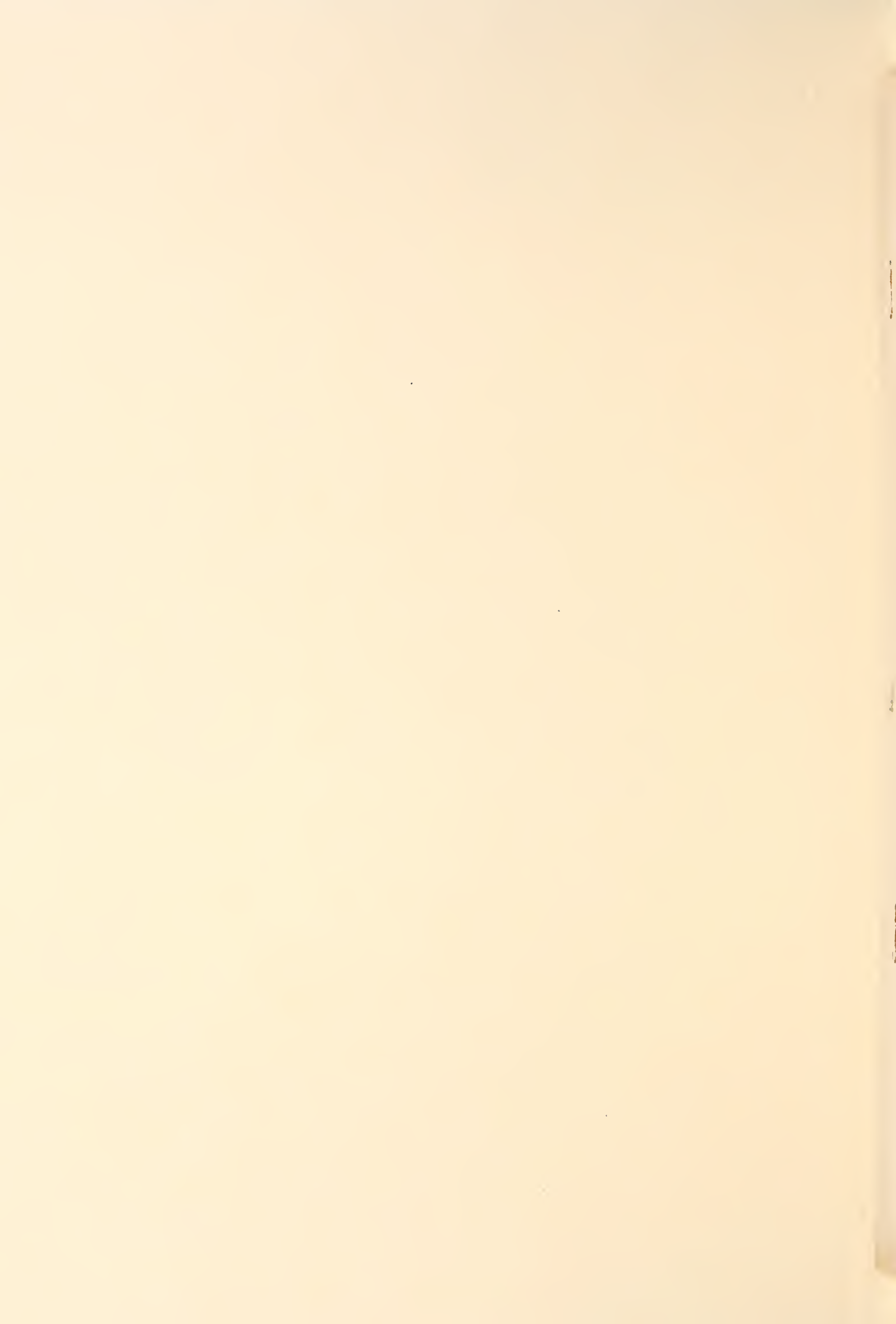


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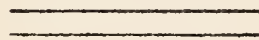
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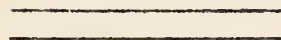
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VITAMINS A, B, AND C IN FOODS



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The accompanying table of the distribution of vitamins A, B, and C in food materials is a revision and extension of the table in the monograph of the American Chemical Society entitled "The Vitamins."¹ A slightly different grouping of the food materials has been followed to conform with the classification in Farmers' Bulletin 1313. It has been thought inadvisable at the present time to extend the table to include the antirachitic vitamin (vitamin D) or the reproductive vitamin (vitamin E), but attention is called to cod-liver oil and egg yolk as the richest known sources of vitamin D and green lettuce and wheat embryo as particularly rich in vitamin E.

