within the grain industry to track basis and use basis information in making marketing decisions. There are various methods to track basis but the content should include: date, cash market price, futures market price (specify contract month), basis and market factors for that date.

The two primary advantages of a soybean buyer to utilize the futures contracts are financial leverage and liquidity. Leverage provides the ability for the buyer to control large dollar amounts of a commodity with a comparatively small amount of capital. The second advantage, liquidity, is a characteristic of a market to absorb large transactions without a substantial change in the price. Liquid markets easily match a buyer with a seller, enabling traders to quickly transact their business at a fair price.

For more information about futures contracts and hedging strategies refer to the CBOT publication, "Agricultural Futures & Options: A Hedger's Self Study Guide" available on the CBOT website: www.cbot.com under the Education section.

Options Contracts

The *option contract* is another contract that can be used for price protection on the commodity market. By definition, a commodity option is the right, but not the obligation, to buy or sell commodities at a specific predetermined price at any time within a specified time period.

Options contracts are traded in much the same manner as their underlying futures contracts. All buying and selling occurs by competitive bids and offers made in the trading pit on the floor of the CBOT, through the exchange's electronic order-entry system, or through the CBOT's electronic trading platform.

Traders have many choices with options contracts and the reason for buying and selling them are as diversified as the marketplace itself. This Guide will only explain a few basic concepts.

There are two distinct types of options: call options and put options. *Call options* contain the right to buy the underlying futures contract and *put options* contain the right to sell the underlying futures contract. Call and put options are not the opposite of each other, nor are they offsetting positions.

Option buyers pay a price for the rights contained in the option. The option price is known as the *premium*. An option buyer has limited loss potential (premium paid) and unlimited gain potential. The premium is paid initially when the option is bought. Since the option buyer has rights, but not obligations, the option buyer does not have margin requirements. Option buyers can exercise their rights at any time prior to the option expiration.

Option sellers collect the premium for their obligations to fulfill the rights. An option seller has limited gain potential (premium received) and unlimited loss potential, due to the obligations of the position. Since the option seller has obligations to the marketplace, they have margin requirements to ensure contract performance.

In the case of purchasing options, hedgers typically buy them to achieve price protection. If a trader is concerned prices will rise before he or she has a chance to purchase the physical commodity, the trader would buy a call option. Call options allow the trader to establish a ceiling price for a commodity he or she is planning to purchase. On the other hand, if a trader is concerned prices will fall before he or she has a chance to sell the physical product or crop, the trader would buy a put option. Puts allow traders to establish a minimum (floor) selling price. In both cases, the trader is not locked in at the ceiling or floor price as with futures or forward contracting. If the market moves in a favorable direction after purchasing an option, the trader can abandon the option and take advantage of current prices. That is different than a futures hedge, which locks in a specific price.

Selling options is a little different. The reason people sell options can be stated in just a few words: to earn the option premium. This applies to both the writing of calls or of puts. Whether to write a call or a put depends largely on one's cash market position or price outlook.

Following is just one example of a choice for an option contract. Assume it is late spring and a farmer wants to protect against lower soybean prices at harvest in the fall. The November futures price is currently quoted at $6.75 per bushel. For a premium of 25 cents per bushel, the farmer may be able to purchase a put option that lets him lock in a harvest time selling price of $6.75 plus his local basis. Or, for a premium of 15 cents, he may be able to buy a put option that lets him lock in a harvest time selling price of $6.50 plus basis. If prices subsequently decline, the higher-priced option provides the farmer with up to 25 cents more protection; but, if prices rise, the savings on the cost of the lower-priced option will add another 10 cents (the difference in the premiums) to his net selling price. In effect, it is similar to deciding whether to buy an automobile insurance policy with a small deductible or a larger deductible.

Much more information about options contracts is available from the CBOT publication, "Agricultural Futures & Options: A Hedger's Self Study Guide" available on the CBOT website: www.cbot.com under the Education section. The CBOT website also has tutorials on commodity futures and options.

Explanation of Codes and Symbols

When listing futures contracts prices and options prices, quote vendors use ticker symbols, or shortened code representing the futures or options markets, along with the traded prices in code. Every commodity for which there is a futures market and

each month of the calendar year are designated by a universally accepted symbol that when combined are recognized and understood by market participants throughout the world. The following is a list of symbols for expiration months and a list of futures contract specifications for soybeans, soybean meal and soybean oil.

