The University of Maine
DigitalCommons@UMaine

Bulletins | Maine Agricultural and Forest Experiment Station

11-1951

B495: Breakfasts of Maine Teen-Agers

Mary M. Clayton

Follow this and additional works at: https://digitalcommons.library.umaine.edu/aes_bulletin

 Part of the Nutrition Commons

Recommended Citation
Clayton, M.M. 1951. Breakfasts of Maine teen-agers. Maine Agricultural Experiment Station Bulletin 495.

This Report is brought to you for free and open access by DigitalCommons@UMaine. It has been accepted for inclusion in Bulletins by an authorized administrator of DigitalCommons@UMaine. For more information, please contact um.library.technical.services@maine.edu.

UNIVERSITY OF MAINE

The Maine Agricultural Experiment Station

ORONO, MAINE

BULLETIN 495 NOVEMBER, 1951

Breakfasts of Maine Teen-Agers

Mary M. Clayton

A nutritious breakfast gives the day a good start.

CONTENTS

	PAGE
Introduction	3
Method of Study	3
Foods Included in the Breakfasts	5
Nutritive Value of Breakfasts	9
Breakfasts in Relation to the Total Day's Food Intake	9
Breakfasts in Relation to the NRC Recommended Daily Allowances	11
Importance of Amount and Type of Protein in the Breakfasts	12
Chief Sources of Protein in the Breakfasts	14
Midmorning Eating	14
Nutritive Value of Diets for the Whole Day	14
Breakfast Menus for Teen-Agers	17
Summary	18
Conclusions	18
Literature Cited	19

BULLETIN 495

BREAKFASTS OF MAINE TEEN-AGERS

MARY M. CLAYTON*
Nutritionist

INTRODUCTION

"Start the day with a good breakfast" has long been a familiar slogan. In recent years much research has been done on the physiological effects of no breakfast, coffee only, light breakfasts, and heavy breakfasts (14, 12, 13, 5). The general conclusion to be made from these studies seems to be that people feel better and work better after a breakfast containing one-fourth to one-third of their total day's food. A recent study (8, 9) has also shown that it is desirable to have some high quality protein food such as meat, milk, or eggs in the breakfast as well as in the other two meals.

The kind of breakfasts which teen-agers eat depends to some extent on whether or not there is someone in the home who takes the responsibility for preparing the meal. The child who prepares his own breakfast is very apt to have an inadequate meal.

The time available for the meal is also important. It is useless for the mother to prepare a good breakfast if the family does not have time to eat it. Many good breakfasts have been left on the table because the children were afraid of being late to school.

The foods included in a particular child's breakfast are usually a matter of family custom. For example, in many Maine homes any day's breakfast without doughnuts on the table would be very unusual.

The present study was undertaken to determine the nutritive value of the breakfasts of Maine teen-agers and the contribution of the breakfasts to their day's food intake.

METHOD OF STUDY

The subjects for this study were 27 girls and 30 boys of junior high school age from Bucksport, Newport, and Skowhegan. They were chosen at random from the group of 780 Maine children who took part in the Cooperative Regional Research Project on Nutritional Status in the Northeast which was begun in 1947.†

* With the technical assistance of Dorothy U. Turner, Ruth Goff, Elaine Fogler, and Rae West.

† The State Experiment Stations taking part in this study included Maine, Massachusetts, New York, New Jersey, Rhode Island, and West Virginia. The study was financed in part by funds provided under the Research and Marketing Act of 1946.

In the spring of 1949 the children kept records of everything they ate for seven days. The nutritive value of the foods eaten in each meal and between meals was calculated, using Babcock's shortened long method of calculation (1) and the Food Value Tables of the U. S. Public Health Service (16). The average daily total food consumption of each child was compared with the National Research Council's recommended daily allowances for each of nine nutrients (Table 1). Then the percentage contribution of the average breakfast to the average total day's food intake and to the National Research Council's recommended daily allowances was calculated.