In the use of the table it should always be kept in mind that the values assigned are purely qualitative. According to the key of symbols employed, a double + does not indicate that the material is twice as rich in a particular vitamin as one to which a single + has been assigned but simply that according to present knowledge it is a somewhat better source of the vitamin in question. It should also be remembered that early as well as recent work has been included in the compilation and that the technique employed in much of the earlier work is open to criticism as to purity of the basal ration, previous feeding of the experimental animals, length of the experimental period, etc. Some of the earlier studies on vitamin A are complicated by the presence or absence of vitamin D, on vitamin B by failure to prevent the rats from having access to their excreta, and on vitamin C by inadequacy of the basal ration. Distinct variations in the vitamin content of the same natural material, whether of

¹ Sherman, H. C. and Smith, S. L. The Vitamins. 1922. Chemical Catalog Co., New York City.

plant or animal origin, may also occur as the result of environmental conditions and food supply. For these reasons even the qualitative values assigned may in some cases be open to question and subject to change.

Unless otherwise noted it is to be understood that the tests upon which the values given are based have been conducted upon the food material in its original state or, in the case of many of the vitamin B tests, dried at temperatures sufficiently low to prevent any possible destruction of the vitamin. Too little work has been done on the effect of various manipulative processes on the vitamin content of foods to place great dependence upon the values reported for cooked, canned, and dehydrated foods but they have been included to indicate in a general way the relative stability of the three vitamins and to suggest the desirability of much more work along these lines.

In this table the signs used have the following meaning:

+ indicates that the food contains the vitamin.

++ indicates that the food is a good source of the vitamin.

+++ indicates that the food is an excellent source of the vitamin.

- indicates that the food contains no appreciable amount of the vitamin.

? indicates doubt as to presence or amount.

* indicates that evidence is lacking or appears insufficient.

GROUP I. FRUITS AND VEGETABLES

Fruits	Vitamin A		Vitamin B		Vitamin C	
Apples, raw, fresh.....	+	...	+	...	++	
" , raw, dried.....	*	...	*	...	- to +	
" , canned commercially.....	*	...	*	...	++	
" , home-cooked.....	*	...	*	...	+ to ++	
Avocados (alligator pears)	++	...	++	...	*	
Bananas, raw, fresh.....	+ to ++	...	+	...	++	
" , raw, dried.....	*	...	*	...	- to +	
" , cooked.....	*	...	*	...	- to +	

GROUP I. FRUITS AND VEGETABLES (Continued)

Fruits	Vitamin	Vitamin	Vitamin
	A	B	C
Chico (see Sapodilla)
Cranberry juice.....	*	*	+
Grapefruit juice, fresh.....	-?	++	++
" " , dried	*	++	++
Grape juice, fresh	*	*	+
" " , commercial	*	+	*
" " , dried	*	*	-
Guava	*	*	++
Lemons, cold storage	*	*	+++
Lemon juice, fresh.....	-	++	+++
" " , frozen (storage)	*	*	++
" " , concentrated.....	*	*	+++
" " , dried	*	++	+++
Lemon peel	+?	*	*
Lime juice, fresh	*	+	+
" " , concentrated.....	*	*	+
Mangoes, dried	*	*	+
Mulberries.....	*	*	+
Oranges, cold storage	*	*	+++
" , canned	*	*	+++
Orange juice, fresh	+ to ++	++	+++
" " , frozen, stored	*	*	++
" " , concentrated	++	*	+++
" " , dried	*	++	+++
Orange marmalade	- to +	-?	- to +
Orange peel, inner	*	+	*
" " , outer	+	*	++
" peel oil	- to ++	*	*
Papaya	++	+	++
Peaches	*	*	+ to ++
Pears	*	+	*
Persimmons, Chinese	*	-	+
Pineapple, raw, fresh	++	++	+++
" , canned	++	++	++
Prunes, dried	++	+	-
Raisins	-	+	-
Raspberries, fresh	*	*	+++
" , canned	*	*	+++
Raspberry juice, dried	*	*	-
Sapodilla (chico)	++	*	++
Strawberries	*	+	++
Tamarind, dried	*	*	+
Tangerines	*	*	+++

GROUP I. FRUITS AND VEGETABLES (Continued)