Current Year	Month	Next Year
F	January	A
G	February	B
H	March	C
J	April	D
K	May	E
M	June	I
N	July	L
Q	August	O
U	September	P
V	October	R
X	November	S
Z	December	T

Chicago Board of Trade Agricultural Futures

Contract/Symbol	Contract	Size	Months Traded
Soybeans = S	5,000	Bushels	F, H, K, N, Q, U, X
Soybean Oil = BO	60,000	Pounds	F, H, K, N, Q, U, V, Z
Soybean Meal = SM	100	Tons	F, H, K, N, Q, U, V, Z

For example, the soybean contract traded for November delivery at the CBOT is designated as SX (soybeans – November). September soybean oil is BOU, and March soybean meal is SMH.

The CBOT price board is coded as indicated in the following example.

Soybeans = cents per bushel	7340	The first three digits are cents per bushel Fourth digit is 1/8 cent per bushel Tick size is ¼ cent per bushel
For example	7350	= $7.35 per bushel
	7352	= $7.35 ¼ per bushel
	7354	= $7.35 ½ per bushel
	7356	= $7.35 ¾ per bushel
	7360	= $7.36 per bushel
Soybean Oil = cents per pound	2679	= $0.2679 per pound
Soybean Meal = dollars per ton	2266	= $226.60 per ton

Reading Commodity Futures Price Tables

Commodity prices are available from a variety of sources, including many daily newspapers and the CBOT website, www.cbot.com. The format and terminology may vary so this Guide will describe price-reporting in general terms using the following table as an example.

Price Unit: Cents and quarter-cents per bu, (5,000 bu.)

Expiration	Open	High	Low	Settle	Change
Sept (this year)	602'0	603'4	584'6	586'6	-13'0
Nov	613'0	615'0	596'4	598'6	-12'2
Jan (next year)	621'4	622'0	604'4	605'6	-12'6
March	628'0	629'0	612'4	614'4	-10'6
May	630'4	632'0	616'0	618'4	-9'4
July	634'0	635'4	619'0	622'6	-8'2

The heading above the table indicates that the prices shown in the table are in units of cents per bushel and the contract size is 5,000 bushels. Thus, 584'6 means $5.84 and ¾ of a cent per bushel.

The **Open** or opening price is the price or range of prices for the day's first trades, registered during the period designated as the opening of the market or the opening call. In the table shown, this year's September Soybeans on the CBOT opened at $6.02 per bushel. Many publications print only a single price for the market open or close regardless of whether there was a range with trades at several prices.

The word **High** refers to the highest price at which a commodity futures contract traded during the day. The high price for this year's September Soybeans was $6.03 and ½ cent per bushel. Low refers to the lowest price at which a commodity futures contract traded during the day. The low price for September Soybeans was $5.84 and ¾ cents per bushel.

Some publications show a close or closing price in their tables. The closing price is the price or range of prices at which the commodity futures contract traded during the brief period designated as the market close or on the closing call (i.e., last minute of the trading day). Because the last few minutes of trading are often the busiest part of the day, with many trades occurring simultaneously, the exchange computes a **settlement** price from the range of closing prices. The settlement price, which is abbreviated as **settle** in most pricing tables, is used by the clearing house to calculate the market value of outstanding positions held by its members. It is also frequently used synonymously with closing price, although they may, in fact, differ.

The **change** refers to the change in settlement prices from the previous day's close to the current day's close. The –13'0 change for September soybeans indicates that the previous day's settlement price must have been $5.99 and ¾ of a cent.

Some tables will indicate a **lifetime high** and **low**. This refers to the highest and lowest prices recorded for each contract maturity from the first day it traded to the present.

In addition to the Chicago Board of Trade, more information on commodity futures and trading is available from the U.S. Commodity Futures Trading Commission (CFTC), an independent agency within the U.S. government. The CFTC website www.cftc.gov lists telephone numbers and email addresses to direct inquiries.

Another resource for information on commodity futures is the National Futures Association (NFA). The NFA contact information is as follows:
Chicago Headquarters
200 W. Madison St., #1600
Chicago, IL 60606-3447
(312) 781-1300
(312) 781-1467 (fax)
Website: www.nfa.futures.org

An Explanation of the Soybean "Crush"

In the soybean industry, the term 'crush' represents both a physical process as well as a value calculation. The physical crush is the process of converting soybeans into soybean meal and soybean oil. The crush 'value' is a dollar amount determined by the price of soybeans relative to the combined price of soybean meal and soybean oil. This value is traded in the cash or futures market based on expectations of future price movement of soybeans versus the components.