TABLE 1

National Research Council's Recommended Daily Dietary Allowances for Children 13-15 Years of Age*

Nutrients	Girls	Boys
Calories, number	2600	3200
Protein, grams	80	85
Calcium, grams	1.3	1.4
Iron, mg.	15	15
Vitamin A, I.U.	5000	5000
Thiamine, mg.	1.3	1.5
Riboflavin, mg.	2.0	2.0
Niacin (Nicotinic Acid), mg.	13	15
Vitamin C (Ascorbic Acid), mg.	80	90
Vitamin D, I.U.	400	400

* National Research Council Reprint and Circular Series No. 129. October, 1948. National Research Council, 2101 Constitution Avenue, Washington 25, D. C.

The frequency with which various foods were served in the breakfasts of both girls and boys was also studied in relation to the nutritive value of the day's meals. A special study was made of the comparative nutritive value of the breakfast cereals which seemed to be most popular with girls and boys.

Statistical studies were done in order to find out the relationship between the amounts of various nutrients in the breakfast and those in the total day's food. That is, an attempt was made to learn whether children tend to make up during the day any deficiencies in their breakfasts. For example, previous work has shown that the diets of Maine people are apt to be low in vitamin C. Therefore, it was of special interest to find out whether the day's intake of vitamin C was apt to be low if the child's breakfast was low in this vitamin.

Menus for four adequate breakfasts for girls and boys, 13-15 years of age, are included. These supply one-fourth or more of the National Research Council's recommended daily allowances for nine nutrients, as given in Table 1.

FOODS INCLUDED IN THE BREAKFASTS

The foods included in the breakfasts and the relative frequency of their consumption are given in Table 2. The foods which were used most are discussed separately in order to show their influence on the nutritive value of the diets as a whole.

TABLE 2

Foods Eaten for Breakfast by Maine Teen-Agers
(Listed in order of frequency†)

Frequency* Index	Girls (27)	Frequency* Index	Boys (30)
480-489	Milk, fresh	500-509	Milk, fresh
400-409	Bread and toast, all kinds	400-409	Bread and toast, all kinds
370-379	Bread and toast, white	390-399	Cereals, all kinds
350-359	Butter	380-389	Sugar
320-329	Citrus f uit and juice and tomato juice	370-379	White bread and toast
		350-359	Butter
310-319	Citrus fruit and juice	270-279	Citrus fruit and juice and tomato juice
250-259	Cereals, all kinds		
220-229	Sugar	230-239	Citrus fruit and juice
180-189	Eggs	220-229	Eggs
160-169	Doughnuts	190-199	Doughnuts
150-159	Cocoa		
120-129	Orange juice	130-139	Coffee
80-89	Grapefruit juice		Orange juice
70-79	Oleomargarine		
50-59	Bananas	120-129	Oatmeal
		100-109	Cocoa
	Bacon	90-99	Bacon
40-49	Corn flakes	80-89	Bananas
	Jam and jelly	60-69	Shredded wheat
	Orange, fresh		
		50-59	Biscuits
	Bread and toast, dark		Oleomargarine
	Cream of Wheat		
30-39	Grapefruit, fresh	40-49	Grapefruit, fresh
	Oatmeal		Pep
	Beans, baked		Bread and toast, dark
	Cream		Jam and jelly
	French toast	30-39	Maltex
	Pancakes		Postum
20-29	Rice Krispies		Potato
	Rolls		Tomato juice
	Syrup, maple		
	Wheaties		Corn flakes
			Grapefruit juice
	Cheerios		Milk, evaporated
	Coffee	20-29	Rice Krispies
	Cookies		Rolls
	Milk, chocolate		Syrup, all kinds
	Milk, evaporated		Wheat, puffed
	Orange and grapefruit juice		
10-19	Pineapple juice		Beans, baked
	Prunes, stewed		Bran, raisin
	Tangerine juice		Cheerios
	Tomato juice		Cookies
	Wheatena		Cream
	Wheat, puffed	10-19	French toast
	Wheat, shredded		Muffins
			Orange, fresh
			Pancakes
			Pineapple juice
			Syrup
			Syrup, maple

* Frequency Index: Percentage of children who had the food during the week x the number of days on which the food was eaten. An index of 700 would be the highest possible.
† Foods with a frequency index below 10 are not listed.

