



The Weston A. Price Foundation



## The Ploy of Soy

**Commercial milk products** have been linked to a number of disease conditions including allergies, asthma, arthritis, diabetes, auto immune diseases, childhood anemia, heart disease and cancer. Many have turned to soy products as substitutes for dairy products. A popular booklet describes soy foods as ". . . uniformly high in protein but low in calories, carbohydrates and fats, entirely devoid of cholesterol, high in vitamins, easy to digest, tasty and wonderfully versatile in the kitchen, [which] positions them as irresistible new food staples for the evolving American diet. <sup>1</sup>. . . with each mouth watering soy food dish," says the author, "comes a balanced, adequate and sustainable nutritional package." <sup>2</sup>

Leaving aside the question of whether products like tofu and soy milk are really "mouthwatering" and "irresistible," those charged with providing nutritious meals for their families should carefully examine claims that newly introduced soybean products provide an easily digested and complete nutritional package, one that adequately replaces dairy products like milk, butter and cheese, which have, after all, provided nourishment for generations of Americans.

### History of the Bean

Soybeans come to us from the Orient. During the Chou Dynasty (1134 - 246 BC) the soybean was designated one of the five sacred grains, along with barley, wheat, millet and rice. However, the pictograph for the soybean, which dates from earlier times, indicates that it was not first used as a food; for whereas the pictographs for the other four grains show the seed and stem structure of the plant, the pictograph for the soybean emphasizes the root structure. Agricultural literature of the period speaks frequently of the soybean and its use in crop rotation. Apparently the soy plant was initially used as a method of fixing nitrogen. <sup>3</sup> soybean did not serve as a food until the discovery of fermentation techniques, sometime during the Chou Dynasty. Thus the first soy foods were fermented products like tempeh, natto, miso and shoyu (soy or tamari sauce). At a later date, possibly in the 2nd century B.C., Chinese scientists discovered that a puree of cooked soybeans could be precipitated with calcium sulfate or magnesium sulfate (plaster of Paris or Epsom salts) to make a smooth pale curd - tofu or bean curd. The use of fermented and precipitated soy products soon spread to other parts of the Orient, notably Japan and Indonesia. Although the highly flavored fermented products have elicited greater interest among scientists and epicures, it is the bland precipitated products that are most frequently used, accounting for approximately 90% of the processed soybeans consumed in Asia today. <sup>4</sup> The increased reliance on bean curd as a source of protein, which occurred between 700 A.D. and the present time, has not necessarily been a beneficial change for the populations of the Orient and Southeast Asia.

### Fit for Human Consumption?

The Chinese did not eat the soybean as they did other pulses (legumes) such as the lentil because the soybean contains large quantities of a number of harmful substances. First among them are potent enzyme

inhibitors which block the action of trypsin and other enzymes needed for protein digestion. These "antinutrients" are not completely deactivated during ordinary cooking and can produce serious gastric distress, reduced protein digestion and chronic deficiencies in amino acid uptake. In test animals, diets high in trypsin inhibitors cause enlargement and pathological conditions of the pancreas, including cancer. The soybean also contains hemagglutinin, a clot promoting substance that causes red blood cells to clump together. Trypsin inhibitors and hemagglutinin have been rightly labeled "growth depressant substances." They are deactivated during the process of fermentation. In precipitated products, enzyme inhibitors concentrate in the soaking liquid rather than in the curd. Thus in tofu and bean curd, these enzyme inhibitors are reduced in quantity, but not completely eliminated.

Soybeans are also high in phytic acid or phytates. This is an organic acid, present in the bran or hulls of all seeds, which blocks the uptake of essential minerals—calcium, magnesium, iron and especially zinc—in the intestinal tract. Although not a household word, phytates have been extensively studied. Scientists are in general agreement that grain and legume based diets high in phytates contribute to widespread mineral deficiencies in third world countries.<sup>5</sup> Analysis shows that calcium, magnesium, iron and zinc are present in the plant foods eaten in these areas, but the high phytate content of soy and rice based diets prevents their absorption. The soybean has a higher phytate content than any other grain or legume that has been studied.<sup>6</sup> Furthermore, it seems to be highly resistant to many phytate reducing techniques such as long, slow cooking.<sup>7</sup> Only a long period of fermentation will significantly reduce the phytate content of soybeans. Thus fermented products such as tempeh and miso provide nourishment that is easily assimilated, but the nutritional value of tofu and bean curd, both high in phytates, is questionable.

