

Approved March 14, 1988  
Date

MINUTES OF THE Senate COMMITTEE ON Agriculture

The meeting was called to order by Senator Allen at  
Chairperson

10:05 a.m./~~p.m.~~ on February 29, 1988 in room 423-S of the Capitol.

All members were present except: Senator Doyen (excused)

Committee staff present: Raney Gilliland, Legislative Research Department  
Jill Wolters, Revisor of Statutes Department

Conferees appearing before the committee: Bill Fuller, Kansas Farm Bureau  
Judy Johnston, Registered dietitian, Director of  
Dietetics, Riverside Hospital,  
Wichita, Kansas  
Judy Hall, Registered dietitian, Coordinator of the  
Coordinated Undergraduate Program for  
Dietetics  
Betty Hanson, dietitian, Topeka  
Eric Neiman, Kansas Soybean Association  
Jean Towne, consumer, Shawnee County  
Francis Kastner, Kansas Food Dealers Association  
Bernie Hansen, Flint Hills Foods, Alma, Kansas  
Steve Paige, Director, Bureau of Food, Drug, and  
Lodging, Kansas Department of  
Health and Environment

Senator Allen called the committee to order and called attention to SB 693; the Chairman then called on the following who testified in favor of the bill.

Bill Fuller gave copies of his testimony to the committee (attachment 1).

Judy Johnston gave the committee copies of her testimony (attachment 2). In answer to committee questions Ms. Johnston answered that to require all labels to carry a warning of 'hazardous to your health' if one ingredient might be dangerous to someone would be going too far. Ms. Johnston stated that it would be helpful if labels stated the percentage of each fat used in the ingredients. She suggested the labelling issue is a national issue but that it would be helpful if Kansas sent a resolution to congress expressing the problem with labels. Ms. Johnston said that companies know the breakdown of their ingredients that it is a matter of them printing the information on their labels.

Judy Hall provided copies of her testimony to the committee (attachment 3). In answer to the question, Ms. Hall answered that, yes, there is a truth in labelling law but some product labels are misleading not illegal.

Betty Hanson gave copies of her testimony to the committee (attachment 4) and urged committee support for SB 693.

Jean Towe expressed support for SB 693. She explained that labels need to give more of a breakdown on the amounts of the ingredients used in products especially with regard to oils used. Ms. Towe stated that SB 693 an important bill for consumers especially persons with special diets. She urged committee support and passage of SB 693.

Eric Neiman gave copies of information to the committee (attachment 5) and expressed a problem with labelling in which coconut oil is listed as a vegetable oil. Mr. Neiman stated that palm and coconut oils are bad on the economic health of United States Farmers. He explained that through the efforts of the Soybean Association that the use of palm oil is down

Unless specifically noted, the individual remarks recorded herein have not been transcribed verbatim. Individual remarks as reported herein have not been submitted to the individuals appearing before the committee for editing or corrections.

CONTINUATION SHEET

MINUTES OF THE Senate COMMITTEE ON Agriculture

room 423-S, Statehouse, at 10:05 a.m. ~~p.m.~~ on February 29, 19 88

20 percent. Mr. Neiman stated that Representative Glickman has introduced legislation that would require more complete labelling if tropical fats are used in a product.

The Chairman called on the following who spoke as opponents of SB 693.

Francis Kastner provided the committee with copies of her testimony (attachment 6). Ms. Kastner requested the committee not pass SB 693 in its present form. She stated if labelling requirements are changed that it should be done at the national level, and in that case the Food Dealers Association would have no objection.

Bernie Hansen provided written information for the committee (attachment 7) and explained that label requirements are governed at the national level and to create Kansas own requirements would make Kansas an island unto itself. Mr. Hansen stated that if the intent of SB 693 was to address labelling problems concerning oils in products only that he did not have a problem with the bill but that the bill states all labels all ingredients.

Steve Paige provided the committee with copies of his testimony (attachment 8), Mr. Paige encouraged SB 693 not be passed.

The Chairman declared the hearing closed for SB 693 and turned committee attention to SB 529 for committee action.

Senator Kerr made a motion the committee recommend SB 529 favorable for passage by asking it be placed on the consent calendar. Senator Montgomery seconded the motion. Discussion followed concerning why under Section (b) paragraph was deleted and what would insurance rates be for a farmer that would lease for pay his farm lands for hunting. The Chairman announced that the committee would vote on the motion later after some information could be provided concerning liability insurance.

The Chairman adjourned the committee at 10:59 a.m.





# PUBLIC POLICY STATEMENT

SENATE COMMITTEE ON AGRICULTURE

**RE: S.B. 693 - Requiring percentages to be required on  
food labels**

February 29, 1988  
Topeka, Kansas

Presented by:  
Bill R. Fuller, Assistant Director  
Public Affairs Division

**Mr. Chairman and Members of the Committee:**

My name is Bill Fuller. I am the Assistant Director of the Public Affairs Division for Kansas Farm Bureau. Farmers and ranchers who were delegates representing the 105 County Farm Bureaus at the 69th Annual Meeting of Kansas Farm Bureau on December 1, 1987 adopted policy on **LABELING** which includes:

**" ... We support legislation to require full and complete labeling of food products to identify type and percentage of oils and other ingredients."**

S.B. 693 implements that concept.

Six of the ten leading causes of death in the United States have been linked to our diet. Our diets have changed radically within the last 50 years. These dietary changes represent a threat to public health. A big part of that change is the fact more of our food is commercially processed or manufactured and purchased in supermarkets. Consumers are at the mercy of food labels ... what does the product contain and how much of each

*attachment 1*

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ingredient? S.B. 693 requires listing each ingredient and the amount of each ingredient on the label.

Our members are especially concerned about the labeling of vegetable oils. All vegetable oils are not created equal! Current FDA regulations do not require food manufacturers to make any distinctions among vegetable oils. As a result, many consumers do not realize the health threats from tropical fats (coconut and palm) hidden in foods.

Kansas farmers produce an abundance of nutritious food. We believe the demand for strict product labeling is essential to all consumers and for Kansas agriculture.

We appreciate the Committee's actions in requesting this bill draft and conducting these hearings today. We will attempt to respond to any questions.

Testimony concerning SB693

February 29, 1988

Judy Johnston, M.S., R.D., C.D.E.  
Director of Dietetics  
Riverside Hospital  
2622 West Central  
Wichita, Kansas 67203

The majority of the people I work with as a Registered Dietitian already have heart disease or are at increased risk due to diabetes or obesity. A large number of lifestyle changes are requested of these people as we attempt to modify behaviors that are potentially harmful. Since we all have lifelong histories of eating, we can all appreciate just how difficult significant changes in eating behaviors can be. The bill you are considering today can greatly lessen the frustration these individuals feel when they shop for foods that comply with their dietary restrictions.

Patients are generally given lists of "acceptable oils" by their physician or dietitian that should make it simple for them to shop. At the grocery store, they are confronted with a barrage of unexplained and confusing terminology. What does "partially hydrogenated" mean? Is that the same as saturated? If it says "all vegetable oil", is it safe? If there are three oils listed as possible ingredients, how do I know which one is present? If I recognize one of the oils listed as polyunsaturated, can I assume that they all are, since they are being used interchangeably? If fat isn't listed as one of the first three ingredients, should I be concerned about it?

These are questions I hear every day from people who are reading labels. In the case of some products, I can't help them because the information just is not available. The original labeling legislation requires that the amount of fat per serving be listed on certain foods. That legislation falls far short of providing adequate information for consumers wishing to make informed choices about cholesterol and saturated fat.

In many food products, there is more than one fat source listed among the ingredients. Under the present labeling system, the consumer has no way of knowing what percent of the total fat came from each source and therefore the ratio of polyunsaturated fat to saturated fat. An even more frustrating problem is the label that states, "Contains one or more of the following: soybean oil, palm kernel oil, coconut oil." These three oils are certainly not the same in degree of saturation, yet the consumer is asked to gamble that the acceptable oil is the one used in that batch of the product.

Nearly every magazine you pick up today has some information about heart disease. People are acutely aware of the role of diet in heart disease. This awareness combined with the frustration of inadequate label information leads many consumers to simply withdraw from the marketplace and restrict themselves to a boring and sometimes inadequate diet of "safe" foods. If labels were required to contain specific information on the fats in products, including the type and amount of each fat source and the cholesterol content of products, consumers would have the

attachment 2  
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information necessary for them to make wise food choices in the marketplace. SB693 would require that kind of labeling. I urge your support of this important legislation.

Judith H. Hall, M.S., R.D.  
Program Coordinator  
KSU Dietetic Center  
Room 3036, UKSM-W  
Wichita, Kansas 67220  
316-261-2696

Testimony in Regard to Senate Bill 693  
February 29, 1988

In an era when nearly one million Americans die annually from various cardiovascular diseases and more than one in four suffer from the effects of these diseases, it is important to provide the public with the information and education necessary to reduce risk factors.

To narrow the statistics to the state level, during 1986 in Kansas, 8,343 of the 22,133 (37.7%) deaths were identified with atherosclerosis and heart disease. Realizing that more than four times that many have a history of or are currently undergoing treatment for one of these disorders, it is vital to assist these Kansans in making appropriate lifestyle changes to further reduce cardiovascular morbidity and mortality.

One of the important risk factors is the serum cholesterol level. Studies seem to indicate that elevated levels cause damage to the interior walls of arteries, thus allowing atherosclerosis to develop. Additionally, there has been a link established between the amount of cholesterol in the blood and the incidence of coronary artery disease - a condition which blocks blood supply to the heart itself and is often a forerunner of myocardial infarction (heart attack).

Cholesterol may be obtained by the body either preformed, from animal sources in the diet, or synthesized, in the liver. Saturated fats are most responsible for this production in the body and the resulting rise in serum cholesterol values. Sources of saturated fat include foods of animal origin and palm, palm kernel, and coconut oils. These oils are frequently used in processed foods, including such items as nondairy products and baked goods.

The fat controlled diet plays a pivotal role in lowering serum cholesterol and treating cardiovascular disease. The tenets of this diet, as outlined both by the American Heart Association and the Kansas Diet Manual - diet authority for most Kansas hospitals, include restriction of dietary cholesterol and saturated fat.

General recommendations to improve the health and diet of the public are included in the "Dietary Guidelines for Americans". One of the seven guidelines is "Avoid too much fat, saturated fat, and cholesterol." It then becomes apparent that for those already identified as having cardiovascular disease as well as those attempting to reduce the risk of developing it, identification of saturated fat and cholesterol sources is an important consideration.



Among the current nutrition labeling requirements are the designation per serving of calories; grams of carbohydrate, protein, and fat; and ingredients listed in descending order of concentration. Labels are not required to list saturated or unsaturated fat or cholesterol content. An additional problem is that the ingredient list is allowed to state that the product may contain one or more of several oils and shortenings, which are then listed. That list ususally includes both saturated and unsaturated sources.

As nutrition professionals, our recommendation to those on fat controlled diet or those attempting to follow the "Dietary Guidelines for Americans", must be to omit a food product when the labeling provides insufficient information to clearly delineate the source, type, and amount of fat. This often results in a significant reduction of prepared and processed food products which the individual may use. As a registered dietitian, I therefore urge your support of this important nutrition labeling legislation.

TO: Members of the Senate Agriculture Committee  
FROM: Betty J. Hanson, R.D., Kansas Dietetic Association  
RE: Senate Bill 693 Testimony  
DATE: February 29, 1988

As a member of the profession of dietetics, I would like to express my support for Senate Bill 693. In working with patients regarding foods that they may purchase to use in their diets, it is difficult to advise them regarding many of the packaged food items when there is not a listing of the nutritive content on the package. On most products there is a listing of the ingredients but there is not an indication of what percent this ingredient is of the total product. Many of our therapeutic diets have been liberalized so that they are not as restrictive as they were even as much as ten years ago.

For example, if we knew that the sugar content of one ounce of a product was only equal to 5% of that ounce, then someone who was on a diabetic diet could possibly use the product if the approximate caloric content of the product was known. In the instance of sodium preservatives, there may be more than one of them in the product but it is unknown by the listing of ingredients what the approximate amount of sodium is.

With persons living longer and developing more chronic diseases, it becomes imperative that we know more about what our food products contain so that we may help them achieve a better quality of life.

*Betty J. Hanson*

*attachment 4  
2-29-88*

DOMESTIC OILS AND TROPICAL FATS  
The American Soybean Association

THE ISSUE: Not all vegetable oils are created equal. Consumers are misled when oils of significantly different saturated fat content are used in food products and called "vegetable oils". Consumers have a right to know what fats and oils are used in their food products. Better labeling is needed.

BACKGROUND: Food manufacturers have spent millions of dollars building a strong health image for "vegetable oils" (soybean, corn, sunflower, peanut and cottonseed oils). They have told consumers vegetable oil has no cholesterol and is low in saturated fat. But not all vegetable oils are the same. When manufacturers claim a product contains "vegetable oil" then include fats with significantly higher levels of saturated fat, like palm, palm kernel and coconut oil, the consumer is misled.