Milk, Fresh

Milk was the food mentioned most often in the breakfasts of both girls and boys. This is significant, since milk is the most important source of calcium in the diet and also an important source of high quality protein and vitamins, particularly vitamins A and riboflavin.

Bread

Although a number of different kinds of bread were mentioned in the breakfasts, white bread was used by far the most frequently. Under the present Maine enrichment law all white bread and plain rolls are enriched with iron and vitamins B_1, riboflavin, and niacin. Since white bread is so popular, the enrichment law has provided for improved nutrition.

Butter

Butter was mentioned a great deal more often than oleomargarine, although it is possible that some of the children did not know which they were eating and put down butter in their food records in place of oleomargarine. Practically all of the children had either butter or oleomargarine on their bread or toast. From the standpoint of nutrition, oleomargarine is as nutritious as butter (6).

Cereals

From Table 2 it will be seen that cereals were eaten more often by the boys than by the girls, but very frequently by both. Most of the children who ate cereal used liberal amounts of milk on it. At the time the food records were kept the favorite cereals for the girls were corn flakes, Cream of Wheat, oatmeal, Rice Krispies, and Wheaties; and for the boys oatmeal, shredded wheat, Pep, Maltex, corn flakes, Rice Krispies, and puffed wheat.

As shown in recent food tables (15) and on the cereal packages, most of the ready prepared cereals are now enriched with iron and vitamins B_1 and niacin. Also, a number of the cereals which require cooking are enriched. Five-minute Cream of Wheat has phosphates added to make it quick cooking. Even though many cereals are now enriched, there is considerable difference in the nutritive value of the various kinds on the market. For example, corn and rice cereals are lower in protein and iron than oats and wheat, and the protein of corn is of poor quality. Corn and oat cereals are comparatively low in niacin.*

* Cream of Wheat is also low, as it is made from the endosperm of the grain.

The popularity of corn flakes with the girls in this study and the general popularity of all kinds of ready prepared cereals calls for a reminder that the protein of puffed and toasted flaked cereals is not as well utilized as that in cereals which are not subjected to such high heat treatment (11, 10, 4, 7). The use of more whole grain home cooked breakfast cereals by Maine school children would add considerably to the nutritive value of their diets. Before buying any breakfast cereal people should always read the label on the package and be sure they are buying a kind which is either whole grain or enriched or both.

Sugar

As shown in Table 2 sugar was used very frequently by both girls and boys. In many cases the amounts added to cereals and drinks seemed excessive. The present tendency to add excessive amounts of sugar to bakery products and in the manufacture of certain ready prepared foods such as cereals, pudding mixes, and cake mixes, calls for a warning that sugar promotes decay of the teeth and decreases the appetite for other more nourishing foods. Parents should guard against the use by children of too much sugar in any form.

Citrus Fruit and Juice

Oranges and grapefruit (including juice) were the fruits most often used by both girls and boys, but were used more frequently by the girls. When citrus fruit or juice was not used in the breakfast, the whole day's diet was very apt to be deficient in vitamin C. This will be discussed more fully later.

Eggs

Eggs were used very frequently by both girls and boys, but somewhat oftener by the boys. Eggs are an important source of high quality protein, vitamin A, riboflavin, and iron, and should be used more often in the breakfasts of Maine school children.

Doughnuts

In the breakfasts of both girls and boys, doughnuts were used almost as often as eggs. To the person who is not accustomed to eating doughnuts, they seem too much like cake to be eaten at breakfast. Moreover, the sweet sticky dough has a tendency to stick to the teeth and may promote decay. However, for many Maine people the morning cup of coffee seems to require a doughnut to go with it.