When precipitated soy products are consumed with meat, the mineral blocking effects of the phytates are reduced.<sup>8</sup> The Japanese traditionally eat tofu as part of a mineral-rich fish broth. Vegetarians who consume tofu and bean curd as a substitute for meat and dairy products risk severe mineral deficiencies. The results of calcium, magnesium and iron deficiency are well known, those of zinc are less so. Zinc is called the intelligence mineral because it is needed for optimal development and functioning of the brain and nervous system. It plays a role in protein synthesis and collagen formation; it is involved in the blood sugar control mechanism and thus protects against diabetes; it is needed for a healthy reproductive system. Zinc is a key component in numerous vital enzymes and plays a role in the immune system. Phytates found in soy products interfere with zinc absorption more completely than with other minerals.<sup>9</sup> Literature extolling soy products tends to minimize the role of zinc in human physiology, and to gloss over the deleterious effect of diets high in phytic acid.

Milk drinking is given as the reason second generation Japanese in America grow taller than their native ancestors. Some investigators postulate that the reduced phytate content of the American diet—whatever may be its other deficiencies—is the true explanation, pointing out that Asian and Oriental children who do not get enough meat and fish products to counteract the effects of a high phytate diet, frequently suffer rickets, stunting and other growth problems.<sup>10</sup> The current climate of medical opinion in America has cast a cloud of disapproval on tallness. Parents would do well to ask their six-year-old boys whether they would prefer to be six-foot-one or five-foot-seven when they grow up, before substituting tofu for eggs, meat and dairy products.

## **Marketing the Soybean**

The truth is, however, that most Americans are unlikely to adopt traditional soy products as their principal

food. Tofu, bean curd and tempeh have a disagreeable texture and are too bland for the Western palate; pungent and musty miso and natto lose out in taste tests; only soy sauce enjoys widespread popularity as a condiment. The soy industry has therefore looked for other ways to market the superabundance of soybeans now grown in the United States.

Large scale cultivation of the soybean in the United States began only after the Second World War, and quickly rose to 140 billion pounds per year. Most of the crop is made into animal feed and soy oil for hydrogenated fats- margarine and shortening. During the past 20 years, the industry has concentrated on finding markets for the byproducts of soy oil manufacture, including soy "lecithin", made from the oil sludge, and soy protein products, made from defatted soy flakes, a challenge that has involved overcoming consumer resistance to soy products, generally considered tasteless "poverty foods". "The quickest way to gain product acceptability in the less affluent society," said a soy industry spokesman, " ... is to have the product consumed on its own merit in a more affluent society."<sup>11</sup> Hence the proliferation of soy products resembling traditional American foods-soy milk for cows milk, soy baby formula, soy yogurt, soy ice cream, soy cheese, soy flour for baking and textured soy protein as meat substitutes, usually promoted as high protein, low-fat, no cholesterol "healthfoods" to the upscale consumer increasingly concerned about his health. The growth of vegetarianism among the more affluent classes has greatly accelerated the acceptability and use of these ersatz products. Unfortunately they pose numerous dangers.

### **Processing Denatures and Dangers Remain**

The production of soy milk is relatively simple. In order to remove as much of the trypsin inhibitor content as possible, the beans are first soaked in an alkaline solution. The pureed solution is then heated to about 115 degrees C in a pressure cooker. This method destroys most (but not all) of the anti-nutrients but has the unhappy side effect of so denaturing the proteins that they become very difficult to digest and much reduced in effectiveness.<sup>12</sup> The phytate content remains in soy milk to block the uptake of essential minerals. In addition, the alkaline soaking solution produces a carcinogen, lysinealine, and reduces the cystine content, which is already low in the soybean.<sup>13</sup> Lacking cystine, the entire protein complex of the soybean becomes useless unless the diet is fortified with cystine-rich meat, eggs, or dairy products, an unlikely occurrence as the typical soy milk consumer drinks the awful stuff because he wants to avoid meat, eggs and dairy products.