How are fats and oils different?

Animal and vegetable fats and oils are made up of combinations of various fatty acids categorized as saturated, monounsaturated and polyunsaturated fats. Each oil is different because the fatty acid profile is different for every fat and oil. The saturated fatty acids cause special problems because, at higher levels, they cause the body to produce serum cholesterol which can build up in the arteries. The result is restricted blood flow leading to heart attacks.

Palm oil contains more than four times as much cholesterol-producing saturated fat as soybean oil. In fact, palm oil contains more saturated fat than lard. The medical profession has suggested for years to reduce cholesterol by cutting back on animal fat which is a saturated fat.

But isn't soybean oil often hydrogenated and doesn't that increase saturated fat?

Fatty acids are made up of hydrogen and carbon chains. When those fatty acid chains have the full complement of hydrogen they are saturated. Saturated fats are generally solid at room temperature. Fatty acids that are lacking in hydrogen are unsaturated.

Most vegetable oils contain large amounts of unsaturated fatty acids and therefore, are liquid at room temperature.

*attachment 5*  
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Hydrogenation adds hydrogen to the fatty acids and serves to stabilize polyunsaturated vegetable oils such as soybean, corn, sunflower, peanut and cottonseed oils. Food processors often hydrogenate soybean oil to increase hardness and improve stability for longer shelf life and for use in products like margarine and shortenings. Consumers should note that when a product contains hydrogenated soybean oil, the label clearly states "hydrogenated soybean oil".

When beginning with a low level of saturated fatty acids, the hydrogenation process does not normally pose a problem for those concerned with blood cholesterol levels. For example, even a heavily hydrogenated soybean oil such as might be used in stick margarine contains no more than 25 percent saturated fat...still half the saturated fat content of palm oil.

The following chart shows what happens to the proportion of saturated fatty acids in soybean oil at different levels of hydrogenation.

	Sat	Monoun	Polyun
Soybean oil	14%	23%	58%
Soybean Oil (part hydro) (cooking oil)	15%	43%	38%
Tub soybean margarine	21%	39%	36%
Stick soybean margarine	21%	49%	26%
Soybean shortening	25%	45%	26%

\* From USDA Agriculture Handbook No. 8-4

What about claims by the tropical fats industry that research has shown that palm oil has several health benefits including:

- a) Lowering blood cholesterol levels
- b) Reducing blood clotting (anti-thrombotic)
- c) May reduce risk of arterial thrombosis and arteriosclerosis
- d) Contains Vitamin E
- e) An important source of carotene
- f) Cancer curbing capabilities

Evidence supporting these claim remains a subject of debate in many circles. Here are questions being raised:

- a) Palm oil does not lower cholesterol levels. In fact, several researchers have shown conclusively that palm oil increases cholesterol levels. A study in the late 60's by noted lipid researcher Dr. Francisco Grande reported in the American Journal of Clinical Nutrition compared the effects of palmitic and stearic acids in the diet on Serum Cholesterol (AJCN, Vol. 23, No. 9, September 1970 pages 1184-1193). The study used safflower, olive, palm and hydrogenated soybean oils. Results showed that stearic acid (high in hydrogenated soybean oil) had no effect on serum cholesterol while palmitic acid (very high in palm oil) significantly increased blood cholesterol levels.



Another study at University of Minnesota titled "Lightly hydrogenated soy oil versus other vegetable oils as a lipid lowering dietary constituent" (April 1982 pp. 683-690 American Society for Chemical Nutrition) showed that cholesterol levels increased for persons consuming palm oil while those who consumed soybean oil or lightly hydrogenated soybean oil had lower cholesterol levels.

European research that claims palm oil does not elevate blood cholesterol has been discredited in a challenge by the Center for Science in the Public Interest (CSPI). Researcher Dr. M. F. Baudet told CSPI the study was done on an undefined substance referred to as "fluid of palm" which contained less than 25 percent saturated fatty acids (less than half the saturated fatty acids in palm oil as documented in USDA Handbook 8-4). According to CSPI, Dr. Baudet did not explain why "fluid of palm" was referred to as palm oil throughout his article. CSPI says the study is meaningless. (See Food Chemical News, May 11, 1987 pg. 17.)

If indeed, claims being made about the value of saturated fat in tropical fats are correct, the labeling proposals submitted in the House and Senate and up for consideration by FDA should benefit the palm industry. By clearly marking palm, palm kernel and coconut oils as "a saturated fat" consumers would be aided in selecting products with saturated tropical fats.

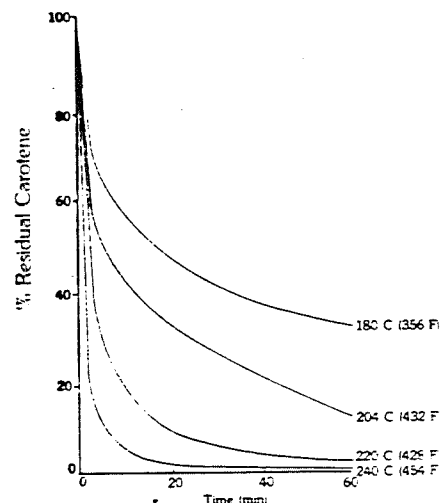
b & c) Proof is far from conclusive on the claim to reduce blood clotting and arteriosclerosis. Support for these claims comes from research using the polyethelene tube "aortic loop" method which, to the best of our knowledge has not been replicated. It should be noted that the study was conducted using rats. It assumes that thrombus formation and blockage of the tube in a period of hours or days in a rat outfitted with a plastic tube is equivalent to what takes decades in normal humans. Furthermore the summary of this research seems to contradict palm industry claims, as the researchers found that "fats containing a large amount of saturated fatty acids promote arterial thrombus formation, whereas dietary linoleic acid (soybean oil is high in linoleic acid) has a specific anti-thrombotic effect".

d) Vitamin E is not present in any greater amount in palm oil than any other oil as can be seen in the following chart derived from U.S.D.A. bulletin 8-4:

	<u>Total Tocopherols</u>	<u>Alpha Tocopherols (Vitamin E)</u>
Palm	38.4	19.1
Soybean	93.0	11.0
Corn	83.2	14.3
Cottonseed	65.2	35.3
Peanut	25.0	11.6
Safflower	38.1	34.1
Sunflower	47.8	44.9

(MG/100)

e & f) True, crude palm oil is very high in carotene, a precursor of Vitamin A which, according to the palm oil industry "has been found to have cancer curbing capabilities." However, palm oil must be refined before use. In the refining process nearly all of the carotene is removed. A graph from research funded by the palm industry itself, clearly shows that carotene is virtually eliminated as a result of processing.



Thermal destruction of β-carotene (5).

Is the Soybean Association trying to create a trade barrier to tropical fats?

No. Soybean farmers believe consumers should make their own decision on the use of tropical fats. Truth-in-labeling is not a trade issue, it is a consumer right to know issue. In order to make a choice, consumers need labeling that allows them to select products that fit their dietary needs.

Current labels that allow tropical fats with significantly higher levels of saturated fat to be listed as a vegetable oil along with low saturated fat oils like soybean oil serve only to confuse and mislead consumers.

Are other organizations involved in this issue?

American Soybean Association did not create the issue of saturated fats and human health. The American Heart Association, National Institute of Health and Center for Science in the Public Interest have long championed the cause for better labeling. Several highly respected groups have joined ASA in the effort to gain improved labeling for fats and oils. They include the American Heart Association, American Public Health Association, Center for Science in the Public Interest, Public Voice for Food and Nutrition Policy, National Corn Growers Association, and National Sunflower Association.

## References

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4. M. F. Baudet, C. Cachet, M. Lassere, O. Estera and B. Jacatot, J. Lipid Res. 25:456-468, 1984.
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7. M. MacLellan, J. Am. Oil Chem. 60:320A-325A, 1983.
8. E. L. Syröja, V. Piironen, P. Varo, P. Koivistoinen and E. Salminen, J. Am. Oil Chem. 63:328-329.



## WHAT ARE SATURATED FATS AND HYDROGENATED FATS?

Fats and oils consist of hydrogen and carbon chains called "fatty acids." Fatty acids that have the full complement of hydrogen are **saturated**, and are generally solid at room temperature. Fatty acids that are lacking in hydrogen are **unsaturated**.

Most vegetable oils contain large amounts of unsaturated fatty acids and, therefore, are liquid at room temperature. The exceptions are the highly saturated palm, palm kernel, and coconut oils.

Hydrogenation is a process that adds hydrogen to the fatty acids of liquid vegetable oils. This serves to impart such desirable characteristics as solidity in margarines and shortenings. Food processors often partially hydrogenate vegetable oils to increase their shelf life, and make them more stable when heated at high temperatures.

Even when oils with low levels of saturated fatty acids are partially hydrogenated, they should not normally pose a problem for those concerned with blood cholesterol levels. For example, even after hydrogenation, soybean shortening contains no more than 25 percent saturated fat.

## EFFECT OF HYDROGENATION ON SATURATED FAT CONTENT

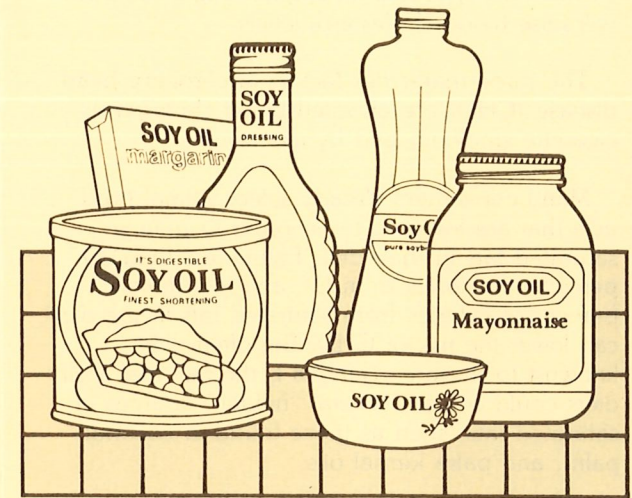
	Sat	Mono	Poly
Soybean oil	14%	23%	58%
Soybean oil (part-hydrogenated)	15%	43%	38%
Tub soybean margarine	21%	39%	36%
Stick soybean margarine	21%	49%	26%
Soybean shortening	25%	45%	26%

from USDA Agriculture Handbook No. 8-4.

The chart above shows that even after being heavily hydrogenated for use in stick margarine or shortening, soybean oil still has less than half the amount of saturated fat found in palm oil. FDA regulations require that hydrogenation of soybean oil be listed on the food label, but does not require the listing of palm or coconut oils as saturated fats.

## ARE ALL VEGETABLE OILS CREATED EQUAL?

No. Vegetable oils, such as soybean, cottonseed, peanut, sunflower, and corn oil are relatively low in saturated fatty acids. But palm, coconut, and palm kernel oils can contain up to 90 percent saturated fats, even before hydrogenation. This is twice the saturated fat content as found in animal fats, such as common lard.



## FATTY ACID COMPOSITION OF OILS AND FATS

% of Total Fatty Acids

Saturated	Monounsaturated	Polyunsaturated
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Sunflower Oil

11	20	69
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Corn Oil

13	25	62
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Soybean Oil

15	24	61
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Peanut Oil

18	48	34
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Cottonseed Oil

27	19	54
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Lard

41	47	12
----	----	----

Palm Oil

51	39	10
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Beef Tallow

52	44	4
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Palm Kernel Oil

86	12	2
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Coconut Oil

92	6	2
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Sources: Handbook No. 8-4 and Human Nutrition Information Service, USDA, and American Soybean Association.

## CAN CONSUMERS GET INFORMATION ON FAT CONTENT IN FOODS?

Consumers interested in selecting foods with lower total or saturated fat and cholesterol may not find this information on today's food labels.

Current FDA regulations allow some highly saturated fats to be classified as vegetable oils. This can be misleading to individuals who have been educated that vegetable oils are both low in saturated fat and a wise choice for health-conscious consumers.

The American Soybean Association (ASA) recently petitioned FDA to correct this deficiency, by requiring that when food products contain palm, palm kernel, and coconut oils, those fats be labeled as "a saturated fat." A recent supermarket study found 1,155 foods that contain fats and oils. Labels listed over 140 different combinations of vegetable oils, or failed to state which specific oils were used. More than one-third of the food products claimed to contain "100 percent vegetable oils," but included the highly saturated "tropical fats" such as palm, palm kernel, or coconut oil.



## SHOULD YOU WORRY ABOUT FATS IN YOUR DIET?

Twenty years of research has consistently shown that diets high in saturated and total fats will raise blood cholesterol levels.

The three major risk factors in coronary heart disease (CHD) are elevated blood cholesterol, cigarette smoking, and hypertension.