The present Maine enrichment law does not require that bakery-made doughnuts should be enriched. However, recent tests made by

E. O. Merrill, Assistant Chemist at the Maine Agricultural Experiment Station, show that doughnuts made with enriched flour are somewhat higher in vitamin B_1 and over twice as high in riboflavin and iron as those made with unenriched flour.

Cocoa and Coffee

Cocoa was preferred as a hot drink by the girls, and coffee by the boys. However, many of the boys also drank cocoa. Coffee was used infrequently by the girls. The difference in the nutritive value of the two beverages is chiefly due to the added nutrients of the milk used in the cocoa. The average cup of beverage cocoa contains about one-half a level tablespoon of cocoa powder. This amount of powder contains 4 mg. of calcium, 25 mg. phosphorus, and 0.4 mg. iron, together with small amounts of protein, fat, carbohydrate, and B vitamins (15). These amounts would contribute only slightly to a day's diet. Within recent years considerable research has been done on the effect of cocoa on the utilization of the calcium and protein of milk (3). In the amounts ordinarily eaten, cocoa has not been found detrimental. One cup of cocoa beverage contains approximately 8 mg. caffeine and 125 mg. theobromine. One cup of coffee contains 68 to 101 mg. caffeine (2). Both caffeine and theobromine are stimulants, but theobromine is less stimulating than caffeine. For that reason, and because milk is used in making it, cocoa is a more desirable beverage for children.

Bacon

Bacon was used more by the boys than by the girls, but was not recorded as often as eggs by either. Bacon has an appetizing flavor and the fat content gives staying power to the breakfast. However, the protein content is low considering the price. If food money is scarce, it would be better to buy milk and eggs rather than bacon.

Bananas

Next to citrus fruits, bananas were the fruit used most often in the breakfasts. If 100 calorie servings of bananas and oranges are compared for amounts of various nutrients, the oranges are found to be considerably higher in calcium, phosphorus, vitamin B_1 and vitamin C than the bananas. In order to secure the amount of vitamin C contained in ½ cup of orange juice or 1 small orange it would be necessary to eat 5 medium sized bananas. Bananas are useful in the diet chiefly on account of their flavor, bulk, and energy value.

NUTRITIVE VALUE OF BREAKFASTS

In order to classify the breakfasts according to their nutritive value, they were divided into groups, according to the percentage of the total day's food intake or the National Research Council's* recommended daily allowances (Table 1) which they supplied. The results are shown in Tables 3 and 4 and Charts 1 and 2.

TABLE 3

Percentage of Children Who Received Various Percentages of Their Total Day's Intake of Different Nutrients in Their Breakfasts

Nutrients	Girls (27)				Boys (30)			
	33.3% or above	25% or above	15.0 to 24.9%	Below 15.0%	33.3% or above	25% or above	15.0 to 24.9%	Below 15.0%
Calories	3.7	14.8	77.8	7.4	0.0	33.3	66.6	0.0
Total protein	3.7	29.6	63.0	7.4	6.7	36.7	63.3	0.0
Calcium	33.3	85.2	7.4	7.4	36.7	70.0	26.7	3.3
Iron	3.7	14.8	59.3	25.9	6.7	20.0	66.7	13.3
Vitamin A	3.7	18.5	25.9	55.6	6.7	10.0	36.7	53.3
Vitamin B_1	11.1	48.1	48.1	3.7	10.0	70.0	30.0	0.0
Riboflavin	18.5	70.4	25.9	3.7	23.3	66.7	33.3	0.0
Niacin	0.0	7.4	44.4	48.1	3.3	23.3	53.3	23.3
Vitamin C	51.9	63.0	22.2	14.8	46.7	56.7	13.3	30.0

TABLE 4

Percentage of Children Who Received Various Percentages of the NRC's Recommended Daily Allowances of Different Nutrients in Their Breakfasts