When a bushel of soybeans weighing 60 pounds is crushed, the conventional result is 11 pounds of soybean oil, 44 pounds of 48% protein soybean meal, and 5 pounds of waste. If the hulls are retained, the result is 44% protein soybean meal. In October 1992, the CBOT switched the soybean meal futures contract specifications from 44% to 48% protein.

The Gross Processing Margin (GPM) is the relation between the cash market price of the soybean products (meal and oil) and the cash market price of soybeans. Since soybeans, soybean meal, and soybean oil are priced differently, conversion factors are needed to equate them when calculating the GPM.

The GPM (crush) is equal to the price of 48% protein soybean meal (dollars/ton) multiplied by .022 plus the price of soybean oil (cents/pound) multiplied by 11 minus the price of soybeans ($/bushel).

The same calculation used for the Gross Processing Margin is also used with futures contract prices from the Chicago Board of Trade and is referred as the 'Board Crush'.

For example, if August Soybean Meal, Soybean Oil and Soybean futures prices were at $297.20/ton, $.3340/pound and $9.565/bushel, respectively, the Board Crush would be calculated as (297.20 x .022) + (.3340 x 11) - 9.565 = $.6474/bushel.

Although the Board Crush can be traded in a 1:1:1 ratio (1 Soybean futures, 1 Soybean Meal futures, and 1 Soybean Oil futures), a more precise ratio is 10:11:9 (10 Soybean futures, 11 Soybean Meal futures, and 9 Soybean Oil futures).

For more information on soybean crush, refer to the Chicago Board of Trade website: www.cbot.com. The oil and meal yield from crushing soybeans is reported weekly by the USDA in their Soybean Crush Report.

Metric Conversion Guide

Soybeans
1 CBOT soybean futures contract = 5,000 bushels

Price per bushel x 36.7437 = Metric Ton Price
(For example: $7.00 per bushel = $257.21 per metric ton)

Metric ton price x .0272155 = Price per Bushel
(For example: $275.00 per metric ton = $7.484 per bushel)

1 Bushel equals 60 pounds

Soybean Oil
1 CBOT soybean oil futures contract = 60,000 pounds

Price per pound x 2204.622 = Metric Ton Price
(For example: $0.2500 per pound = $551.16 per metric ton)

Metric ton price x .0004536 = Price per Pound
(For example: $600.00 per metric ton = $0.272160 per pound)

1 Metric ton of soybean oil is equivalent to the oil in 206 bushels of soybeans

Soybean Meal
1 CBOT soybean meal futures contract = 100 short tons

Price per Short Ton x 1.102311 = Metric Ton Price
(For example: $200.00 per short ton = $220.46 per mt)

Metric ton price x .907185 = Price per Short Ton
(For example: $250.00 per mt = $226.80 per short ton)

1 Short ton = 2,000 pounds
1 Metric ton = 2,204.622 pounds

Chapter Six: Biotechnology, IP Soybeans, Soyfoods, and Industrial Uses

Agricultural Biotechnology

The adoption of biotech crops, particularly herbicide-tolerant soybeans and cotton, has been rapid since their commercial introduction in 1996. For example, herbicide tolerant soybeans accounted for 87 percent of U.S. soybean acreage in 2005, leaping from 7 percent in 1996. U.S. farmers have broadly adopted the use of herbicide-tolerant soybeans because of lowered productions costs and increased net yields due to reduced weed pressure and insect attack. USDA's National Agricultural Statistics Service (NASS) maintains statistics for all crops in the United States, including biotech crops. Statistics for biotech acreage planted for all crops in the U.S. can be found at http://www.usda.gov/nass/pubs/pubs.htm.

Today's biotechnology is an improved version of the same seed stock breeding process that has long been used to increase crop productivity, improve the food supply, and produce better, more nutritious foods. Researchers and scientists around the world have confirmed that there is no difference between health and environmental risks posed by plants that have been enhanced through modern biotechnology and those that were modified by conventional breeding techniques.