Vegetables	**		
	Vitamin A	Vitamin B	Vitamin C
Artichokes, globe, fresh.....	*	+	*
" , " , canned	++?	+	*
Asparagus	*	+++	*
Bamboo shoots	*	+	*
Beans, kidney	+	+++	*
" , mung	+	++	*
" , " , sprouted	+	++	++
" , navy	+	+++	++
" , soy	+	+++	-
" , sprouted	*	*	-
" , string, fresh	++	++	++
" , " , canned	*	*	+
Beets, root	-	+	+
" , leaves	++	++	*
" , stems	*	++	*
Cabbage, green, fresh	+ to ++	++	+++
" , white, "	- to +	++	+++
" , old	*	*	+
" , green, dried	+ to ++	++	+
" , " , " , stored	*	*	- to +
" , head, canned	+	*	++
" , " , cooked	+	++	+
Carrots, raw, young	++	++	++
" , " , old	++	++	+
" , cooked, young	++	+	+
" , " , old	++	+	- to +
Cauliflower	+	++	++
" , boiled	*	*	+
Celery, stems	- to +	++	*
" , leaves, blanched	+	*	*
" , " , green	++	*	*
Chard, Swiss	++	+	*
Chayotes	++	*	*
Cowpeas, fresh, boiled	*	++	*
" , germinated	*	*	+++
" , dried	++	*	*
Cress	*	*	+
Cucumbers	- to +	+	+++
Dandelion greens	++	+	+
Dasheens	-?	++	+
Eggplant	-	++	*
Endive	+	*	+
Kohlrabi	*	*	+
Lentils	++	++	-
" , sprouted	*	++	++
Lettuce, whole head	++	++	++
Langels	-	-	+

GROUP I. FRUITS AND VEGETABLES. (Continued)

Vegetables	Vitamin		Vitamin		Vitamin	
	A		B		C	
Mushrooms, fresh	*	...	*	...	-	
" , dried	-	...	++	...	-	
Okra	*	...	+++	...	*	
Onions, raw	- to +	...	++	...	++	
" , cooked	- to +	...	++	...	+	
Parsley	*	...	++	...	*	
Parsnips	-?	...	++	...	*	
Peas, green, fresh, raw	++	...	+++	...	+++	
" , fresh, home-cooked	++	...	+++	...	++	
" , " , canned	++	...	+++	...	++	
Pepper, red (Capsicum).....	+	...	*	...	*	
Potatoes, sweet	+ to ++	...	+	...	++	
" , white, raw	+	...	++	...	++	
" , " , boiled 15 min.	+	...	++	...	++	
" , " , boiled 1 hr.	+	...	++	...	+	
" , " , baked	+	...	++	...	+	
" , " , steamed and dried ...	*	...	*	...	+	
Pumpkin	+	...	+	...	+	
Radishes	-	...	+	...	*	
Rhubarb	*	...	*	...	+	
Rutabagas, fresh	-?	...	++	...	++	
" , cold storage	*	...	*	...	++	
" , juice	*	...	++	...	+++	
" , " , frozen, stored 15 mos.	*	...	*	...	-	
" , " , heated	*	...	*	...	++	
Spinach, fresh, raw	+++	...	+++	...	++	
" , dried	+++	...	++	...	*	
" , home-cooked	+++	...	*	...	+	
" , commercially canned	+++	...	*	...	++	
Squash, Hubbard	++	...	*	...	*	
" , summer (see Vegetable marrow).			
Swedes(see Rutabagas)		---		...		
Tomatoes, raw.....	++	...	+++	...	+++	
" , canned	++	...	+++	...	+++	
" , dried	++	...	+++	...	++	
Turnips (see also Mangels, Rutabagas).	-?	...	++	...	++	
Vegetable marrow, juice	*	...	*	...	++	