Most soy products that imitate traditional American food items, including baby formulas and some brands of soy milk, are made with soy protein isolate, that is the soy protein isolated from the carbohydrate and fatty acid components that naturally occur in the bean. Soy beans are first ground and subjected to high-temperature and solvent extraction processes to remove the oils. The resultant defatted meal is then mixed with an alkaline solution and sugars in a separation process to remove fiber. Then it is precipitated and separated using an acid wash. Finally the resultant curds are neutralized in an alkaline solution and spray dried at high temperatures to produce high protein powder. This is a highly refined product in which both vitamin and protein quality are compromised-but some trypsin inhibitors remain, even after such extreme refining! Trypsin inhibitor content of soy protein isolate can vary as much as 5-fold.<sup>14</sup> In rats, even low level trypsin inhibitor soy protein isolate feeding results in reduced weight gain compared to controls.<sup>15</sup> Soy product producers are not required to state trypsin inhibitor content on labels, nor even to meet minimum standards, and the public, trained to avoid dietary cholesterol, a substance vital for normal growth and metabolism, has never heard of the potent anti-nutrients found in cholesterol-free soy products.

## **Soy Formula Is Not the Answer**

Soy protein isolate is the main ingredient of soy-based infant formulas. Along with trypsin inhibitors, these formulas have a high phytate content. Use of soy formula has caused zinc deficiency in infants.<sup>16</sup> Aluminum content of soy formula is 10 times greater than milk based formula, and 100 times greater than unprocessed milk.<sup>17</sup> Aluminum has a toxic effect on the kidneys of infants, and has been implicated as causing Alzheimer's in adults. Soy milk formulas are often given to babies with milk allergy; but allergies to soy are almost as common as those to milk.<sup>18</sup> Use of soy formula to treat infant diarrhea has had mixed results, some studies showing improvement with soy formula while others show none at all.<sup>19</sup> Soy formulas lack cholesterol which is absolutely essential for the development of the brain and nervous system; they also lack lactose and galactose, which play an equally important role in the development of the nervous system. A number of other substances, which are unnecessary and of questionable safety, are added to soy formulas including carrageenan, guar gum, sodium hydroxide (caustic soda), potassium citrate monohydrate, tricalcium phosphate, dibasic magnesium phosphate trihydrate, BHA and BHT. Nitrosamines, which are potent carcinogens, are often found in soy protein foods, and are greatly increased during the high temperature drying process.<sup>20</sup> Not surprisingly, animal feeding studies show a lower weight gain for rats on soy formula than those on whole milk, high-lactose formula.<sup>21</sup> Similar results have been observed in children on macrobiotic diets which include the use of soy milk and large amounts of whole grains. Children brought up on high-phytate diets tend to be thin and scrawny.<sup>22</sup>

## **Fabricated Soy Foods**

A final indignity to the original soy bean is high-temperature, high-pressure extrusion processing of soy protein isolate to produce textured vegetable protein. Numerous artificial flavorings, particularly MSG, are added to TVP products to mask their strong "beany" taste, and impart the flavor of meat. Soy protein isolate and textured vegetable protein are used extensively in school lunch programs, commercial baked goods, diet beverages and fast food products. They are heavily promoted in third world countries and form the basis of many food give-away programs. These soy products greatly inhibit zinc and iron absorption; in test animals they cause enlarged organs, particularly the pancreas and thyroid gland, and increased deposition of fatty acids in the liver.<sup>23</sup> Human feeding tests to determine the cholesterol lowering properties of soy protein isolate have not shown them to be effective.<sup>24</sup> Nevertheless, they are often promoted as having beneficial effects on cholesterol levels.

## **Cancer Preventing or Cancer Causing?**

The food industry also touts soy products for their cancer preventing properties. Isoflavone aglycones are anticarcinogenic substances found in traditionally fermented soybean products. However, in non-fermented soy products such as tofu and soy milk, these isoflavones are present in an altered form, as beta-glycoside conjugates, which have no anti-carcinogenic effect.<sup>25</sup> Some researchers believe the rapid increase in liver and pancreatic cancer in Africa is due to the introduction of soy products there.<sup>26</sup>

The fatty acid profile of the soybean includes large amounts of beneficial omega-3 fatty acids compared to other pulses (legumes); but these omega-3 fatty acids are particularly susceptible to rancidity when subjected to high pressures and temperatures. This is exactly what is required to remove oil from the bean, as soybean oil is particularly difficult to extract. Hexane or other solvents are always used to extract oil

from soybeans, and traces remain in the commercial product.