Biotech crops have enabled farmers to expand greatly their use of conservation tillage, which is better for insect and bird life, reduces soil erosion, and cuts the amount of CO2 farming releases into the atmosphere. Biotech crops also deliver benefits to consumers and society at large, through more affordable food, feed and fiber that require less pesticides and hence a more sustainable environment. Most of the world's leading scientific institutions have confirmed that food containing biotech crops are safe, if not safer, than conventional agricultural methods. For more information on biotech crops refer to the following publications and websites.

"Dispelling the Myths" by Kimball Nill, USSEC Technical Issues Director
Available on the USSEC website: www.ussoyexports.org

"Global Status of Commercialized Biotech/GM Crops" by the International Service for the Acquisition of Agri-Biotech Applications (ISAAA)
Available on the ISAAA website: www.isaaa.org

Council for Biotechnology Information: www.whybiotech.com
Biotechnology Industry Organization: www.bio.org
Agriculture and Biotechnology Strategies, Inc: www.agbios.com

Identity Preserved (IP) Soybeans

To meet customers' demand, the U.S. soybean industry is focused on developing production methods that assure buyers that the beans they order are the beans they receive. This system of preserving the quality and identity of soybeans from seed to harvest to delivery is referred to as "identity preserved." As demands for differing varieties of soybeans change, the U.S. identity-preserved system continues its decades-long reputation of being the world's best provider of IP soybeans – exceeding global demands.

Suppliers of IP soybeans typically contract for the production of seed-variety specific soybeans and work directly with seed suppliers, farmers, independent certification agencies, intermediate processors, and freight companies to deliver the pre-

ferred product within very tight tolerances, complete with sufficient documentation to trace it back to the producing farm and seed supplier.

IP soybeans are used primarily for human consumption in a variety of non-fermented food products including tofu (bean curd), yuba (soy protein extracts from soy milk), kinako (roasted soy powder), nimane (cooked beans), edamame (vegetable soybean), bean sprouts and soymilk. IP soybeans are also part of fermented food products including soy sauce, natto, miso, tempeh (Indonesia), thau-nao (Thailand), chongkuk-jang (Korea), dou-chi and doufuru (China), and kinema (Nepal, Bhutan, India).

Many superior IP soybeans have unique value-added quality traits such as high protein, low saturated fat, high digestible sugar, high isoflavone or improved texture and flavor. Breeders are working with food scientists on improving important nutraceutical characteristics and combining specific quality traits into specialty IP soybeans for functional soyfoods. In the future, new varieties with special nutritional attributes are expected to be released.

U.S. soybean farmers and grain handlers have become highly skilled in the IP process. This is clearly demonstrated by the consistent ability to deliver high-quality seed-variety specific soybeans concurrently with the rapid adoption of biotechnology. The U. S. food and agriculture system is the world's most experienced and motivated to supply future world IP markets.

Soyfoods

Soybeans contain all three of the macro-nutrients required for good nutrition: complete protein, carbohydrate and fat, as well as vitamins and minerals, including calcium, folic acid, and iron. Soybeans are the only vegetable that contains complete protein. Consumption of soy protein provides health benefits that may help prevent or treat certain chronic diseases. A great deal of research is being conducted to investigate possible health benefits of soy.

Whole soybeans can be cooked and used in sauces, stews, and soups. Whole soybeans can be roasted for snacks. Traditional soyfoods developed from whole soybeans include miso, natto, okara, soymilk, soynuts, soysauce, tempeh, tofu, yuba, and edamame.

Processed soybean protein products are divided into three categories based on protein content: soy flour, concentrates, and isolates. These three types of proteins are considered the starting materials for soy protein products. In some instances these materials may be processed further before they are incorporated into a food product.

Soy Flour

Soy flour is made from roasted soybeans ground into a fine powder and contains 50 percent protein. Soy flour comes in three forms: natural or full-fat, defatted, and lecithinated. Natural or full-fat contains natural oils found in the soybean. Defatted has the oils removed during processing. Lecithinated has lecithin added. Soy flour is gluten-free, so yeast-raised breads made with soy flour are dense in texture. Soy grits are similar to soy flour except that the soybeans have been toasted and cracked into coarse pieces.