Many consumers already select animal products that are lower in fat in order to reduce saturated fats in their diet. Eating less than 30 percent of calories from fat, and less than 10 percent of calories from saturated fats in the diet can lower the risk of CHD. But often unbeknownst to these consumers is the fact that their diets could contain several "hidden" sources of saturated fats, such as those found in coconut, palm, and palm kernel oils.

These saturated vegetable fats are most often found in snack and baked foods, breakfast cereals, and so-called "health" foods such as granola bars.

## WHAT DO THE EXPERTS SAY?

A two-year scientific report by the National Heart, Lung, and Blood Institute, a unit of the prestigious National Institutes of Health, states: "The general rule is to reduce intakes of fats and oils that are high in saturated fatty acids and cholesterol. Vegetable fats do not contain cholesterol. However, certain vegetable fats—coconut oil, palm oil, and palm kernel—are very high in saturates and should be avoided. . . ." The report released on October 6, 1987, goes on to say: "Labels on food should be read carefully to detect the presence of saturated vegetable oils."

This report by the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults was completed under NIH's National Cholesterol Education Program. It is modeled after the National High Blood Pressure Education Program initiated some ten years ago. Copies of both reports are available through the National Heart, Lung, and Blood Institute, National Institutes of Health, 9000 Rockville Pike, Bethesda, Maryland 20892.

## WHAT ACTION IS NEEDED TO PROPERLY INFORM CONSUMERS?

A change is needed in current food labeling regulations. By requiring that palm, palm kernel, and coconut oils be identified as saturated fats, consumers could monitor their intakes of saturated fats, and adjust their diets accordingly.

The ASA petition would require manufacturers who label their products as containing "100 percent vegetable oil" to:

- List the specific type of vegetable oil used
- State "Contains palm (palm kernel or coconut) oil, a saturated fat" when these oils are used
- "Identify tropical oils as saturated fats"
- Require that "tropical fats not be classified as vegetable oils."

## WHAT CAN THE CONSUMER DO?

Consumers can read the labels on the foods they purchase to assure that they do not contain highly saturated tropical fats. They can also write or telephone food processors and retailers to express their concern for clear ingredient statements and use of low saturated oils like soybean oil.

# FACTS ABOUT FATS IN YOUR DIET



FOR MORE INFORMATION, CONTACT:



**American Soybean Association**

777 CRAIG ROAD, P.O. BOX 27300  
ST. LOUIS, MISSOURI 63141

**Information  
You Should Know**

Consumer information from the American Soybean Association



**Q****Why are consumers confused about vegetable oils?****A**

There is a general lack of awareness about foods, diet and nutrition among U.S. consumers.

However, recent attention to the relation between diet and heart disease has prompted new interest in what we eat.

It has also prompted some food companies that market vegetable oils to make exaggerated claims, some of which are misleading.

**Q****How important are vegetable oils in the diet?****A**

Vegetable oils are the principal source of the essential polyunsaturated fatty acids, an important element in any good diet.

Advertising that gives consumers the impression that they can have a more healthful diet by switching brands of oil or consuming a little (or a lot) more vegetable oil is misleading.

**Q****What oil do most people prefer?****A**

Seven of eight Americans prefer brands containing soybean oil. Crisco and Wesson oil are two of the leading brands containing soybean oil. Practically all private and generic "vegetable oils" are soybean oil.

In blind, strictly controlled, in-home use tests consumers preferred soybean oil because of its lightness and

performance. Consumers also select soybean oil because it is economical and it meets dietary guidelines.

**Q****How can I be sure products I'm using are free of highly saturated fats?****A**

It may be impossible. Current FDA regulations do not require food manufacturers to make any distinctions among vegetable oils. As a result, consumers may have the misleading impression that all vegetable oils are low in saturated fat. This is not the case. In fact tropical fats (palm and coconut) have more saturated fat than animal fats.

Consumers are further misled by food ingredient labeling regulations that allow multiple listings of vegetable oils. Consumers are often confounded by the phrase "contains one or more of the following vegetable oils . . ." followed by a laundry list of oils connected with another food marketing favorite "and/or".

A recent American Soybean Association supermarket survey of 1,155 foods containing vegetable oils found labels with 158 different combinations of fats and oils. Nearly half used the multiple choice "and/or" phrase while two-thirds of all labels included possible use of one of the tropical fats.

**Q****Why is the American Soybean Association concerned about use of tropical fats?****A**

In the last six years U.S. food manufacturers have steadily increased their use of palm and coconut oils. These tropical fats replace U.S.

produced soybean oil which is in abundant supply at competitive prices. U.S. farmers seek to maintain and expand soybean oil markets. This information campaign is intended to encourage action to clarify labeling regulations and make consumers aware of the benefits of using U.S. soybean oil. Soybean oil has no cholesterol, is low in saturated fat, and meets dietary and health recommendations of the American Heart Association.

**Q****What's the difference between a saturated and a polyunsaturated fat?****A**

Dietitians agree we need to increase the amount of polyunsaturated fat in the diet and decrease the saturated fats. Polyunsaturated is a chemical term that has to do with the number of hydrogen atoms attached to carbon atoms forming fat molecules. Fewer hydrogen atoms make a fat more polyunsaturated and less of a health risk.

Saturated and unsaturated fats are generally distinguished by their consistency at room temperature. Saturated fats are solid at room temperature while polyunsaturated fats like soybean oil are liquid.

**Q****How should I interpret those TV ads that compare the consistency of two different vegetable oils?****A**

Some advertising has attempted to equate consistency of refrigerated vegetable oils with nutritional value.

In fact the consistency of chilled oil has nothing to do with the way people use oil or its function in the body. Vegetable oils should always be compared at room temperatures.



# Knowing The Facts About Vegetable Oils Has Never Been More Important

## Fact 1

All the leading vegetable oils—soybean, corn, sunflower, safflower—are high in polyunsaturates and low in saturates.

## Fact 2

No vegetable oil contains cholesterol.

## Fact 3

Not all vegetable oils are equal. There is great variation in saturated fats. Palm and coconut oils have more saturated fat than animal fats.

## Fact 4

The difference in the ratio of saturated to unsaturated fats in the leading vegetable oils is insignificant.

## Fact 5

Price is no indication of the health value of a vegetable oil.

## Fact 6

Consumers are confused about facts 1, 2, 3, 4, and 5.

## You can help improve labeling. Here's how:

1. Call or write to food manufacturers. Tell them why you think they are not serving consumers by using the current multiple choice labeling on products containing fats and oils. Some major food manufacturers are:

The Pillsbury Company  
200 South 6th Street  
Minneapolis, MN 55402  
800/328-4466

General Mills, Inc.  
General Offices  
Minneapolis, MN 55440  
800-326-1144

Hershey Chocolate Company  
Hershey, PA 17033-0815  
800/468-1714

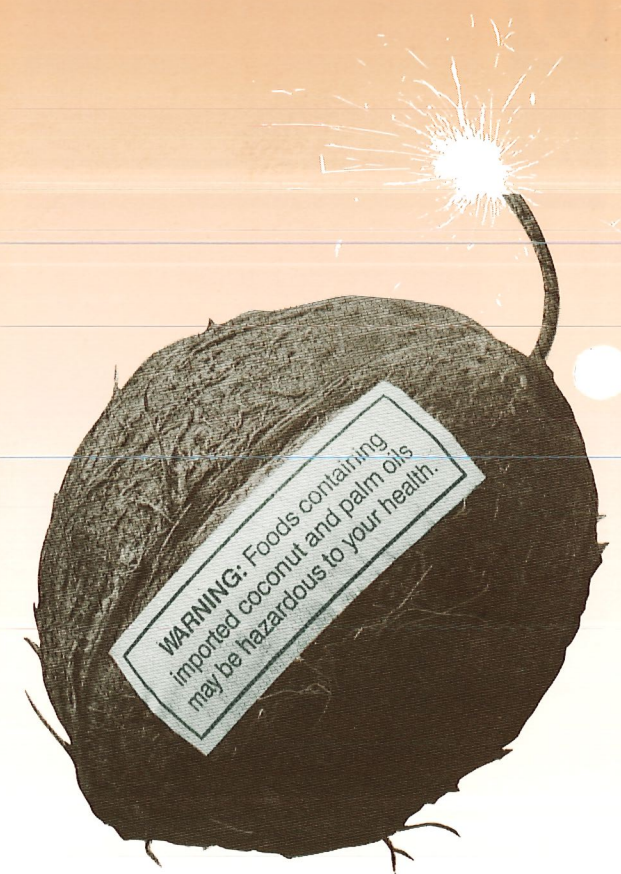
Frito-Lay  
National Headquarters  
Dallas, TX 75235  
800/FL-C HIPS  
800/352-4477

Betty Crocker  
c/o General Mills, Inc.  
Minneapolis, MN 55440  
800/328-6787

General Foods  
Box 7989  
White Plains, NY 10625  
800/431-1001

2. Request a Fat Fighter kit from American Soybean Association. The kit includes a poster, additional copies of this brochure and several ideas you can put to work to fight tropical fats.

# What You Don't Know About Tropical Fats Can Kill You.



**American Soybean Association**

P.O. BOX 27300, ST. LOUIS, MO 63141, PHONE (314) 432-1600



# Facts On FATS

American Soybean Association

Summer 1987

## Supermarket Survey Reveals Confusing Food Labels

Crackers and soup may be a great "pick-me-up," but food manufacturers often "let-you-down" when they select the fat in crackers. Worse yet, the label on the box may make it impossible to tell what fats are in the product.

A recent survey of items in a large Minneapolis supermarket revealed the problem isn't unique to crackers. Consumers confront a confusing array of labels on hundreds of food products.

### Palm Oil Has more Saturated Fat Than Lard

The American Soybean Association (ASA) funded a survey of 2500 food products, turned up 1155 items containing fats and oils. More than half (55 percent) of the items listed fats and oils in a confusing "multiple choice listing," making it impossible to be sure of the kind of oil used in food products.

The problem is that not all fats and oils are created equal, says ASA Technical Director, Dr. Dave Erickson. According to Erickson, food manufacturers cut costs by substituting cheap palm, palm kernel and coconut oils for more healthful home grown soybean, corn, sunflower, and cotton seed oils.

"Tropical fats contain up to six times the saturated fat in soybean oil," says Erickson. "Palm oil has more saturated fat than lard, yet few consumers are aware that tropical fats can raise blood cholesterol and increase the risk of heart disease.

"We think it's appalling that U.S. consumers usually can't tell from the label whether a food contains healthy soybean oil or a highly saturated tropical import like palm, palm kernel or coconut oil," says ASA President, Dave Haggard.

The ASA supermarket study revealed that highly saturated tropical fats are used in a wide variety of products. Items as diverse as "natural" cereals and rich pastries contain moderate to high levels of tropical fats.

According to Erickson, food manufacturers use tropical fats because they may perform special functions needed in food manufacture. But more important, he says, they use them because

### Read The Labels

they are cheap. To make his point, Erickson notes that use of tropical fats increases when prices are low.

Erickson cautions consumers to read the labels and avoid foods containing palm, palm kernel and coconut oils. He says foods most likely to contain tropical fats are frozen dinners, baked goods such as cookies and cakes, crackers, breakfast cereals, candies, popcorn oil, and snack foods of all kinds—especially chips and pastries.

Haggard says farmers are upset that food manufacturers are using tropical fats at the expense of home-grown oils.

"Food manufacturers have spent millions of dollars educating consumers that soybean oil, (which manufacturers generally refer to as vegetable oil) is a

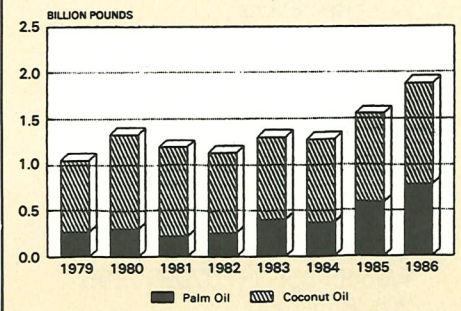
healthy product that is low in saturated fat and has no cholesterol."

"Manufacturers are taking unfair advantage of the positive image when they boldly promote on the package 'made with pure vegetable oils' then use highly saturated tropical fats in the product ingredients.

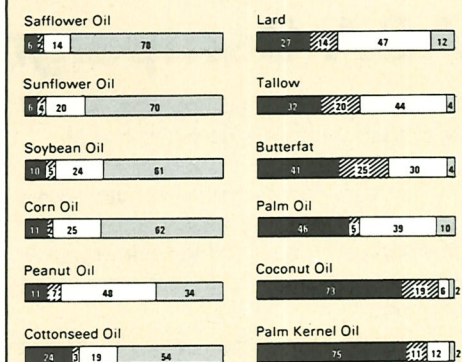
Haggard says it is a well documented fact that saturated fats such as those found in palm and coconut oils cause an increase in serum (blood) cholesterol which has been linked to heart disease.