Nutrients	Girls (27)				Boys (30)			
	33.3% or above	25% or above	15.0 to 24.9%	Below 15.0%	33.3% or above	25% or above	15.0 to 24.9%	Below 15.0%
Calories	3.7	3.7	70.4	25.9	6.7	20.0	63.3	16.7
Total protein	0.0	25.9	51.9	22.2	16.7	33.3	56.7	10.0
Calcium	22.2	44.4	44.4	11.1	20.0	50.0	33.3	16.7
Iron	3.7	3.7	51.9	44.4	16.7	30.0	53.3	16.7
Vitamin A	0.0	11.1	48.1	40.7	6.7	30.0	40.0	30.0
Vitamin B_1	18.5	44.4	48.1	7.4	26.7	63.3	33.3	3.3
Riboflavin	29.6	66.7	29.6	3.7	40.0	83.3	6.7	10.0
Niacin	0.0	3.7	59.3	37.0	3.3	23.3	46.6	30.0
Vitamin C	40.7	48.1	11.1	40.7	26.7	43.3	20.0	36.7

Breakfasts in Relation to the Total Day's Food Intake

Table 3 shows that less than 10 per cent of the children received ⅓ or more of their day's intake of calories, total protein, iron, vitamin A, and niacin in their breakfasts. This indicates that most of the children do not eat heavy breakfasts. However, only one girl and one boy missed any breakfasts during the week. As shown in Table 3 and also in Chart

* Abbreviated as NRC in the following pages.

1 less than 40 per cent received ¼ or more of their day's intake of calories, total protein, iron, vitamin A, and niacin. The breakfasts of 40 per cent or more of the children did contain ¼ or more of their day's intake of calcium, animal protein, and vitamin B_1, riboflavin, and C. These nutrients are furnished by milk, enriched bread, cereals, and citrus fruits and juices. As shown in the 5th and 9th columns of Table 3, the breakfasts of the girls were more apt to supply less than 15 per cent of the day's intake of iron and niacin than those of the boys. The boys' breakfasts were more apt to supply less than 15 per cent of the day's intake of vitamin C.

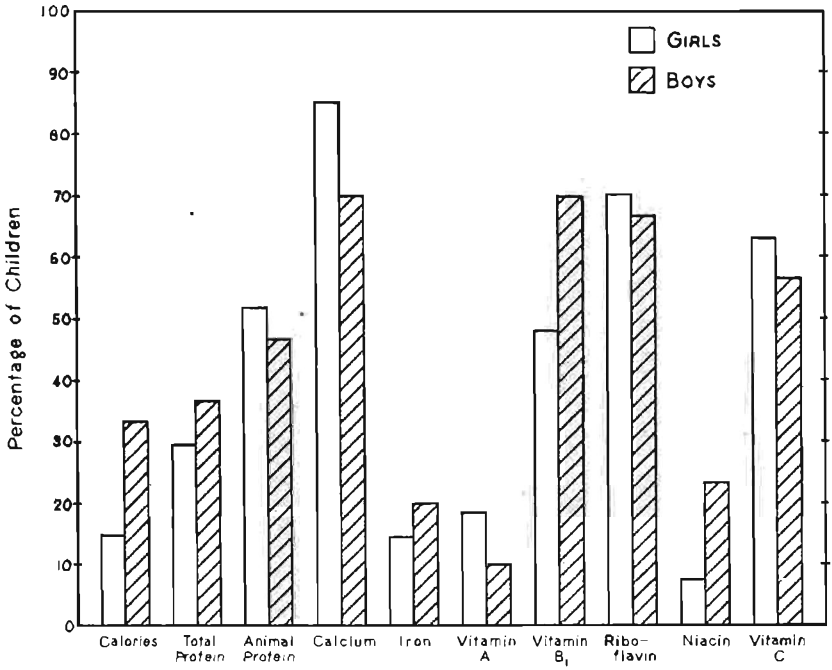

CHART 1

Percentage of Children Who Received 25 Per Cent or More of Their Total Day's Intake of Different Nutrients in Their Breakfasts

Since it is possible for deficiencies in the breakfast to be made up later in the day, a deficient breakfast does not necessarily indicate that the whole day's diet will be deficient. However, deficiencies in some nutrients are seldom made up later in the day.