Soy Protein Concentrate
Soy protein concentrate (SPC) is made wholly from defatted soy meal; soluble carbohydrates that are present in the meal, flour or TSP are removed by further processing. It is a flour-like product consisting of about 70% protein. Soy protein concentrate is used in a variety of meat systems, baked goods, and dairy applications. It is highly digestible and well suited for children, pregnant and lactating women, elderly, people who are ill, and situations where protein nutrition is of utmost importance. This product can also be fortified with various micronutrients and minerals.

Soy Protein Isolates
When protein is removed from defatted flakes the result is soy protein isolate (SPI), the most highly refined soy protein. Containing 90 percent protein, isolates possess the greatest amount of protein of all soy products. They are a highly digestible source of amino acids and because of the bland taste can be added to foods without jeopardizing flavor or characteristics. SPI can be used as an ingredient in high-protein foods including dairy foods, nutritional supplements, meat systems, infant formulas, nutritional beverages, cream soups, sauces, and snacks. It is also the source of protein in milk replacers. Due to its high protein content, soy protein isolate is highly suited for those people who have high protein needs due to, for example, growth (children), famine (acute needs), and chronic diseases (HIV/AIDS and tuberculosis). This product can also be fortified with various micronutrients and minerals.

Textured Soy Protein (TSP)
Textured soy protein (TSP) usually refers to products made from textured soy flour and textured soy protein concentrates. It is used as a meat extender or analog and can be added to a meal to increase its protein content. TSP has a texture similar to ground beef or other meat products and must be rehydrated with water before use.

Textured soy flour is made by running defatted soy flour through an extrusion cooker, which allows for many different forms and sizes. It contains 50 percent protein as well as the dietary fiber and soluble carbohydrates from the soybean. When hydrated, it has a chewy texture. It is widely used as a meat extender. Often referred to as textured soy protein, textured soy flour is sold dried in granular and chunk style and is bland in flavor.

Textured soy protein concentrates are made by extrusion and are found in many different forms and sizes. Textured soy protein concentrates contain 70 percent protein as well as the dietary fiber from the soybean. When hydrated, they have a chewy texture and contribute to the texture of meat products.

For more information on uses of soyfoods, distributors and manufacturers of soyfoods and general health-related information, refer to the following websites.

www.talksoy.com - Sponsored by the United Soybean Board
www.soyfoods.org - Soyfoods Association of North America
www.thesoyfoodscouncil.org - The Soyfoods Council

Industrial Uses of Soybeans

While most soybeans are further processed for feed or food uses, up to 15% of soybean oil is used for industrial purposes. Soybean oil can be used as emulsi-

fiers, lubricants, plasticizers, surfactants, plastics, solvents, and resins. Research and development approaches take advantage of the natural properties of soybean and other vegetable oils. These oils have superb environmental qualities, such as being inherently biodegradable, having low ecotoxicity and low toxicity towards humans, being derived from renewable resources, and contributing no volatile organic chemicals.

Biodiesel is a clean burning alternative fuel developed from soybean oil. The use of biodiesel reduces exhaust toxins by 90 percent and results in a substantial reduction of unburned hydrocarbons, carbon monoxide and particulate matter. Biodiesel is less toxic than petroleum diesel fuel and is readily biodegradable. But these environmental benefits do not negatively affect performance. Tests show that blending even a two percent blend of biodiesel into petroleum diesel can increase lubricity by more than 65 percent. For more information on soy-based biodiesel, refer to the National Biodiesel Board at www.biodiesel.org

Another example of products that enhance environmental and worker safety is soy-based engine oils. The oil is readily biodegradable, virtually nontoxic and exceeds the performance requirement of the International Organization for Standardization (ISO) global specification, the world's toughest standard for this type of lubricant. Soy-based engine oil emits fewer harmful emissions than petrochemical-based oil for increased worker safety.

Methyl soyate, the main ingredient in soy-based solvents, is another example of how biobased products enhance environmental and worker safety. Methyl soyate is low in volatile organic compounds (VOCs) and does not generate Hazardous Air Pollutants (HAPs). It can reduce hazardous waste generation and lower costs for disposal, insurance and regulatory reporting. Testing shows that soy-based solvents may improve flammability safety due to a very high flash point. They are readily biodegradable and lower in toxicity than most common solvents.

For more information on industrial uses of soybeans and soybean products and a listing of suppliers, refer to the Soy Products Guide available on the United Soybean Board website: www.unitedsoybean.org.