In addition to his concern for consumer health, Haggard says he is concerned about the economic health of farmers. He says in 1986 imported palm and coconut oils displaced the equivalent of the oil produced from 171 million bushels of U. S. soybeans valued at \$273 million.

### TROPICAL FATS U.S. Consumption



### Fat Composition of Oils Percent of Total Fatty Acids



Sources: USDA Handbook No. 8-4 and American Soybean Association

Saturated Fats:
 

- Black: Fatty acids that increase serum cholesterol levels (lauric, myristic and palmitic)
- Diagonal lines: Fatty acids that do not affect cholesterol levels
- White: Monounsaturated
- Light blue: Polyunsaturated

These materials made available through an investment of the soybean checkoff



# Facts On FATS

Nationally recognized nutritionist, Nancy Chapman, R.D., M.P.H., has joined ASA's campaign to inform consumers of the dangers in highly saturated tropical fats. The Washington-based nutritional consultant formerly served as chief nutritionist for the House of Representatives' Committee on Agriculture, before establishing her own firm two years ago.



## Noted Nutritionist Joining Battle Against Mis-Labeled Fats

*Nancy Chapman, R.D., M.P.H.*

Ms. Chapman is serving soybean farmers as spokesperson on health and nutritional matters, as ASA works to assure that food labels differentiate between highly saturated imported tropical fats, such as palm, coconut, and palm kernel oils, and more healthful domestic fats, including soybean, sunflower, cottonseed, and corn oils.

"Tropical fats are high in saturated fats that raise serum (blood) cholesterol

levels," says Chapman. "They appear most often in baked goods, non-dairy creamers, chips and other snack foods, frozen dinners, and other processed foods."

Chapman recommends choosing foods made with oils high in polyunsaturated fats such as soybean, sunflower, and corn oil. These oils not only lower the intake of saturated fats, but also have

been shown to help reduce serum cholesterol levels."

The ASA petition to the Food and Drug Administration, along with bills pending in Congress, would help consumers determine whether food ingredients are high in saturated fat. Current FDA food labeling regulations permit tropical fats, often containing more than 90 percent saturated fat content, to be labeled simply as a "vegetable oil." Soy-

bean oil and other domestic oils contain less than 30 percent saturated fat.

Chapman says that Americans can lower their risk of heart disease by carefully controlling their intake of highly saturated fats.

"In 1982, coronary artery disease, stroke, and related heart diseases killed nearly 1 million Americans," she says. "But Americans can change their lifestyles and lower their risks. Thirty years of scientific research provides some clues about reducing the risks of killer heart disease. For every one percent decline in blood cholesterol, mortality from coronary heart disease declines by two percent."

She recommends that Americans begin immediately to lower their dietary fat by selecting low-fat dairy products, leaner meats, poultry without skin, and fish, along with fewer fried foods and fatty snacks. She also recommends eating more fruit and vegetables, as well as lower-fat breads and cereal products.

"Remember to lower your saturated fat content to less than 10 percent of your daily caloric intake," she says. That requires that food labels identify the specific fats used and state the saturated fat content. Only then can shoppers select foods with lowest fat levels.

Finally she urges consumers to avoid foods with highly saturated tropical fats and look for foods that use low saturated fat soybean, sunflower, cottonseed, corn or peanut oils.

## ASA Campaign Gets Results

Contrary to what you may have heard food manufacturers do listen to consumers.

The ASA campaign is working. ASA has learned that one large manufacturer stopped using palm oil in their crackers after receiving just 25 letters expressing concern.

Frito-Lay, Inc., the nation's largest snackfood manufacturer, has written ASA that "it is indeed true that Frito-Lay is discontinuing its use of palm oil".

A large food product distributor told ASA that food manufacturers are very concerned about consumer reaction to the information about saturated fat. The company reports an increase in sale of its soybean/cottonseed oil blend and

says manufacturers are seeking alternatives to palm and coconut oils.

You can make a difference by writing or calling food manufacturers. Tell them to end the confusion of "multiple choice" labeling for fats and oils and ask them to substitute more healthy domestic oils for saturated tropical fats. Here are some of the major food companies that use tropical fats:

Procter and Gamble Company  
#1 Procter and Gamble Plaza  
Cincinnati, OH 45202  
Phone: 800/543-7276  
In Ohio: 800/582-3945  
General Foods Company  
Box 7989  
White Plains, NY 10625

Phone: 800/431-1001

The Pillsbury Company  
200 South 6th Street  
Minneapolis, MN 55402  
800/328-4466

General Mills, Inc. (Betty Crocker)  
General Offices  
Minneapolis, MN 55440  
800/326-1144

Nabisco Brands  
Grocery Products Division  
East Hanover, NJ 07936  
201/884-4000

Sunshine Biscuits, Inc.  
Woodbridge, NJ 07095-1196  
201/855-4000



## Action On Cholesterol Labeling Heats Up In Washington

Discussions continue at the highest levels of Congress, the Executive Branch, and along Embassy Row over current food labeling that keeps consumers in the dark as to saturated fat content of vegetable oils.

At issue is whether the generic term "vegetable oil" can include both domestic oils such as soybean oil containing less than 30 percent saturated fat, and imported tropical fats such as palm, coconut, and palm kernel oils containing as much as 92 percent saturated fat. Current FDA regulations permit grouping the widely divergent oils together without informing consumers as to amounts of potentially harmful saturated fats in the food product.

The American Soybean Association (ASA) petitioned FDA in January, 1987, to require food labeling differentiating highly saturated tropical fats from more healthful soybean, corn, cottonseed and sunflower oils. FDA deferred action on ASA's petition for rule-making, electing instead to merely consider the 300-page petition as "comments" on pending and unrelated FDA cholesterol proposals.

In the months since the petition was filed, Malaysian palm producers have taken issue with ASA's initiatives to educate U.S. consumers. A reported \$2 million has been earmarked by palm producers to target U.S. media and policymakers in an effort to improve the image of tropical fats. Palm producers have also threatened possible legal action if image building efforts are unsuccessful.

ASA President Dave Haggard, a soybean farmer from Steele Missouri, says he's outraged that palm producers are spending that kind of money to influence U.S. legislation aimed at helping consumers.

"It's ironic that U.S. dollars invested in the World Bank helped build foreign palm plantations, that are stealing our soybean oil markets today," says Haggard. "Now those palm interests are coming in here and trying to tell our legislators to vote against legislation aimed at helping consumers identify foods containing products proven to be

a potential health hazard."

The legislation that has raised the ire of palm producers is HR-2148 introduced by Rep. Dan Glickman (D-Kan.) on April 13. The bill would require food labels to identify tropical fats, and to label them as "saturated fats." His bill was referred to the House Sub-Committee on Health and Environment, with hearings tentatively planned for mid-September. More than 65 Members of Congress have signed on as co-sponsors as of July 1.

Senator Tom Harkin (D-Iowa) has introduced an identical bill (S-1109) in the

Senate. Nearly a dozen Senators have co-sponsored the legislation, with hearings also planned for mid-September.

"This is an important issue for both farmers and consumers," Senator Harkin points out. His bill has been referred to the Senate Committee on Labor and Human Resources for Action.

Haggard says the battle in Washington is likely to be long and difficult. He urges farmers and consumers alike to write their Congressmen and Senators in support of the Glickman and Harkin bills.



*Reps. Dan Glickman (D-Kan.), left, and Ron Wyden (D-Ore.) announce introduction of HR-2148, a bill that would require food labels to disclose use of tropical fats, and notify consumers of the saturated nature of the palm, coconut, and palm kernel oils.*

## What Does It Mean If An Oil Is Hydrogenated

An article in the June 1987 issue of Tufts University Diet and Nutrition Letter contained an excellent explanation of this often asked question:

Since the process of hydrogenation makes a fat more saturated than it was to begin with, doesn't that mean hydrogenating oils like soybean, sunflower, corn and cottonseed oils makes them just as saturated as palm kernel and coconut oils?

Fortunately, no. When a vegetable oil high in polyunsaturated fatty acids undergoes hydrogenation it is still likely to

end up less saturated than palm or coconut oil. In fact, the hydrogenation process generally converts polyunsaturated fatty acids to monounsaturated acids; there is usually no marked increase in saturated fatty acids. That's why, says Dr. David Kritchevsky, a fats and oils specialist at Philadelphia's Wistar Institute and associate professor of biochemistry at the University of Pennsylvania, "a polyunsaturated fat like soybean oil that undergoes hydrogenation is still more unsaturated than coconut oil."



# Facts On FATS

## Help Your Heart, Get A Blood Cholesterol Test

You can significantly reduce chances of heart disease by monitoring and learning to control blood cholesterol level.

A one percent decrease in blood cholesterol decreases by two percent your risk factor for heart disease, reports the National Health Institute.

"For most people, blood cholesterol is one of the most controllable factors of those which lead to heart disease," says Linda Muser, registered dietitian for Missouri Baptist Hospital in St. Louis. Missouri Baptist is one of a growing number of health care facilities nationwide which is increasing programs in heart disease prevention.

Blood cholesterol can act as sluggish debris in your arteries, causing them to deteriorate and making your heart work harder, explains Muser. Reducing cholesterol and saturated fats in your diet in most cases will reduce blood cholesterol. In fact, the American Heart Association recommends that you consume no more than 300 milligrams of cholesterol per day.

One way to cut your cholesterol intake is to use vegetable oils, like soybean oil, which are low in saturated fats and high

in cholesterol-reducing poly-unsaturated fats.

Many health care facilities offer cholesterol testing or your family doctor can administer a cholesterol test. A technician takes a blood sample, usually by pricking your finger. Laboratory tests analyze the sample to determine the amount of cholesterol.

How much blood cholesterol is safe?

"Experts are leaning away from calling any certain amount of blood cholesterol 'normal,'" says Muser. "If you are 30 or older, strive for a blood cholesterol level of 200 or less. For persons under 30, strive for blood cholesterol of 180 or less.

"The bottom line," says Muser, "A 15 percent reduction in blood cholesterol could cut your chances of heart disease by 30 percent."

She recommends a routine test for cholesterol every two to three years. If test results indicate excessive blood cholesterol, see your doctor. By changing your diet, you may see blood cholesterol drop within two to six months. Find out by having your blood cholesterol retested in three to six months.

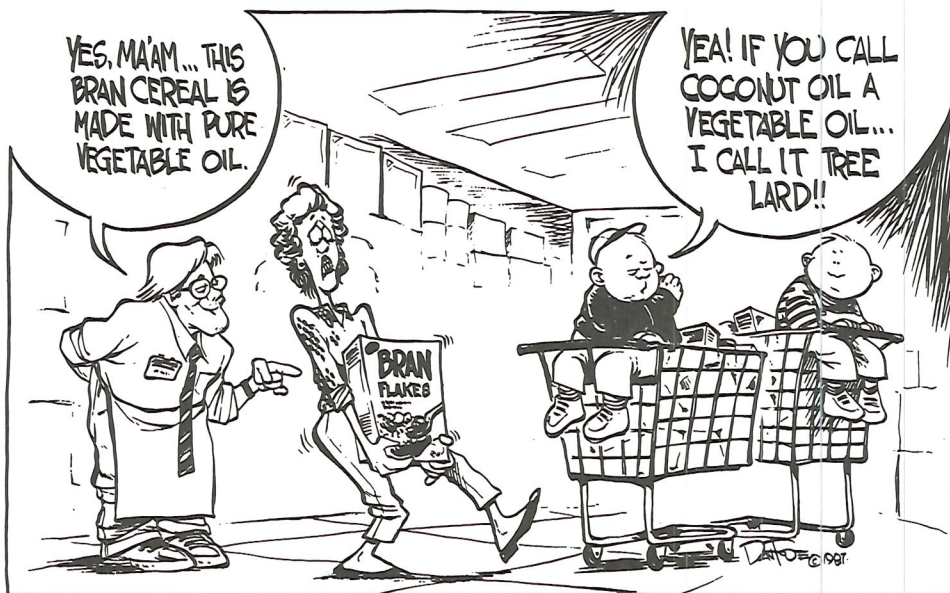
## Radio And Television Help Tell Soy Oil Story

Selecting holiday foods free of tropical fats was the subject of radio news reports over the July 4 weekend. The reports could be heard over stations that subscribe to the AP and UPI radio news services.

The spots featured nutritionist Nancy Chapman and ASA Technical Director Dr. Dave Erickson. Consumers were urged to read the labels and look for foods containing domestic oils like soybean oil that are low in saturated fat and have no cholesterol.

Additional radio news features and a television news feature are planned for future dates. A one minute television commercial urging consumers to read labels and avoid highly saturated tropical fats is under development. Cost of developing the commercial is being underwritten by Archer, Daniels Midland Co. for use with the company's sponsorship of the TV program "Face the Nation."