By statistical methods the relationship between the amounts of various nutrients in the breakfasts and in the total day's food was studied for both girls and boys. For both girls and boys a close relationship

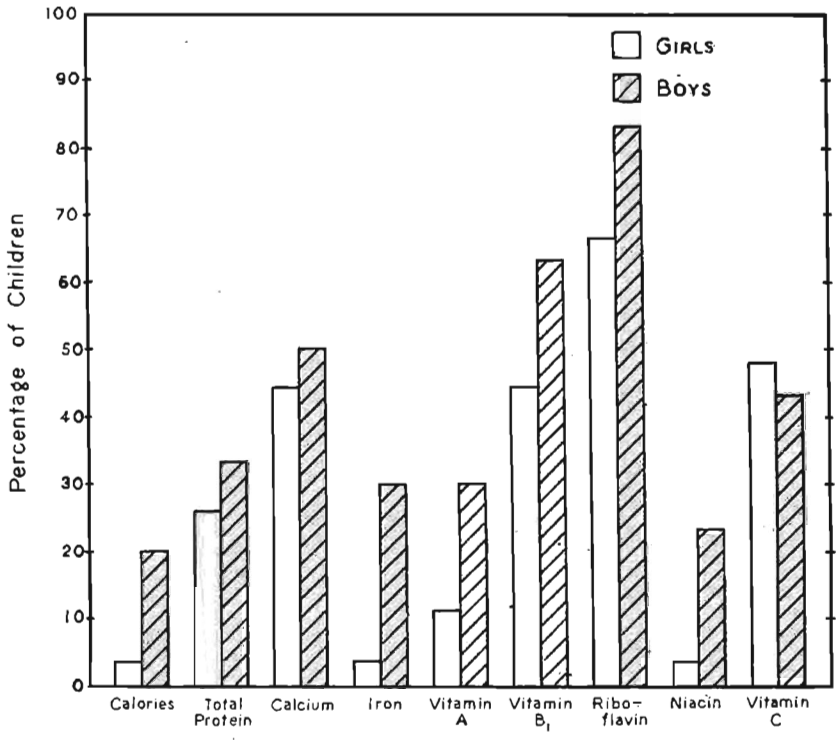

CHART 2

Percentage of Children Who Received 25 Per Cent or More of the NRC's Recommended Daily Allowances of Different Nutrients in Their Breakfasts

was shown for calcium, iron, and vitamins B_1, riboflavin, and C. For boys a close relationship was also shown for calories and total protein. Apparently, girls tend to make up for breakfast deficiencies in calories and protein later in the day, but boys do not. Both girls and boys tend to make up deficiencies of vitamin A and niacin. That is because foods high in these nutrients are more apt to be eaten at noon or night than in the morning.

Breakfasts in Relation to the NRC Recommended Daily Allowances

It has generally been assumed that the breakfasts of teen-agers should contain at least 25 per cent of their total food for the day. A comparison of Charts 1 and 2 shows that, on this basis, the breakfasts tended to be more deficient in relation to the NRC recommended daily allowances than they were in relation to the total day's food intake. That is because the recommended allowances provide for a considerable margin

of safety and the daily food intake of many of the children provided less than the recommended amounts of a number of nutrients.

When the individual nutrients supplied in the breakfasts are studied in relation to the recommended daily allowances, statements similar to those in the preceding section can be made.

