Cottonseed

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Introduction

Cotton has the dual role of both clothing and feeding mankind. Its history is closely wound with the human journey, having been domesticated in both the Old and New Worlds and being key to the Industrial Revolution. Of course the fibre aspect of cotton is the most prominent and is the reason cotton is grown. However, the seed has always been a critical part of cotton production and technology now makes the most of the seed. Cotton is grown around the world primarily in tropical and subtropical latitudes and as far north as 45N latitude in the People's Republic of China (PRC).

Cottonseed was the second most commonly produced oilseed in the world in the 1993/94 to 1997/98 period, averaging one-fourth that of soybeans in the same period, just slightly ahead of rape/Canola. World cottonseed production has averaged about 33 million metric tons annually in this decade. Cottonseed oil falls to about fifth or sixth in world production of oils, however, due to the relatively low amount of oil in the seed (about 18%) and to the great amount of cottonseed which is fed unprocessed to cattle, especially dairy cattle. World production of cottonseed oil was about 4 million metric tons in both 1997 and 1998.
The relationship between fibre production and the fortunes of cottonseed are unique in the oilseed world. In the United States, which is the world's second largest cotton producer behind the PRC and just ahead of India, about 15% of the producer's income is from the seed portion of the crop. World cotton fibre stocks are currently high, putting downward pressure on prices and the outlook for acreage expansion.

About Cottonseed Oil

Cottonseed oil's history is closely related to the history of the modern vegetable oil refinery business. Cottonseed oil was the first vegetable oil used in the United States and its development followed by several decades the 1793 invention of the cotton gin. David Wesson and other edible oil refining pioneers developed and employed their machinery first on cottonseed oil.

Cottonseed oil is a versatile oil prized by chefs for its unique ability to allow the flavour of foods to come through. Whether making salad dressing or deep-frying, cottonseed oil has many applications, such as snack foods, mayonnaise, pastries, baked goods, margarine, shortening and oil blends. Noted as a slightly nutty or buttery flavoured oil, cottonseed oil is well regarded for its ability to avoid overpowering the flavour of foods and its composition prevents an unpleasant greasiness on food.

Cottonseed oil's functional qualities in the kitchen make it a popular choice. It has a high smoke point of 428F (220C), which makes it a good choice for stir fry. When heated at deep-frying temperatures for a long time, it tends to give a more intense note of its original flavour, which is not objectionable. Also, cottonseed oil is considered a highly stable vegetable oil and has a good level of natural antioxidants, including Vitamin E. A saturated fat level of 27% contributes to this stability. The principal saturated fatty acid is palmitic at 24.4%, while the main monounsaturated fatty acid is oleic at 17.2%. The principal fatty acid is linoleic at 55%. The flavour of the oil does not deteriorate like other cooking oils, which allows for longer fry-life. When cooking with cottonseed oil, very few undesirable odours or off-flavours are produced due to its ability to carry the flavour of the food. These factors make it very popular with potato chip and fried snack makers, which is its major use in the United States. Indeed, they are the same characteristics that make it a popular oil for local falafal shops in Egypt. Falafal is deep fried to order in oil kept hot all day. Fine tempura restaurants in Japan also use cottonseed oil to ensure that the delicate food can be properly heated without the oil affecting the taste.

Cottonseed oil is a heart-healthy oil choice. The percentage of saturates is below that commonly found in the dietary fat consumed in the West. Cottonseed oil, like other oils of plant origin, is cholesterol free. Also, pure cottonseed oil with a trans fatty acid level below 0.4% is virtually trans free. It can be used in formulations to reduce trans fats and can act to lower total trans in cases where some hardening is needed because less hydrogenation is required, than many other vegetable oils with lower levels of saturated fats. Cottonseed oil has three times as many polyunsaturated fats as saturated fats. As

mentioned, linoleic, an essential fatty acid, is the major polyunsaturated fatty acid. Refined and deodorized vegetable oils, including cottonseed oil, are some of the purest food products available.
Since most cottonseed meal and seed used in the animal feed industry is, by and large, fed domestically in the countries of production, the prime cottonseed product of significance in international trade is cottonseed oil. The United States is the most significant cottonseed oil exporter in the world with an annual volume of about 100,000 metric tons. Argentina is second. Cottonseed oil largely follows the soy oil complex and responds similarly to international prices for vegetable oils. The oil maintains about a 10-15% premium over soybean oil. As it is not traded on any exchange, its ties to other, larger oil markets are important to international customers.

Other Products of Cottonseed

Along with oil, linters, hulls and meal are also produced in the processing of cottonseed. Intact cottonseed, as it comes from the cotton gin, has short linter fibres remaining on it. These are removed at the oil mill for their cellulose value. Products such as paper, diapers, mattress padding and even currency are manufactured from linters. Since cottonseed linter fibres are nearly 100% cellulose, they can also be used as a dietary fibre for baked goods, dressings, snacks and processed meats. Dissolved cellulose derived from cottonseed linter pulp is used for products such as plastics, rocket propellants, rayon, pharmaceutical emulsions, cosmetics and photography and x-ray film. While linter pulp is typically higher in price than competing products, it is used for superior quality and performance.

Cottonseed hulls are the tough outer covering of the cottonseed and, when removed, provide an excellent roughage for cattle, with a similar feeding value to that of good quality grass hay. Since cottonseed hulls mix well with other feed ingredients and require no grinding, they are typically used in ruminant rations. Also, cottonseed hulls can be pelleted to allow for better flowability, handling and lower transportation costs.

Cottonseed meal is produced principally by the extraction of oil by solvent methods, with very little still extracted by mechanical means. Solvent extraction of cottonseed can result in as little as 0.5% fat in meal, while mechanically extracted meal can leave 2% or more. Cottonseed meal is a high quality protein feed ingredient typically ranging from 36-44% crude protein. However, it is most commonly sold in the United States as 41% crude protein. Maximum fibre levels for 36, 41 and 43% protein meals are 17, 14 and 13% respectively. The meal offers good palatability for a variety of species. After soybean meal, cottonseed meal is the second most abundant plant protein produced. From cattle to catfish, the meal is used as a protein concentrate that can have economical advantages over other plant protein sources. Cottonseed meal is purchased by ranchers and feedlots for beef rations, by dairymen for milk cattle and by other producers for catfish, as well as for some poultry and swine.

Whole cottonseed is a compact energy source that contains protein, fat and fibre. In the past two decades, it has become a key feed ingredient for North American milking cows. Whole seed has approximately 18% fat and 20% protein. It is commonly used by dairies at a typical feeding rate of 1.8 to 3.2 kg per dairy cow each day. Gossypol, a natural pigment in the cotton plant and seed, can reduce animal performance if ingested at excessive levels. Gossypol typically binds with lysine or other compounds when seed are extracted due to the heat and pressure involved. With normal feeding practices of cottonseed meal, gossypol is typically not considered the most limiting agent, but it must be managed properly to avoid any concern. Feeding practices with whole seed need to be managed more carefully.