A number of health, consumer and senior citizens publications have been contacted on the issue of better labeling for fats and oils. Several have indicated they are considering articles to inform their readers of the issue.



Courtesy of KS Farmer

## Want More Information?

Want more information about truth-in-labeling and tropical fats? Write the American Soybean Association and ask for the "Fat Fighter Kit." The kit includes a poster, a brochure you can provide to friends and several ideas you can put to work immediately to fight tropical fats.

Write to:

**Fat Fighter**  
AMERICAN SOYBEAN ASSOCIATION  
BOX 27300 ST. LOUIS, MO 63141  
PHONE: 314/432-1600

# The Facts About Soybean Oil

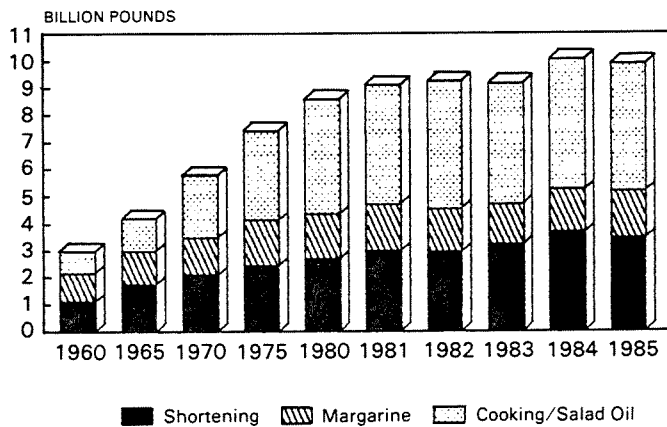
To most people, soybean oil is as American as apple pie. But soybeans are actually native to the Orient.

The seed was first introduced to the United States early in the 19th century. But it wasn't until the middle 1920s when farmers and processors actively cooperated in contracts to grow soybeans. What has happened since then has been nothing short of phenomenal.

The oil content of the soybean varies from 13 percent to 26 percent (average 18-22 percent). One bushel of soybeans (60 pounds) yields about 10.7 pounds of crude soy oil. The remainder consists of 47.5 pounds of soybean meal, which is manufactured into soy flour, soy concentrate and isolates.

After it is extracted, crude soy oil is degummed, refined, bleached, hardened or blended to make various edible oils.

## U.S. SOYBEAN OIL Consumption 1960-85



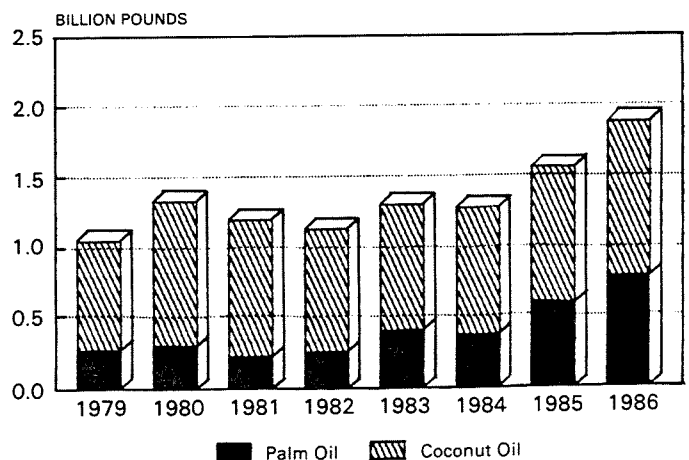
Demand for the two main products of soybeans -- oil and meal -- has helped a foster a variety of food products, agricultural industries and business ventures. But the use of soybean oil is in shortening, margarine, and salad oils as shown in the chart to the left.

All edible oils are composed of many different fatty acids. Soy oil is relatively high in polyunsaturates and low in fatty acids. This makes it an ideal edible oil for use by diet-conscious consumers. Most oil chemists and nutritionists consider total saturates in soybean oil to be nutritionally insignificant.

Demand for edible soy oil has steadily risen during the past 25 years. This has been brought about through better nutrition education regarding the importance of reducing cholesterol intake and lowering levels of saturated fat through use of vegetable oils.

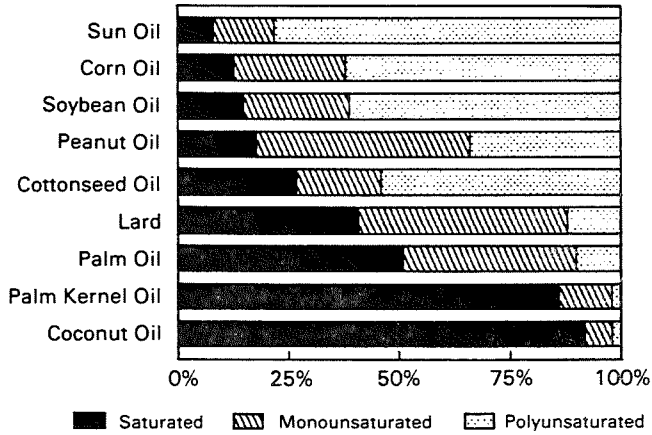
But while soybean oil remains the most popular vegetable oil in U.S. diets, statistics show an increase in use of other oils. Imported tropical fats, other vegetable oils and marine (fish) oils have contributed to the increase in fats and oils consumption.

## TROPICAL FATS U.S. Consumption



Diet conscious consumers generally view all vegetable oils alike. Yet the fatty acid content of each vegetable oil varies. Some are very low in saturated fatty acids while others such as palm, palm kernel and coconut oil contain more saturated fatty acids than animal fats.

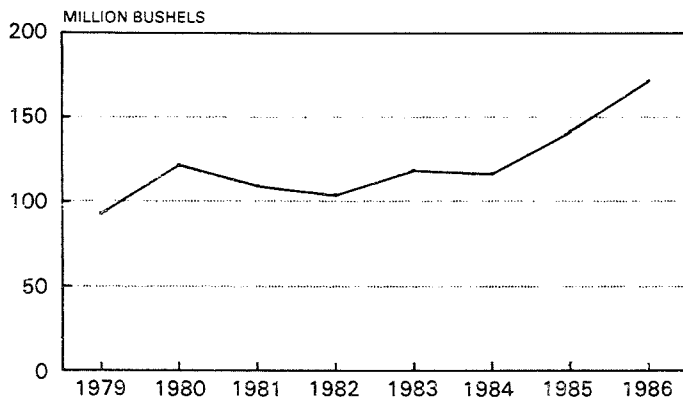
## FAT COMPOSITION % of Total Fatty Acids



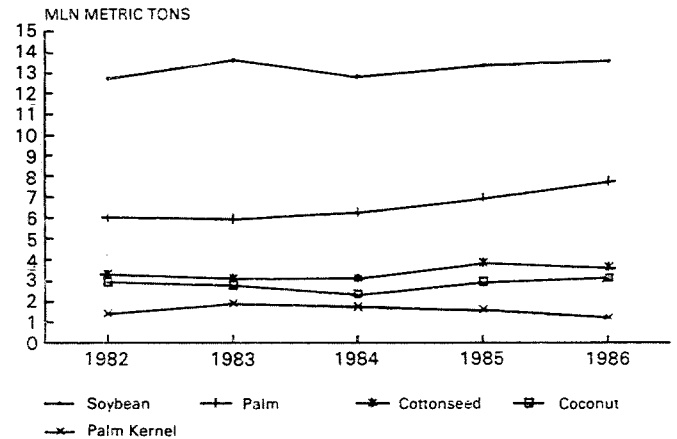
Because soy oil is considered low in saturated fatty acids, the American Soybean Association believes consumers should become familiar with foods that contain vegetable oils that may pose a risk to health.

The tables below show market growth of tropical fats consumed in the U.S.

## SOYBEANS DISPLACED By Tropical Fats



## WORLD MAJOR VEG. OILS Supply and Consumption



The table on the left shows it would have taken 171 million bushels of soybeans to produce the tropical fats being imported as a substitute for domestic vegetable oils. That's equal to the soybean production of Minnesota in 1986 (170.4 million bu.)

The increase in tropical fat imports from 1979 to 1986 was equal to 79 million bushels of soybeans. That is equal to the entire soybean crop of Mississippi (44 million bushels) plus Tennessee (37 mln bu.) in 1986. The value of soybean oil displaced by palm and coconut oil consumption was \$273 million in 1986 and \$304 million in 1985.

For more information about soybean oil, tropical fats and the need for better labeling regulations, please contact:

Dan Reuwee  
American Soybean Association  
Box 27300,  
St. Louis, MO 63141  
Phone: 314/432-1600



The American Society for Clinical Nutrition does not endorse any commercial product or program.

## Lightly hydrogenated soy oil versus other vegetable oils as a lipid-lowering dietary constituent<sup>1-3</sup>

Dawn C. Laine, R.D., Constance M. Snodgrass, R.D., Emily A. Dawson, B.A., Marita A. Ener, Ph.D., Kanta Kuba, M.S., and Ivan D. Frantz, Jr., M.D.

**ABSTRACT** Fully refined, bleached, deodorized corn oil and soy oil, and lightly hydrogenated, winterized soy oil were compared for effectiveness in lowering plasma cholesterol. Twenty-four healthy, young college students were the subjects for the 10-wk studies. At the 3000 cal level, the corn oil and unhydrogenated soy oil diets contained approximately 53 g of polyunsaturated and 26 g of saturated fat. The hydrogenated soy oil diet contained 42 and 25 g, respectively. All diets contained approximately 700 mg of cholesterol. Corn oil and unhydrogenated soy oil were equally effective in lowering both total and low density lipoprotein cholesterol. Lightly hydrogenated soy oil was also quite effective, but less so than the more unsaturated oils. Triglycerides were also lowered, but very low density and high density lipoprotein cholesterol concentrations, as well as total high density lipoproteins, were scarcely affected. All of the polyunsaturated fat diets produced small but statistically significant reductions in the cholesterol to protein ratio of all three lipoproteins. *Am J Clin Nutr* 1982;35:683-690.

**KEY WORDS** Lipoprotein composition, plasma lipid and lipoprotein concentration, soy oil, polyunsaturated fats, dietary fats

### Introduction

The primary objective of this study was to compare fully refined, bleached, deodorized soy oil and lightly hydrogenated, winterized soy oil as constituents of the diet with refined, bleached, deodorized corn oil, with respect to their effectiveness in lowering plasma cholesterol.<sup>4</sup> The corn oil and unhydrogenated soy oil diet provided approximately 16% of calories from polyunsaturated fatty acids and 8% of calories from saturated fatty acids. The lightly hydrogenated soy oil diet provided 13 and 8%, respectively. Refined, bleached, deodorized palm oil was used as the added fat in the control diets, formulated to resemble an ordinary American diet in nutrient content. Corn oil and safflower oil have been much more extensively studied than soy oil even though the latter oil accounts for 62% of shortening, 83% of margarine, 80% of salad and cooking oil, and 90% of prepared salad dressings in the United States. Salad dressings and mayonnaises are made from unhydrogenated soy oil. However, the liquid soy oil readily available from the supermarket is

lightly hydrogenated. Hydrogenation is done because soy oil contains appreciable quantities of linolenic acid, adversely affecting storage properties by oxidation and thus possibly contributing a flavor undesirable to some. Based on almost identical saturated, monosaturated, and unsaturated fatty acid composition, one would predict that corn oil and

<sup>1</sup> From the Departments of Medicine and Biochemistry and the Clinical Research Center, University of Minnesota, Minneapolis, MN 55455.

<sup>2</sup> Supported by a grant from the American Soybean Association and by Grant RR-400 from the General Clinical Research Centers Program of the Division of Research Resources, National Institutes of Health to the Minnesota Clinical Research Center. Lipid and lipoprotein analyses were carried out in the Core Laboratory of the Minnesota Lipid Research Clinic, supported by NIH Contract N01 HV2-2915-L.

<sup>3</sup> Address reprint requests to: Dr. Ivan D. Frantz, Jr., Department of Medicine, University of Minnesota, Minneapolis, MN 55455.

Received November 17, 1980.

Accepted for publication September 22, 1981.

<sup>4</sup> Winterization is a process by which refrigeration and filtration remove high melting glycerides formed during partial hydrogenation which may cause clouding at low temperatures.

unhydrogenated soy oil would behave similarly. The present study was designed to test the hypothesis that corn oil and unhydrogenated soy oil are equally effective, and to determine the relative effectiveness of lightly hydrogenated soy oil. Secondary objectives were to determine the effect of the various diets on the concentration and composition of the plasma high-density (HDL), low-density (LDL), and very low-density (VLDL) lipoproteins.