Appendix 1
U.S. Soy: International Buyers' Guide

Appendix 1

American Soybean Association-International Marketing Overseas Offices

Asia Subcontinent
New Delhi, India
Phone: 91-11-2465-1659
E-mail: asaasc@vsnl.net
Website: www.asaasc.com

China
Beijing
Phone: 86-10-6505 1830
E-mail: beisoya@asachina.org
Website : www.asachina.org.

Europe
Amsterdam, Netherlands
E-mail: info@ussoyexports.org
Website: www.asa-europe.org

Japan
Tokyo
Phone: 81-3-5563 1414
E-mail: asatokyo@gol.com
Website: www.asajapan.org

Korea
Seoul
Phone: 82-2-738 7056
E-mail: soyakor@kornet.net
Website: www.asa.or.kr

Latin America & Caribbean
Guadalajara, Mexico
Phone: 52-33-5000-0990
E-mail: asamex@soyamex.com.mx
Website: www.soyamex.com.mx.

Middle East, North Africa & Eurasia
Istanbul, Turkey
Tel: 90-212-258 2800
Email: asatr@superonline.com

Southeast Asia
Singapore
Phone: 65-6737 6233
E-mail: asaspore@pacific.net.sg
Website: www.asasea.com

Taiwan
Taipei
Phone: 886-2-2560 2927
E-mail: asatwn@ms75.hinet.net
Website: http://www.soybean.org.tw

Glossary
U.S. Soy: International Buyers' Guide

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 the food supply and eight are considered essential because the body cannot make them. Soybeans contain all eight of these amino acids.

Basis — The difference between the local cash price of a commodity and the price of a related futures contract, i.e., cash price – futures price = basis.

Bearish — A market view that anticipates lower prices.

Bill of lading — A document that establishes the terms of a contract between a shipper and a transportation company under which freight is to be moved between specified points for a specified charge. Usually prepared by the shipper on forms issued by the carrier, it serves as a document of title, a contract of carriage, and a receipt of goods.

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

Bullish — A market view that anticipates higher prices.

Call option – An option that gives the option buyer the right to purchase the underlying futures contract at the strike price on or before the expiration date.

Cash grain — The physical commodities, the definition encompasses all or any markets.

Cash market — A market in which buyers and sellers purchase/sell physical commodities. This can refer to a specific place, but it can also refer to the transactions themselves and need not be confined to any one place.

Cash position — A trading position in a physical commodity.

Cash price — The price of the physical commodity.

CFR (cost and freight) – A pricing term indicating that the cost of goods and freight charges are consolidated for shipment or unloaded for final delivery.

C & I (cost and insurance) – A pricing term indicating that the cost of the product and insurance is included in the quoted price. The buyer is responsible for freight to the named port of destination.

CIF (cost, insurance and freight) – A pricing term indicating that the cost of the goods, insurance, and freight is included in the quoted price.

Confirming bank — The financial institution that confirms payment against presentation of negotiated documents; preferably a first class U.S. bank.

Container — A uniform, sealed, reusable metal "box" (generally 40 feet in length, able to hold about 40,000 pounds) in which goods are shipped by vessel or rail. The use of containers (or containerization) in trade is generally thought to require less labor than more traditional shipment methods and reduce losses due to breakage, spoilage, and pilferage.

Container Ship — A ship specially constructed to handle containerized cargo.

Cooking Oil — A refined, bleached, and deodorized oil that has not been further processed to remove the higher melting point portions of the oil. Cooking oils tend to crystallize or set up semi-solid at temperatures much below about 70 degrees F. For this reason, heating coils should be installed in storage tanks for cooking oils in contrast to salad oils where no heating coils are usually necessary.

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

Crude soy oil — Sometimes referred to as crude raw soybean oil; the 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.

Dead weight — The vessel's total carrying capacity, i.e. cargo plus fuel and water and constant (crew, machinery, spare parts, etc). Dead weight cargo capacity is what remains after deducting fuel and water, etc. as above for total dead weight.

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

Degummed soy oil — Sometimes referred to as crude degummed soy oil; 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. It shall not contain more than 0.02% of phosphorus without a discount penalty.

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

Delivery period — The time period within which a buyer will provide a vessel to receive delivery on FOB contracts.

Demurrage – A surcharge assessed by steamship lines and railroads for storage at their port facility longer than the allotted "free time."

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.