### **Soy Protein Is Not Complete**

While fermented soy products contain protein, vitamins, anti-carcinogenic substances and important fatty acids, they can under no circumstances be called nutritionally complete. Like all pulses, the soybean lacks vital sulfur-containing amino acids cystine and methionine. These are usually supplied by rice and other grains in areas where the soybean is traditionally consumed. Soy should never be considered as a substitute for animal products like meat or milk. Claims that fermented soy products like tempeh can be relied on as a source of vitamin B12, necessary for healthy blood and nervous system, have not been supported by scientific research.<sup>27</sup> Finally, soybeans do not supply all-important fat soluble vitamins D and preformed A (retinol) which act as catalysts for the proper absorption and utilization of all minerals and water soluble vitamins in the diet. These "fat soluble activators" are found only in certain animal foods such as organ meats, butter, eggs, fish and shellfish. Carotenes from plant foods and exposure to sunlight are not sufficient to supply the body's requirements for vitamins A and D.<sup>28</sup> Soy products often replace animal products in third world countries where intake of B12 and fat soluble A and D are already low. Soy products actually increase requirements for vitamins B12 and D.<sup>29</sup>

Are soy products easy to digest, as claimed? Fermented soy products probably are; but unfermented products with their cargo of phytates, enzyme inhibitors, rancid fatty acids and altered proteins most certainly are not. Pet food manufacturers promote soy free dog and cat food as "highly digestible".

### **Only Fermented Soy Products Are Safe**

To summarize, traditional fermented soy products such as miso, natto and tempeh-which are usually made with organically grown soybeans-have a long history of use that is generally beneficial when combined with other elements of the Oriental diet including rice, sea foods, fish broth, organ meats and fermented vegetables. The value of precipitated soybean products is problematical, especially when they form the major source of protein in the diet. Modern soy products including soy milks and ersatz meat and dairy products made from soy protein isolate and textured vegetable protein are new to the diet and pose a number of serious problems.

### **Another Look at Milk**

What then about dairy products? A few studies have linked modern commercial milk products with serious diseases such as cancer, diabetes and arthritis; but natural milk products have a long history of conferring good health in many parts of the globe. Dr. Weston Price, a pioneer in the science of nutrition, studied isolated population groups during the 1930's. He found that milk products were the principal food of many supremely healthy populations including isolated villagers in the Swiss Alps, the Masai and related tribes in Africa, and Arabic peoples in the Middle East.<sup>30</sup>

Of the three areas in the world noted for the longevity of the local population -the Caucasus Mountains in Russia, the village of Vilcabamba in Ecuador and the land of the Hunza in northern India- all three use whole milk products. The people of Hunza and Kashmir consume whole fermented goat milk products; inhabitants of Vilcabamba consume raw cows milk which they usually separate into cream cheese and

whey; and the centenarians of the Caucasus Mountains eat whole milk yogurt and other dairy products.

Milk products form the backbone of the Hindu diet, with clarified butter (ghee) and fermented curds eaten with every meal. "The cows are our friends, they give food, they give strength, they likewise give a good complexion and happiness," said Gautama Buddha. While the Japanese have the longest life span of the civilized world on a diet containing few milk products, the Swiss are a close second in the longevity stakes with a diet just loaded with rich milk products like butter, cream and cheese. Tied for third and fourth are the Austrians and the Greeks. Both these populations consume whole milk products, especially cheese. Milk products are even found in some parts of the Orient, from water buffalo milk in Southeast Asia to cows milk in northern China. The longest living man in the West was Old Par, an English peasant who labored in the fields until his death at 152 years. His diet consisted almost entirely of raw goat milk products-milk, cheese and whey.<sup>31</sup>

### **Processing Is the Problem**

The path that transforms healthy milk products into allergens and carcinogens begins with modern feeding methods that substitute high-protein, soy-based feeds for fresh green grass; and breeding methods to produce cows with abnormally large pituitary glands so that they produce three times more milk than the old fashioned scrub cow. These cows need antibiotics to keep them well. Their milk is then pasteurized so that all valuable enzymes are destroyed-lactase for the assimilation of lactose; galactase for the assimilation of galactose; phosphatase for the assimilation of calcium. Literally dozens of precious enzymes are destroyed in the pasteurization process. Without them milk is very difficult to digest. The human pancreas is not always able to produce these enzymes; overstress of the pancreas can lead to diabetes and other diseases.<sup>32</sup>