## Methods

### Subject selection

Twenty-four healthy volunteers (11 women and 13 men) completed a 10-wk outpatient study to compare the effect on blood lipids of palm oil, corn oil, unhydrogenated soy oil, and lightly hydrogenated soy oil. All subjects were college students between the ages 19 to 33 yr (mean age 24.9 yr) that met the following criteria: 1) Within  $\pm 10\%$  ideal weight for height. 2) Normal fasting cholesterol and triglyceride values. 3) No medications that would interfere with data collection. 4) Ability to maintain routine daily exercise. 5) Willingness to complete a 3-day food record to be utilized in determining an isocaloric diet. 6) Willingness to eat all meals at the General Clinical Research Center and consume no other food during the 10-wk period. 7) Abstinence from alcohol for the 10-wk period.

Prospective subjects indicating an interest in participating in the study were interviewed by a clinical research dietitian to evaluate ability to comply with the stated criteria. For all subjects selected a medical history was taken, physical examination conducted, and a battery of blood tests performed to confirm the subject's state of good health.

The protocol had the approval of the University of Minnesota's Clinical Research Committee. Written, informed consent was obtained from each subject, after thorough explanation of the details of the study.

### Experimental procedure

The volunteers were divided into four groups of 6 subjects. A 4-day menu rotation was planned by the

dietitian using food composition data from independent laboratory analysis, nutrient analysis provided by manufacturers, scientific journals, and Agriculture Handbook no. 8 (1-5).

Food for each participant was weighed individually in the raw or dry state to the nearest 0.1 g with a Mettler Electric Scale. (Foods were not transferred to other containers after they had been weighed.) Foods making a significant fat contribution in the diet were purchased in lot quantities at the beginning of the study to assure uniformity of composition. A local laboratory analyzed these products for total fat, total cholesterol, and fatty acid content (Medallion Laboratories, Minneapolis, MN). The products were not analyzed for carbohydrate and protein. These figures agreed well with those used for calculations (see Table 1).

All menus provided carbohydrate at 45% of total calories, protein at 20%, and fat at 35%. Cholesterol remained constant at approximately 700 mg daily, reflecting a high but typical intake of an average American consuming two eggs and cholesterol containing meats daily. The polyunsaturated/saturated fat (P:S) ratio varied from 0.2 for the palm oil diet to 2.0 for the corn and unhydrogenated soy oil diets. In order to highlight any possible differences in the effect of the unhydrogenated soy oil versus lightly hydrogenated soy oil, the only difference between these two diets was the type of oil

TABLE 2  
Quantity of oil added to the study diets to maintain desired P/S ratio

Type of vegetable oil*	Cal level			
	1900	2500	3000	3500
Palm oil	27.1 g	44.7 g	53.9 g	61.5 g
Corn oil	46.0 g	55.9 g	61.3 g	77.5 g
Unhydrogenated soy oil	45.4 g	55.0 g	65.4 g	74.5 g
Lightly hydrogenated soy oil	45.4 g	55.0 g	65.4 g	74.5 g

\* Palm oil provided by Capitol City Products, Co., a division of Stokley-Van Camp, Inc. Corn oil, Mazola oil. Unhydrogenated soy oil provided by the American Soybean Association. Lightly hydrogenated soy oil—Crisco oil.

TABLE 1  
A comparison of diet composition comparing food table calculations with actual values based on laboratory analysis for the 3000-kcal diet

	Palm		Corn		Unhydrogenated soy		Lightly hydrogenated soy	
	Calculated	Analyzed	Calculated	Analyzed	Calculated	Analyzed	Calculated	Analyzed
kcal	2,932.0		2,938.4		2,904.0		2,904.0	
Carbohydrate (g)	334.68		341.01		335.80		335.80	
Protein (g)	147.90		146.46		147.20		147.20	
Fat (g)	114.39	121.59	116.54	123.25	120.00	126.50	120.00	126.50
Cholesterol (mg)	758.73	779.35	702.33	722.42	702.30	686.20	702.30	686.20
Saturated fat (g)	55.21	55.56	25.18	25.54	25.80	26.90	25.78	25.60
Polyunsaturated fat (g)	11.30	12.28	49.13	52.99	51.50	52.30	42.24	41.90
P/S ratio	0.20	0.22	1.94	2.07	2.00	1.94	1.59	1.64

added (see Table 2). The fatty acid composition of the oils was determined by analysis and provided for calculation of the diets (see Table 3). Hydrogenation produced no change in the saturated fatty acid content of soy oil. In the calculations of polyunsaturated fat, all polyunsaturated fatty acids were included, without regard to *cis* or *trans* configuration.

A 7-day equilibrium period began the 10-wk study period. Each study diet period lasted 20 days; the subjects received the diets in randomized order. Groups I and III received palm oil, corn oil, and unhydrogenated soy oil; groups II and IV received palm oil, corn oil, and lightly hydrogenated soy oil (see Table 4).

Total caloric intake per day was established for each volunteer to allow for weight maintenance. Subjects were weighed daily; gains and/or losses were kept to  $\pm 2$  kg of the initial body weight by minor caloric adjustments.

During the equilibrium period three plasma blood samples were drawn for cholesterol and triglyceride analysis. In each of the three 20-day study diet periods, three plasma samples were drawn for determination of cholesterol and triglycerides—one on day 10, one on day 18, and one on day 20. No additional reduction in plasma cholesterol occurred from the mid-period determinations to those at the end of the 20 days, and so the three measurements were averaged. A sample was also drawn on day 20 for determination of LDL, VLDL, and HDL cholesterol and protein and for fractionation of HDL by analytical ultracentrifuge.

#### Laboratory methods

Laboratory methods for analysis of food and oils were those of the Association of Official Analytical Chemists (6) and American Oil Chemists' Society (7).

Total plasma cholesterol and triglycerides and LDL,

VLDL, and HDL cholesterol were determined according to standard Lipid Research Clinics methodology (8), with the use of the AutoAnalyzer II. HDL<sub>1</sub>, HDL<sub>2</sub>, and HDL<sub>3</sub> were measured in the analytical ultracentrifuge by methods developed by the Donner Laboratory (9).

In preparation for determination of their composition, lipoproteins were separated from plasma collected in 0.1% EDTA by sequential ultracentrifugation at densities 1.006, 1.067, and 1.216 according to standard techniques (10). The fractions were further purified by recentrifugation at their corresponding densities, a step that proved especially important in the case of VLDL to eliminate traces of contamination with other lipoproteins.

Protein was determined using the Markwell modification (11) of the Lowry method (12). Due to the low concentration of VLDL and HDL cholesterol, the determinations were done according to the Abell method (13).

#### Results

Table 5 shows the average plasma concentrations of total cholesterol, triglycerides, LDL cholesterol, VLDL cholesterol, HDL cholesterol, and total HDL for each of the four groups of subjects after stabilization on each of the experimental diets. In order to facilitate comparisons, the data are presented in Table 6 as changes from the palm oil regimen to corn oil and unhydrogenated and hydrogenated soy oil. The groups whose treatment differed only in the order in which the diets were rotated have been combined. Corn oil produced an average reduction in total plasma cholesterol of 13.2%, and in LDL cholesterol, 22.8%. The corresponding reductions for unhydrogenated soy oil were 12.9 and 24.3%, respectively, and for hydrogenated soy oil, 9.2 and 9.7%. An additional feature of Table 6 is an entry of the predicted change in total cholesterol, calculated according to Anderson et al. (the Keys-Anderson-Grande equation) (14). The predicted value for each subject was calculated on the basis of his diet assignment, with an "intrinsic factor" correction derived from his average plasma cholesterol concentration while consuming the palm oil diet. Although wide individual variations were apparent, the average of the predicted values agreed rather well with the values observed. Most of the reduction in total cholesterol could be accounted for by the reduction in LDL. HDL cholesterol did not change significantly with any of the diets. Triglycerides showed small reductions. VLDL cholesterol rose with two of the diets and fell with the other two. The changes

TABLE 3  
Percentage fatty acid composition of oils used in the study diets\*

	Corn oil	Lightly hydrogenated soy oil	Unhydrogenated soy oil	Palm oil
C12				0.4
C14		0.1	0.1	1.0
C16	11.2	8.9	10.3	39.1
C18	2.1	4.6	4.7	6.1
C18:1	25.3	45.5	23.4	42.6
C18:2	59.8	37.1	53.2	9.6
C18:3	1.1	3.3	7.6	0.4
C20	0.3	0.2	0.3	0.3
C22		0.2	Trace	
<i>Cis-cis</i> †	58.9	33.4	57.6	10.0
<i>Trans</i> ‡	ND§	15.5	ND§	ND§

\* Data from "log book" from Dr. Savinay Patel of Central Soya, Research and Engineering Center, Fort Wayne, IN. Determined by A.O.C.S. Official Method Ce 1-62 (7).

† Determined by A.O.C.S. Tentative Method Cd 15-78 (7). This method, which uses a soybean lipoxidase, is specific for the *cis, cis* 1, 4 methylene interrupted diene structure.

‡ Total isolated *trans* double bonds, determined by A.O.C.S. Official Method Cd 14-61 (7).

§ Not determinable by the method used.



TABLE 4  
Calculated dietary intake for the 10-wk study period

Group	7-Day equilibrium diet	1st 20-Day study diet	2nd 20-Day study diet	3rd 20-Day study diet
Group I	Palm oil	Palm oil	Corn or RBD* soy oil <sup>†</sup>	Corn or RBD soy oil
	700 mg cholesterol P:S ratio 0.2 35% Fat	700 mg cholesterol P:S ratio 0.2 35% Fat	700 mg cholesterol P:S ratio 2.0 35% Fat	700 mg cholesterol P:S ratio 2.0 35% Fat
Group II	Palm oil	Palm oil	Corn or LHW† soy oil	Corn or LHW soy oil
	700 mg cholesterol P:S ratio 0.2 35% Fat	700 mg cholesterol P:S ratio 0.2 35% Fat	700 mg cholesterol P:S ratio 2.0 or 1.5‡ 35% Fat	700 mg cholesterol P:S ratio 2.0 or 1.5‡ 35% Fat
Group III	Palm oil	Corn or RBD soy oil	Corn or RBD soy oil	Palm oil
	700 mg cholesterol P:S ratio 0.2 35% Fat	700 mg cholesterol P:S ratio 2.0 35% Fat	700 mg cholesterol P:S ratio 2.0 35% Fat	700 mg cholesterol P:S ratio 0.2 35% Fat
Group IV	Palm oil	Corn or LHW soy oil	Corn or LHW soy oil	Palm oil
	700 mg cholesterol P:S ratio 0.2 35% Fat	700 mg cholesterol P:S ratio 2.0 or 1.5‡ 35% Fat	700 mg cholesterol P:S ratio 2.0 or 1.5‡ 35% Fat	700 mg cholesterol P:S ratio 0.2 35% Fat

\* Refined, bleached, deodorized.

† Lightly hydrogenated, winterized.

‡ In those diets containing corn or unhydrogenated soy oil, the P:S ratio was held as closely as possible to 2.0. At the four caloric levels, it actually varied from 1.96 to 2.06. In those diets containing lightly hydrogenated soy oil, the P:S ratio varied from 1.42 to 1.51.

reached statistical significance, but were small in magnitude. Corn oil and unhydrogenated soy oil were equally effective in reducing plasma total and LDL cholesterol concentrations, but corn oil was definitely more effective than lightly hydrogenated soy oil ( $p < 0.01$  for both total and LDL cholesterol).

For group 4, the ratio of HDL<sub>2</sub> to HDL<sub>2</sub> + HDL<sub>3</sub> was measured. No significant changes were found. On the palm oil diet the average ratio for the six subjects was 0.33, on corn oil it was 0.36, and on lightly hydrogenated soy oil 0.32.

For group 4, the cholesterol/protein ratio was measured for the three lipoprotein classes. As shown in Table 7, small but statistically significant decreases in this ratio were found for all of the lipoproteins with the

change from the saturated to both of the polyunsaturated fat diets. To check on the possibility that these changes might have been due to an effect of lipoprotein lipid composition on the protein content as determined by the Lowry method, protein was also determined in one subject by amino acid analysis. Table 8 shows that the ratio of the protein content as measured by the two methods differed somewhat for the three lipoproteins. The ratio for each lipoprotein was the same within experimental error, however, when the subject had been maintained on the palm oil or the corn oil diet.