GROUP II. FOODS DEPENDENT ON FOR EFFICIENT PROTEIN	Vitamin A	Vitamin B	Vitamin C
Eggs			
Eggs, whole, fresh	++	+	-
" , " , cold storage	++	*	*
Egg white	-	-	-
" yolk	+++	++	-
Eggs, duck's, salted	++	-	*
Fish and sea food			
Fish, fat (such as herring, salmon)...	+	+	*
" , lean (such as cod, haddock)	- to +	+	*
" , liver	++ to +++	*	*
" roe, fresh and dried	++	++	*
Oysters	*	*	+
Shrimps	+	*	*
Meat			
Edible viscera			
Brains	+	++	-?
Heart	+	+	+?
Kidney	+	++	+?
Liver	++ to +++	++	+
Lungs	++	*	*
Sweetbreads	+	+	*
Muscle (lean meat), beef	- to +	- to +	- to +
" " " , poultry	- to +	- to +	*
" " " , lamb or mutton	- to +	- to +	*
" " " , pork	- to +	+	*
Meat extract	-	-?	-
" juice, beef	*	+	- to +
Milk and dairy products			
Milk, cow's, whole, fresh	+++	++	+
" , " , " , boiled	+++	++	- to +
" , " , " , condensed	+++	++	+
" , " , " , dried	+++	++	- to +
" , " , " , evaporated	+++	++	- to +
" , " , " , pasteurized	+++	++	- to +
" , " , skin, fresh	+	++	+
" , " , " , dried	+	++	- to +
" , " , colostrum	+++	*	*
" , goat's	*	*	+
" , human	++	+?	+
Buttermilk	+	++	- to +
Lactic-acid milk	*	*	+
Cheese	++	*	*
Cottage cheese	+	*	*

GROUP III. CEREALS AND CEREAL PRODUCTS	Vitamin A	Vitamin B	Vitamin C
Barley, unhusked	+?	..	-
" , husked	*	..	-
" , sprouted	*	*	+
" (see also Malt)			
Bread, white, water	?	+	-
" , " , milk	+	+	- to +
" , whole wheat, water	+	++	-
" , " " , milk	++	++	- to +
Corn, whole, white	-	++	-
" , " , yellow	+	++	-
" , white, embryo	-	++	-
" , yellow, embryo	+	+++	-
" , " , endosperm	*	-	*
" , bran	*	-	*
Cottonseed meal	+	++	*
Flour (see Wheat)			
Malt, green	+	++	++
" , kilned	-	++	-
" , extract	*	+	*
Millet seed	++	++	*
Oats	- to +	++	-
" , sprouted	*	*	+
Rice, polished	-	-	-
" , whole	+	++	-
" , wild	+?	++	-
Rye, whole	+?	++	-
Starch	-	-	-
Wheat, bran	+	++	-
" , embryo	++	+++	-
" , " , extract	*	+++	*
" , endosperm	-	+	-
" , flour, white	-	+	-
" , middlings, commercial	*	++	-
" , whole	+	++	-

GROUP IV. SUGARS

Glucose	-	..	-
Honey	-	..	+
Molasses	-	..	-
Sugar	-	..	-

GROUP V. FATS AND FAT-RICH FOODS	Vitamin A		Vitamin B		Vitamin C
Fats and oils of animal origin					
Beef fat	+	...	-	...	-
Butter	+++	...	-	...	-
Cream	+++	...	++	...	- to +
Cod liver (and other fish liver)oils	+++	...	-	...	-
Herring oil	++	...	-	...	-
Horse fat	+	...	-	...	-
Lard	- to +	...	-	...	-
Margarin, oleo	+ to ++	...	-	...	-
Mutton fat	+	...	-	...	-
Oleo oil	+	...	-	...	-
Pig kidney fat	++	...	-	...	-
Seal oil	+	...	-	...	-
Whale oil	++	...	-	...	-
Fats and oils of vegetable origin					
Almond oil	-	...	-	...	-
Cocoa butter	-	...	-	...	-
Coconut oil	-	...	-	...	-
Corn oil, yellow	+	...	-	...	-
Cottonseed oil	+?	...	-	...	-
" " , hydrogenated.....	-	...	-	...	-
Lemon oil	+	...	-	...	-
Linseed oil	+	...	-	...	-
Margarin, nut	-	...	-	...	-
Olive oil	- to +	...	-	...	-
Orange peel oil	++	...	-	...	-
Palm oil	++	...	-	...	-
" kernel oil	+	...	-	...	-
Peanut oil	+	...	-	...	-
Sesame oil	-	...	-	...	-
Soybean oil	+	...	-	...	-
Nuts					
Almonds	+	...	++	...	*
Beechnuts	*	...	++	...	*
Brazil nuts	+	...	++	...	*
Butternuts	+	...	*	...	*
Chestnuts	*	...	++	...	*
Coconut	+	...	++	...	*
Filberts	*	...	++	...	*
Hickory nuts	*	...	++	...	*
Peanuts	+	...	++	...	*
Pecans.....	+	...	++	...	*
Pine nuts	*	...	++	...	*
walnuts, black	*	...	++	...	*
" , English	+	...	++	...	*
MISCELLANEOUS					
Yeast	*	...	+++	...	-
" , extract	-	...	+++	...	-
" , fat	+	...	*	...	*