Diglyceride — A chemical combination of fatty acids and glycerin in the proportion of two fatty acid units to one glycerin 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.

Edible crude soy oil — Soy oil which shall be of any of the following designated types produced from mature yellow soybeans: (1) expeller pressed, (2) expeller 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.

Edible refined soy oil — Crude or degummed soy oil which has been subjected to special refining processes to adapt it specifically for use in food products. In addition to treatment with alkali, bleaching, partial hydrogenation, the oils may be also winterized. These oils are further classified as salad oils, cooking oils, or shortening.

Expeller — Equipment for expressing oil from oil seeds, consisting of an augur moving through a slotted barrel through which oil can drain. Also called a continuous screw press.

Extruder — A jacketed augur used as an economical cooker and as a means of texturizing soy flours or concentrates. 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.

FAS (free alongside) – A pricing term indicating that the quoted price includes the cost of delivering the goods alongside a designated vessel.

FEU (40-foot-equivalent unit) – Commonly describes a 40-foot container.

FOB (free on board) – A pricing term indicating that the quoted price includes the cost of loading the goods into transport vessels at the specified place.

Fully refined soy oil — 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 final step of deodorizing.

Fumigation — Application of a pesticide or chemical to a cargo in order to rid the cargo of insects. The most common type of fumigant is phosphine gas, which is applied, in several different methods, to grain while in the elevator or vessel or

barge. A firm licensed by the government should handle fumigant, which can be toxic.

Futures contract – A contract traded on a futures exchange for the delivery of a specified commodity at a future time. The contract specifies the item to be delivered and the terms and conditions of delivery.

Futures price – The price of a futures contract determined by open competition between buyers and sellers on the trading floor of a commodity exchange or through the exchange's electronic trading platform.

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.

Hedging — Shifting the price risk to reduce or remove any unforeseen adverse price movements in the future. The risk is shifted to those who are willing to take on the risk in hopes of making a profit (speculators).

High-fat soy flour — Flour produced by adding back soy oil and/or lecithin to defatted soy flour to a specified level, usually in the range of 15%.

Hydrogenated soy oil — During the process of hydrogenation, the soy oil is exposed to hydrogen gas in the presence of heat and a catalyst (nickel, copper chromite) and the hydrogen combines with certain of the chemical components (unsaturated fatty acids) of the triglycerides with a resultant increase in the melting point of the oil; sometimes referred to as "hardening."

Hydrogenation — The process of chemically adding hydrogen in the presence of a catalyst to the unsaturated, "hydrogen short" portions of a natural fat. The addition of hydrogen reduces the reactivity of the fat toward oxygen and thus stabilizes and retards rancidity development in the fat. Hydrogenation usually raises the melting point of a fat or changes it from liquid oil to a solid fat.

Hydrolyzed soy protein — Made from soybean flours, concentrates or isolates, treated with an acid or a base or an enzyme and then dried.

Kibbled soybean meal — The product obtained by cooking ground solvent extracted soybean meal, under pressure and extruding from an expeller or other mechanical pressure device. It must be designated and sold according to its protein content and shall contain not more than 7% crude fiber.

Lecithin — The mixed phospholipids product obtained from soy oil by the degumming process, contains lecithin, cephalin and inositol phosphatides, together with glycerides of soy oil and 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 soy 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.

Loading charges — Costs incurred for the loading of cargo. The charges vary depending on the kind of vessel specified, the port visited, and the time spent at berth. The party responsible for the charges is determined as part of contract negotiation.

Long position — A position established by purchasing a futures contract or an options contract (either a call or a put).

Margin — Deposits posted by all futures buyers or sellers to the brokers handling their accounts, guaranteeing that the buyer/seller will meet his obligation.

Margin call – A requirement made by a brokerage firm to a market participant to deposit additional funds into one's margin account to bring it up to the required level.

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 melting point for typical nonhydrogentated soy oil is in the range of –10 to –16 degrees C. Hydrogenation decreases the degree of saturation, and therefore, raises the melting point of oil.

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

Premium – The price of a particular option contract determined by trading between buyers and sellers. The premium is the maximum amount of potential loss for an option buyer and the maximum amount of potential gain for an option seller.

Put option – An option that gives the option buyer the right to sell the underlying futures contract at the strike price on or before the expiration date.

Price discovery — The process by which a combination of the futures and cash markets allow both buyers and sellers to determine the approximate value of a commodity at a given moment.