#### Discussion

Rather high cholesterol diets were used in these experiments because of our earlier ob-

TABLE 5  
Mean values in mg/dl and SE for all subjects on the various regimens

Plasma values*	Group 1				Group 2				Group 3				Group 4													
	Palm oil		Corn oil		Unhydrogenated soy oil		Palm oil		Corn oil		Lightly hydrogenated soy oil		Palm oil		Corn oil		Unhydrogenated soy oil		Palm oil		Corn oil		Lightly hydrogenated soy oil			
	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM	$\bar{x}$	SEM		
Total cholesterol	205.5	±180.7	176.0	±150.0	161.0	±161.0	191.2	±163.5	168.9	±153.0	180.9	±153.0	161.2	±153.0	180.9	±153.0	161.2	±153.0	180.9	±153.0	161.2	±153.0	180.9	±153.0	161.2	±153.0
Triglycerides	68.3	±57.5	55.9	±45.4	64.4	±64.4	51.4	±49.6	48.5	±48.5	55.4	±47.7	47.9	±47.9	55.4	±47.7	47.9	±47.9	55.4	±47.7	47.9	±47.9	55.4	±47.7	47.9	±47.9
LDL cholesterol	130.7	±112.0	102.5	±79.3	94.2	±94.2	117.7	±81.0	85.2	±85.2	109.3	±90.0	101.2	±101.2	109.3	±90.0	101.2	±101.2	109.3	±90.0	101.2	±101.2	109.3	±90.0	101.2	±101.2
VLDL cholesterol	6.7	±9.0	8.7	±8.7	11.5	±11.5	7.7	±7.7	13.0	±13.0	16.5	±16.5	4.2	±4.2	8.7	±8.7	4.2	±4.2	8.7	±8.7	4.2	±4.2	8.7	±8.7	4.2	±4.2
HDL cholesterol†	64.2	±66.8	62.3	±53.3	56.2	±56.2	69.0	±70.7	67.7	±67.7	61.2	±58.8	58.2	±58.2	61.2	±58.8	58.2	±58.2	61.2	±58.8	58.2	±58.2	61.2	±58.8	58.2	±58.2
HDL total‡	315	±315	285	±285	224	±224	298	±298	319	±319	315	±315	262	±262	298	±298	262	±262	298	±298	262	±262	298	±298	262	±262
	±54	±52	±42	±32	±39	±39	±40	±35	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26	±26

\* Total cholesterol and triglyceride values are based on the average of three measurements on each of the six subjects in each of the four groups. Other values are from single analyses on each subject at the end of the 20-day periods.

† By precipitation

‡ By analytical ultracentrifuge.

servation that at high cholesterol intakes, the effect of the degree of saturation of the dietary fats seemed to be accentuated (15).

Our calculations of predicted changes in plasma cholesterol were based on each subject's average plasma cholesterol concentration while eating the palm oil diet. This diet was designed to mimic an average American diet in nutrient content. Predicted changes arrived at in this way agreed quite closely with the observed changes, suggesting that our subjects' adherence closely approached that of subjects maintained under the more rigid conditions of an in-patient metabolic ward, from which the Keys-Anderson-Grande equation was derived. Predictions based on the subjects' initial cholesterol levels, before any dietary intervention, fell well short of the observed reductions. The reason for this circumstance was that several of our subjects had unusually low cholesterol levels while consuming their self-selected diets, resulting in very large corrections for the "intrinsic factor" (3, 14, 16, 17). This factor is defined as  $1.84\pi - 0.84$ , where  $\pi$  is the ratio of the individual's blood cholesterol on an ordinary American diet, divided by 224, which was the average level for the persons from whom the factor was derived. The "intrinsic factor" as calculated in this way is most likely invalid at low cholesterol concentrations, in view of the fact that it actually becomes negative at a plasma cholesterol below 102 mg/dl and would predict a rise in cholesterol if the diet were made less saturated. One of our subjects had an initial base-line level of 95 mg/dl. This rose to an average of 151 on palm oil. It fell 36 mg/dl on corn oil, and 14 mg/dl on lightly hydrogenated soy oil. It is worth noting that every one of our subjects showed a fall in cholesterol on all of the unsaturated fat diets to which they were assigned. There were no nonresponders.

Although lightly hydrogenated soy oil is lower in polyunsaturated fat than corn and unhydrogenated soy oils, its predicted effectiveness is not greatly inferior (Table 6). This is because it is similarly low in saturated fat, which is twice as important, gram for gram, in its effect on plasma cholesterol as is polyunsaturated fat. In our groups 2 and 4, lightly hydrogenated soy oil produced an average

TABLE 6

Mean change in mg/dl  $\pm$  SE and p values\* where refined, bleached, deodorized palm oil in the diet was replaced by refined, bleached, deodorized corn oil, refined, bleached, deodorized soy oil, or lightly hydrogenated, winterized soy oil

Plasma values (mg/dl)	Groups 1 and 3						Groups 2 and 4					
	Corn oil		Unhydrogenated soy oil		Corn oil		Lightly hydrogenated soy oil		Corn oil		Lightly hydrogenated soy oil	
	$\bar{x}$	SEM	p	$\bar{x}$	SEM	p	$\bar{x}$	SEM	p	$\bar{x}$	SEM	p
Total cholesterol												
Predicted	-27.8			-27.4			-21.6			-18.6		
Observed	-26.3 $\pm$ 3.40		<0.001	-25.9 $\pm$ 3.84		<0.001	-25.9 $\pm$ 2.96		<0.001	-16.4 $\pm$ 2.50		<0.001
Difference P-O	-1.5 $\pm$ 3.49		NS	-1.5 $\pm$ 3.46		NS	+4.3 $\pm$ 2.67		NS	-2.2 $\pm$ 2.59		NS
Triglycerides	-6.3 $\pm$ 2.57		<0.05	-7.7 $\pm$ 2.51		<0.02	-7.4 $\pm$ 3.02		<0.05	-2.8 $\pm$ 3.57		NS
LDL cholesterol	-27.7 $\pm$ 4.64		<0.001	-30.3 $\pm$ 3.80		<0.001	-23.8 $\pm$ 3.79		<0.001	-10.8 $\pm$ 2.86		<0.01
VLDL cholesterol	3.8 $\pm$ 1.61		<0.05	5.4 $\pm$ 2.38		<0.05	-5.6 $\pm$ 0.98		<0.001	-5.5 $\pm$ 1.53		<0.01
HDL cholesterol†	2.2 $\pm$ 1.44		NS	-1.6 $\pm$ 1.22		NS	-0.7 $\pm$ 2.73		NS	-0.1 $\pm$ 1.65		NS
Total HDL‡	-12.6 $\pm$ 20.81		NS	-1.3 $\pm$ 17.14		NS	-25.7 $\pm$ 8.41		<0.02	-12.5 $\pm$ 11.96		NS

\* Based on 2-tailed paired t tests.

† By precipitation.

‡ By analytical ultracentrifuge.

TABLE 7

Cholesterol/protein ratio, group 4 (palm, corn, and lightly hydrogenated soy oil)

	Palm	Corn	C/P ratio change	p*	% Change
VLDL	1.14 $\pm$ 0.05†	1.00 $\pm$ 0.04	-0.14 $\pm$ 0.03	<0.01	-12.33 $\pm$ 2.73
LDL	1.52 $\pm$ 0.03	1.38 $\pm$ 0.03	-0.14 $\pm$ 0.01	<0.001	-8.80 $\pm$ 0.86
HDL	0.371 $\pm$ 0.017	0.331 $\pm$ 0.014	-0.040 $\pm$ 0.007	<0.01	-10.50 $\pm$ 1.63
	Palm	Lightly hydrogenated soy	C/P ratio change	p*	% Change
VLDL	1.14 $\pm$ 0.05	0.99 $\pm$ 0.04	-0.15 $\pm$ 0.05	<0.05	-13.15 $\pm$ 3.68
LDL	1.52 $\pm$ 0.03	1.41 $\pm$ 0.02	-0.11 $\pm$ 0.03	<0.02	-6.85 $\pm$ 1.72
HDL	0.371 $\pm$ 0.017	0.343 $\pm$ 0.015	-0.028 $\pm$ 0.008	<0.05	-7.33 $\pm$ 2.01
	Corn	Lightly hydrogenated soy	C/P ratio change	p*	% Change
VLDL	1.00 $\pm$ 0.04	0.99 $\pm$ 0.04	-0.01 $\pm$ 0.05	NS	-0.50 $\pm$ 5.18
LDL	1.38 $\pm$ 0.03	1.41 $\pm$ 0.02	+0.03 $\pm$ 0.03	NS	+2.22 $\pm$ 2.07
HDL	0.331 $\pm$ 0.014	0.343 $\pm$ 0.015	+0.012 $\pm$ 0.008	NS	+3.63 $\pm$ 2.47

\* Based on 2-tailed paired t-tests.

† Mean  $\pm$  SEM.

TABLE 8

Comparison of the Lowry method and the amino acid analysis in the determination of lipoprotein protein

Lipoprotein	Palm Oil Diet			Corn Oil Diet		
	Lowry	Amino acid	Amino acid	Lowry	Amino acid	Amino acid
			Lowry			Lowry
VLDL	$\mu\text{g}^*$ 45.8	$\mu\text{g}^*$ 43.8	0.96	$\mu\text{g}^*$ 25.2	$\mu\text{g}^*$ 24.0	0.95
LDL	44.6	36.0	0.81	44.6	37.7	0.85
HDL	40.8	38.5	0.94	40.8	37.4	0.92

\*  $\mu\text{g}$  lipoprotein protein in the sample analyzed. Identical aliquots were analyzed by the two methods.

fall in cholesterol of 16.4 mg/dl, whereas corn oil produced a fall of 25.9. This difference is somewhat greater than called for by the predictions, suggesting that some other charac-

teristic of the lightly hydrogenated oil may have a slight negative influence on its effectiveness. Its content of *trans* fatty acids is a possibility, but most previous evidence favors

the view that, with respect to blood cholesterol lowering, *trans* fatty acids behave like *cis* acids (18-20).

We are unable to confirm the impression of some persons in the food industry that unhydrogenated soy oil is unacceptable because of its taste. None of our subjects offered a complaint, despite the large amounts of oil that they consumed.

In our experiments, LDL cholesterol was the only component of plasma cholesterol that showed important responses to diet. A small but statistically significant decrease was found in the lipoprotein cholesterol/protein ratio in all three lipoprotein classes with the change from saturated to unsaturated diet and may offer support for the hypothesis that unsaturated fats alter the configuration of lipids within the lipoproteins, reducing their cholesterol transporting capacity. On the other hand, lightly hydrogenated soy oil altered the cholesterol/protein ratio about as much as corn oil, yet it is considerably lower in polyunsaturated fat. Our results are in agreement with the work of Spritz and Mishkel (21) and Shepherd et al. (22, 23). Durrington et al. (24) did not observe any changes in the LDL and VLDL cholesterol/apo B ratio when the P:S ratio was changed from 0.23 to 2.82 with a simultaneous reduction of dietary cholesterol from 667 to 112. It is conceivable that the pattern of response to changes in the P:S ratio also depends on the amount of dietary cholesterol.

Durrington suggested that the discrepancies in the changes of cholesterol/protein ratios in the three studies could be the result of incorrect protein determinations. It has been shown that the Lowry protein method may give misleading results when applied to lipoproteins (25). In the present study a modification of the original procedure was used. Markwell et al. (11) have shown that the use of sodium dodecyl sulfate during the assay eliminates the need for delipidating lipoproteins. To determine if different lipid composition of the lipoprotein might affect the protein determination, amino acid analysis was done on the lipoproteins of a subject on both saturated and unsaturated fat diets. Although there is a definite difference in the amount of protein measured by the Lowry method and amino acid analysis, the ratio of protein (Lowry, BSA standard)/protein (amino acid

analysis) of lipoproteins separated after different diets is unchanged within the accuracy of the analysis. □

The authors thank Dr. James B. Howard for carrying out the amino acid analyses, and Dr. Frederick C. Goetz for making available the facilities of the University of Minnesota General Clinical Research Center. The authors are especially grateful to Dr. Frank Lindgren for tutoring us in the use of the analytical ultracentrifuge and for providing us with the Berkeley computer program for analyzing the ultracentrifugal results.

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# Kansas Food Dealers' Association, Inc.

2809 WEST 47th STREET SHAWNEE MISSION, KANSAS 66205  
PHONE: (913) 384-3838

February 29, 1988

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## SENATE AGRICULTURE COMMITTEE

### OPPOSING SB 693

SB 693 would completely isolate Kansas and make it difficult for our retailers to stock their shelves with food products. Manufacturers would be required to re-do their labels for containers of food to list the percentage of EACH ingredient in proportion to total weight and volume of food in a container. IF SB 693 PASSED, they would have about three months to comply with the law for anything shipped into Kansas.

We checked with a wholesaler for an estimate of the number of foods found in an average supermarket and determined that in a total of 13,000 items, over 10,000 FOOD ITEMS would be included in this bill.

What would likely happen, if this bill passed, is that Kansans would have LESS ITEMS TO CHOSE FROM, and be forced to go to neighboring states to buy groceries.

It would probably require that retailers having a deli or salad bar within their store operation, make a list of percentages of ingredients in those items also.

The FDA now permits foods that meet government requirements for "Standards of Identity" to omit those items. This is common practice when dealing with tomato paste, catsup, salad dressings, ice cream, to name a few. I have attached copies of some labels which list the ingredients as well as nutritional value. Long ago we were taught that ingredients on a label are listed in the order of predominance.