Non-fat dried milk is added to 1% and 2% milk. Unlike the cholesterol in fresh milk, which plays a variety of health promoting roles, the cholesterol in nonfat dried milk is oxidized and it is this rancid cholesterol that promotes heart disease. Like all spray dried products, non-fat dried milk has a high nitrite content. Non-fat dried milk and sweetened condensed milk are the principal dairy products in third world countries; use of ultra high temperature pasteurized milk is widespread in Europe.

### **Quality Dairy Products Are Available**

Public health officials and the National Dairy Council have worked together in this country to make it very difficult to obtain wholesome fresh raw dairy products. Nevertheless, they can be found with a little effort. In some states you can buy raw milk directly from farmers. Whole pasteurized non-homogenized milk from cows raised on organic feed is now available in many gourmet shops and health food stores. It can be cultured to restore enzyme content, at least partially.<sup>33</sup> Cultured buttermilk is often more easily digested than regular milk; it is an excellent product to use in baking.

Many shops now carry whole cream, that is merely pasteurized (not ultra pasteurized like most commercial cream): diluted with water it is delicious on cereal and a good substitute for those allergic to milk. Traditionally made creme fraiche (European style sour cream) also has a high enzyme content. Fresh, organic yogurt made from whole milk according to traditional methods is also now available, as well as organic raw cheese. Many imported cheeses are raw (look for the words "milk" or "fresh milk" on the

label) and are of very high quality.

### **Butter Is a Healthy Food**

Organic, cultured butter is available in many stores. It has restored enzymes and a high vitamin A content. Contrary to widely held opinion, there is no evidence that butter contributes to heart disease or cancer. At the turn of the century, butter consumption in America was 18 pounds per person per year. Today it is a mere five pounds. As butter consumption has plummeted, cancer and heart disease have risen dramatically. The real blame for this increase points squarely at hydrogenated butter substitutes—margarine and shortening.<sup>34</sup> Butter contains many nutrients that protect us against disease. Those with severe allergies to milk products can still eat clarified butter (ghee) and enjoy its good taste and numerous nutritional benefits.

In countries that traditionally produce milk, adults favor fermented products such as yogurt, clabber, buttermilk and soft and hard cheeses. These are easier to digest because of enhanced enzyme content. But fresh whole milk is easily digested by most children and is an appropriate food up to the age of three or four. A child's toleration for milk will be much greater if it is raw. If you have property in the country, consider raising scrub cows or goats in order to provide fresh raw milk for your children, grandchildren, nieces and nephews—there is no greater gift you can give them than the healthy start conferred by fresh whole raw milk.

### **Homemade Formula Best for Babies**

Neither milk-based nor soy-based infant commercial formulas can be recommended for optimal development of the infant. Mothers who cannot breast feed, for whatever reason, should prepare homemade formula based on whole milk for their babies. The rare child allergic to whole milk formula should be given a whole foods meat-based formula, not one made of soy protein isolate. Time invested in preparing homemade formula will be well rewarded with the joys of conferring robust good health on your children.

### **Consumer Beware!**

To summarize, there may be some beneficial factors in soy foods prepared according to traditional fermentation methods. In the Orient these are eaten in small amounts as condiments, and not as a replacement for animal foods. Highly processed soy protein isolates and textured vegetable protein have little in common with traditional soy products. They might be compared to plastic processed cheese slices, which have nothing in common with traditionally processed whole milk natural cheeses.

Promotion of modern, industrially processed soy products should be viewed with skepticism. This is a huge and powerful industry. Archer Daniel Midlands, the world's major soy processor, spends heavily on advertising, especially for news programs on major networks. The company spent \$4.7 million for advertising on "Meet the Press" and \$4.3 million on "Face the Nation" during the course of a year.

ADM also has holdings in major newspapers. Naturally, the press presents soy in a favorable light. ADM lobbies heavily in Washington, and supports university research programs. ADM president Dwayne Andreas is a fanatic about spreading soy-based food around the world. There's a lot in it for him—but not much in it for us. Consumer beware. There is no joy in soy—it's a ploy.

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