Refining — Treatment of a natural or processed fat to remove impurities. Refining is accomplished by treatment of the fat with caustic soda, centrifuging, washing with water and centrifuging again. The separated refined fat or oil is dried by heating under vacuum.

Shipped weight — The weight of the grain that is shipped; determined by or under the supervision of FGIS or a state weighing agency. Shipped weight is almost always the weight that governs. The weight certificate is final. This is also frequently referred to as loaded weight.

Short position — The position created by the sale of a futures contract or option (either a call or put).

Speculator – A market participant who buys and sells futures and/or options in hopes of making a profit – adding liquidity to the market.

Soy flour and/or grits — The ground, screened, graded product obtained after extracting most of the oil from selected, sound, clean, dehulled soybeans. They are produced from grinding the defatted soy flakes. Grits are courser ground than soy flour. Protein range is 40% to 60%. It must contain not more than 4.0% crude fiber.

Soy protein concentrate — Prepared from high quality sound, clean, dehulled soybean seeds by removing most of the oil and water soluble non-protein constituents and must contain not less than 65% protein on a moisture-free basis.

Soy protein isolates — Soy protein that has been removed and greatly concentrated from the soybean by chemical or mechanical means. Isolates are 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%.

Soya — As with the term soybeans, soya describes a legume, the botanical name of which is Glycine max (L) Merrill. Also, soya can be used when describing the entire plant, crop or category of products derived from soybeans. Differentiated from the term soybeans, which can be used to describe the actual seed of soya. Internationally acceptable.

Soybeans — A legume, the botanical name of which is Glycine max (L) Merrill; a summer annual varying in height from less than a foot to more than six feet and in habit of growth from stiffly erect to prostate; the cultivated plant may reach a height of three feet or more. The seeds (soybeans) are borne in pods that grow in cluster of three to five with each pod usually containing two or three 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.) Soybeans were grown for centuries in the Orient and first introduced to the United States early in the 19th century. Soybeans grow best in areas having hot, damp summer weather but they can be grown under a great variety of climatic conditions.

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 extraction/processing — The procedures involved in the separation of the oil and the protein meal; also called "crushers" or oil mill operations. There are two types of processes presently used in the United States for this purpose: (1) Solvent extraction: the process whereby the oil is leached or washed (extracted) from flaked soybeans by the use of commercial hexane as the solvent. The level of oil in the extracted flakes can be reduced to 1% or less by this processing method. The products resulting from the use of this process are designated in the trade as "solvent extracted," e.g. "Solvent extracted soybean meal," "dehulled solvent extracted soybean meal," "solvent extracted soy grits," "solvent extracted soy flour." Practically all soybeans processed in the United States are processed by the solvent extraction system. (2) Continuous pressing: a continuous pressing process, at elevated temperatures, using expellers or screw presses which utilize a worm shaft continuously rotating within a pressing cylinder or cage to express the oil from soybeans after they have been ground and properly conditioned. The oil content of

the resulting press cake is reduced to from 4% to 6% by this processing method. Although technically incorrect, the products resulting from this type of processing are often referred to as "expeller," e.g. "expeller soybean meal."

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% minimum, and moisture 12.0% maximum.

Soybean meal, dehulled, solvent extracted — 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.

Soybean meal, mechanical 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.

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 7.0% crude fiber.

Soybean mill 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 35% crude fiber.

Soybean mill run — 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.

Soybean processor — A company or firm 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 with soybean meal or soybean protein.

Soybean hulls — The outer covering of the soybean. Hulls typically contain 13% moisture.

Soyfoods — Term for edible (primarily for human consumption) soy-based products. These include traditional soyfoods such as tofu, soymilk, tempeh, soy sauce etc: soy protein products produced after processing 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.

Soymilk — A protein-rich, milk-like liquid typically obtained from the soaking and grinding of whole soybeans with water; or, 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.

TEU (20-foot-equivalent unit) – Commonly describes a 20-foot container.

Trimmed cargo — Cargo is manually or mechanically moved to the edges of the holds for safe stowage to reduce any risk of shifting during the voyage. Ordinary vessels require cargo to be trimmed.

Unsaturation — a term descriptive of the carbon-hydrogen make-up 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 more tendencies to polymerize. Highly unsaturated fats are usually oils, and solid fats have lower unsaturation.