We believe good nutrition is a matter of education rather than labelling. We could have labels a yard long but most consumers wouldn't read or understand it. For the consumers who require more information for dietary purposes, our retailers have always supplied them with the manufacturer's address. On the Pork and Bean ingredients panel the address for more dietary information is printed at the bottom of the label.

We respectfully ask that you NOT PASS SB 693.

*attachment 6  
2-29-88*

# Kansas Food Dealers' Association, Inc.

JAMES G. SHEEHAN, EXECUTIVE DIRECTOR  
2809 WEST 47th STREET • SHAWNEE MISSION, KANSAS 66205  
PHONE (913) 384-3838



INGREDIENTS: PREPARED SMALL WHITE BEANS, WATER, TOMATO PUREE, SUGAR, CORN SYRUP, SALT, VINEGAR, PORK, SODIUM BICARBONATE, ONION POWDER, SPICE, NATURAL AND ARTIFICIAL FLAVORS.

**NUTRITION INFORMATION PER SERVING**  
SERVING SIZE 8 OZ (227 GRAMS)  
APPROXIMATE SERVINGS PER CONTAINER 2  
CALORIES 230 CARBOHYDRATE 41 GRAMS  
PROTEIN 11 GRAMS FAT 2 GRAMS  
SODIUM 1000 MG

**PERCENTAGE OF U.S. RECOMMENDED DAILY ALLOWANCES (U.S. RDA)**  
PROTEIN 15 RIBOFLAVIN (VITAMIN B<sub>2</sub>) 6  
VITAMIN A 2 NIACIN 4  
VITAMIN C 4 CALCIUM 10  
THIAMIN (VITAMIN B<sub>1</sub>) 8 IRON 20

PORK AND BEANS ARE A SIGNIFICANT SOURCE OF PROTEIN, CALCIUM AND IRON.

For additional information write to Consumer Response-9VP at address below.

**GUARANTEE** Your money back if not satisfied. Please send the code imprinted on end of can with an explanation of what you did not like to Consumer Response-9VP.

Stokely-Van Camp, Inc., Chicago, Illinois 60654

## RICE A RONI<sup>®</sup> FRIED RICE

INGREDIENTS: ENRICHED RICE, (RICE, NIACIN, REDUCED IRON, THIAMINE MONONITRATE AND RIBOFLAVIN), ENRICHED VERMICELLI (VERMICELLI, NIACIN, REDUCED IRON, THIAMINE MONONITRATE AND RIBOFLAVIN), ALMONDS, PRESERVED WITH B.H.A. AND B.H.T., SALT, LACTOSE, MONOSODIUM GLUTAMATE, DRIED CORN SYRUP, NATURAL FLAVORS, HYDROLYZED VEGETABLE PROTEIN, DRIED CELERY, DRIED LEEKS, DRIED ONION, PARTIALLY HYDROGENATED VEGETABLE OIL (SOYBEAN AND/OR PALM AND/OR COTTONSEED OIL), DRIED PARSLEY, TURMERIC, DRIED GARLIC, DISODIUM INOSINATE, DISODIUM GUANYLATE, ARTIFICIAL FLAVOR, SODIUM SULFITE, SODIUM BISULFITE ADDED TO VEGETABLES TO PRESERVE COLOR.

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DISTRIBUTED UNDER LICENSE BY:  
NUTRITION INDUSTRIES CORPORATION, P.O. Box 4E, Cresskill, New Jersey 07626

**NUTRITION INFORMATION (PER SERVING)**  
SERVING SIZE 1 TBSP. (14 g)  
SERVINGS PER CONTAINER (1 QT.) 64  
CALORIES 40  
PROTEIN 0 g  
CARBOHYDRATE 0 g  
FAT 1 g  
PERCENT OF CALORIES FROM FAT 91 %  
POLYUNSATURATED 1 g  
SATURATED 1 g  
\*CHOLESTEROL (35 mg/100 g) 5 mg  
SODIUM 80 mg

**PERCENTAGE OF U.S. RECOMMENDED DAILY ALLOWANCES (U.S. RDA)** VITAMIN E 6%; CONTAINS LESS THAN 2% OF THE U.S. RDA OF PROTEIN, VITAMIN A, VITAMIN C, THIAMINE, RIBOFLAVIN, NIACIN, CALCIUM AND IRON.  
\*Information on fat and cholesterol content is provided for individuals who, on the advice of a physician, are modifying their total dietary intake of fat and cholesterol.

**CALORIES PER SERVING**  
Weight Watchers 40  
Regular Mayonnaise 100



**NUTRITION INFORMATION (PER SERVING)**

SERVING SIZE 1 TBSP. (14 g) PERCENTAGE OF U.S. RECOMMENDED DAILY ALLOWANCE (U.S. RDA)  
SERVINGS PER CONTAINER 32 VITAMIN A 10%  
CALORIES 100 CONTAINS LESS THAN 2 PERCENT OF THE U.S. RDA OF PROTEIN, VITAMIN C, THIAMINE, RIBOFLAVIN, NIACIN, CALCIUM AND IRON.  
PROTEIN 0 g  
CARBOHYDRATE 0 g  
FAT (100% OF CALORIES) 11 g  
SODIUM 100 mg

INGREDIENTS: LIQUID SOYBEAN OIL, PARTIALLY HYDROGENATED SOYBEAN OIL, WATER, SALT, LECITHIN, WHEY, VEGETABLE MONO AND DIGLYCERIDES, SODIUM BENZOATE AS A PRESERVATIVE, ARTIFICIALLY COLORED, (BETA CAROTENE) ARTIFICIALLY FLAVORED, VITAMIN A PALMITATE ADDED.

INGREDIENTS: AMERICAN CHEESE (MILK, CHEESE CULTURES, SALT, ENZYMES), WATER, NONFAT MILK SOLIDS, CHEESE WHEY SOLIDS, SODIUM PHOSPHATE, CHEESE, SALT, SORBIC ACID (AS A PRESERVATIVE), ARTIFICIAL COLOR.

**NUTRITION INFORMATION PER SERVING**  
SERVING SIZE 1 oz. PROTEIN 5g  
SERVINGS PER CONTAINER 32 CARBOHYDRATE 2g  
CALORIES 60 FAT 6g  
SODIUM 380mg

**PERCENTAGE OF U.S. RECOMMENDED DAILY ALLOWANCES (U.S. RDA)**  
PROTEIN 10 RIBOFLAVIN 10  
VITAMIN A 4 NIACIN 0  
VITAMIN C 0 CALCIUM 15  
THIAMINE 2 IRON 0

Processed Cheese Spread

BASED ON USDA  
HANDBOOK #8

NET 32 FL. OZS. (1 QT.)

REDUCED CALORIE  
MAYONNAISE

Weight Watchers<sup>™</sup>

HALF THE CALORIES OF  
REGULAR MAYONNAISE.  
NO ARTIFICIAL FLAVOR OR COLOR



K PARVE



## ADDITIVES ON FOOD LABELS

Commercial additives are developed by scientists, therefore they have scientific or chemical names. Consider common words like air, vinegar and salt. A scientist refers to them as oxygen (O<sub>2</sub>), acetic acid (CH<sub>3</sub>COOH) and sodium chloride (NaCl). When unfamiliar scientific terms appear on food labels, many people become suspicious. Let's examine some additives that appear on food labels in context with their purpose, then perhaps they will seem less ominous.

### purpose label terms

- To Preserve Freshness:
 

Microorganism Controls	Calcium propionate, Sodium benzoate, Sorbic acid, Methylparaben
Antioxidants	Butylated hydroxyanisole (BHA), Butylated hydroxytoluene (BHT), Propyl gallate
  
- To Add Flavor:
 

	Citrus oils
	Amyl acetate, Benzaldehyde
  
- To Improve Texture and Consistency:
 

Emulsifiers	Cholic acid, Glycocholic acid, Dexoxycholic acid, Lecithin, Mono- and Di-glycerides
Stabilizers and Thickeners	Gum arabic, Modified starch, Calcium carbonate, Sodium caseinate, Magnesium stearate, Agar-agar

### purpose label terms

- To Provide Color:
 

	Carotene, Annatto, Cochineal
--	------------------------------
  
- To Control Acidity or Alkalinity:
 

Leavening Agents	Sodium acid phosphate, Monocalcium phosphate
Acid-Alkaline Balance	Acetic acid, Citric acid, Hydrochloric acid, Phosphoric acid, Lactic acid, Sodium hydroxide, Bicarbonate of soda
  
- To Act as Maturing and Bleaching Agents:
 

	Chlorine, Chlorine dioxide, Potassium bromate, Benzoyl peroxide
--	---
  
- To Provide Nutrients:
 

Vitamin A	– Vitamin A acetate – Vitamin A palmitate
Vitamin B <sub>1</sub>	– Thiamine hydrochloride – Thiamine mononitrate
Vitamin B <sub>2</sub>	– Riboflavin – Riboflavin – 5 – phosphate
Vitamin B <sub>3</sub>	– Niacin, Niacinamide
Vitamin B <sub>6</sub>	– Pyridoxine hydrochloride
Vitamin C	– Ascorbic acid
Vitamin D	– Vitamin D <sub>2</sub> or D <sub>3</sub> – Tocopherols
Calcium	– Calcium oxide – Calcium sulfate – Calcium phosphate
Iron	– Ferrous sulfate – Ferric phosphate – Ferric pyrophosphate
Potassium	– Potassium chloride
Sodium	– Sodium phosphate – Sodium pantothenate



Additional information about food additives can be obtained from:

U. S. Department of Health, Education, and Welfare  
 Public Health Service  
 Food and Drug Administration  
 5600 Fishers Lane  
 Rockville, Md. 20852

Manufacturing Chemists Association  
 1825 Connecticut Avenue, N. W.  
 Washington, D.C. 20009

Institute of Food Technologists  
 221 N. LaSalle Street  
 Chicago, IL 60601





**FLINT HILLS FOODS, INC. • QUALITY MEATS**

P.O. Box 435 • ALMA, KANSAS • 66401

Tel. 913-765-3396

February 29, 1988

Subject: Kansas Meat Processors Association opposing S.B. 693

- 1) Economic Impact to our Industry - Extreme cost
  - a. All labels redone - Approvals
  - b. All labeling laws are federal - other states a problem
  - c. Require a Quality Control Program
  - d. Affects many agri businesses
- 2) Labels are controlled now
  - a. Has to be listed in order of amount
  - b. Would require exposing our formulas
  - c. Many items amounts change daily with market
  - d. Many ingredients are controlled amounts by USDA and FDA
- 3) Wrong Approach
  - a. Concern needs different solution - USDA petition
  - b. Anti Agri-business
  - c. Creates "Island of Kansas"

Respectfully submitted,

Bernard L. Hansen, President  
FLINT HILLS FOODS, INC.

attachment 7  
2-29-88

STATE OF KANSAS



DEPARTMENT OF HEALTH AND ENVIRONMENT

*Forbes Field*

*Topeka, Kansas 66620-0001*

*Phone (913) 296-1500*

Mike Hayden, *Governor*

Stanley C. Grant, Ph.D., *Secretary*

Gary K. Hulett, Ph.D., *Under Secretary*

Testimony Presented to

Senate Committee on Agriculture

by

The Kansas Department of Health and Environment

Senate Bill 693

Passage of S.B. 693 would create a new state law concerning the labeling of food products. Provisions of S.B. 693 would require labeling on immediate containers of food to contain a listing of ingredients indicating the percent of total weight and volume for each ingredient. Foods would be considered to be misbranded if in immediate containers having labels in noncompliance with the Act.

At any given time a full line retail food store may contain as many as 10,000 separate food products requiring individual immediate container labeling. Most, if not all of these products, would require label modifications subject to passage of Senate Bill 693. Foods manufactured and involved in interstate commerce complying with the requirements of other state and federal agencies would be considered as misbranded in Kansas. All companies providing foods in immediate containers in Kansas would be required to modify their product labels. Data collection by industry for necessary label information would be complex and costly.

Many products have been assigned a standard of identity as a means of assuring product consistency. Products having a standard of identity continue to have certain label requirements but are not required to include listing of ingredients. Products not having any standard of identity are required to list ingredients in order of their preponderance.

Senate Bill 693 does not designate an agency to assume responsibility for enforcement. The Kansas Department of Health and Environment and the Kansas State Board of Agriculture currently have food establishment inspection programs in place. Provisions of S.B. 693 could not be enforced without additional staff.

*attachment 8*

*2-29-88*

Testimony  
Senate Bill 693  
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Considering the potential conflicts with other regulatory agencies and the history of the food product label development across the United States, we do not offer support for S.B. 693.

Presented by: Stephen Paige, Director  
Bureau of Food, Drug &  
Lodging  
February 29, 1988

*attachment 8*  
*2-29-88*