As shown in Table 4, few of the children ate breakfasts which supplied ⅓ or more of the recommended daily allowances of the different nutrients. Less than 40 per cent of the breakfasts supplied ¼ or more of the recommended allowances for calories, total protein, iron, vitamin A, and niacin. One-fourth or more of the recommended amounts of calcium and viatmins B_1, riboflavin, and C were more apt to be supplied. The breakfasts of the girls were more apt to supply less than 15 per cent of the recommended daily allowances of calories, total protein, iron, vitamin A, and niacin than those of the boys. The percentages of girls and boys whose breakfasts supplied less than 15 per cent of the recommended allowances of vitamin C were about the same. However, in general, the girls' breakfasts tended to be slightly better in respect to vitamin C than those of the boys.

The fact that the NRC recommended daily allowances for iron and vitamin A are the same for the girls as for the boys partly explains why the breakfasts of the girls tend to be more deficient in these nutrients. Since the girls require breakfasts of lower calorie value than the boys, their breakfasts need special planning in order to supply ¼ of the recommended daily amounts of iron and vitamin A. See page 17 for breakfast menus.

Importance of Amount and Type of Protein in the Breakfasts

In recent years considerable research has been done on the physiological effects of breakfasts containing different amounts of protein (14, 12, 13, 5). Also, studies have been made on the utilization of high quality protein, such as milk, when it is served at only two meals or at all three meals (8, 9). The conclusions from this work are that when people eat breakfasts which contain a liberal amount of protein they work better and usually do not get as hungry as when low protein breakfasts are eaten. Also, high quality protein is used better by the body when it is divided into three meals instead of two.

As shown in Table 3 and Chart 1, only 29.6 per cent of the girls and 36.7 per cent of the boys received ¼ or more of their day's intake of total protein in their breakfasts. For both girls and boys the percentage who received ¼ or more of their day's intake of animal protein in their breakfasts was considerably higher (Chart 1). The liberal amounts of

milk used in many of the breakfasts account for the higher percentages of animal protein.

TABLE 5

Chief Sources of Protein in Breakfasts
Average Amounts of Protein Supplied by Different Foods

Approximate Percentages of NRC Recommended Allowances	Protein in Breakfasts	No. of Breakfasts Studied	Milk	Eggs	Meat	Bacon	Cereals	Breads*	Doughnuts	Pancakes
	gms.		gms. pro.	gms. pro.	gms. pro.	gms. pro.	gms. pro.	gms. pro.	gms. pro.	gms. pro.
Girls, Age 13-15										
20	14.0-17.9	38	8.0	1.4	0.0	.2	1.7	2.7	1.1	.3
25	18.0-21.9	15	7.0	5.3	.4	.3	1.6	3.3	.5	1.4
30	22.0-26.9	11	8.4	3.8	1.6	1.2	2.0	3.5	.4	2.0
Boys, Age 13-15										
20	15.0-18.9	46	7.2	2.0	.2	.5	3.0	2.4	.7	0.0
25	19.0-22.9	39	8.0	3.1	0.0	.5	3.1	4.4	1.0	0.0
30	23.0-26.9	10	11.7	4.6	.8	.3	2.2	4.0	.6	0.0

* Including French Toast.

Chief Sources of Protein in the Breakfasts

A study was made of the chief sources of protein in three groups of girls' and boys' breakfasts. These groups of breakfasts supplied approximately 20, 25, and 30 per cent of the NRC recommended daily allowances of protein. The results are shown in Table 5. It will be seen that in all breakfasts milk, eggs, breads, and cereals were the chief sources of protein, but doughnuts, pancakes, and meats furnished considerable amounts. Small amounts were also supplied by bacon.

In all three groups of breakfasts, milk supplied the largest amounts of protein. In the girls' 20 per cent group, bread held second place as a source of protein, cereals held third place, and eggs fourth. In the girls' higher percentage groups, eggs held second place, breads third, and cereals fourth. In the boys' 20 per cent group, cereals held second place, breads third, and eggs fourth. In the boys' 25 per cent group, breads held second place and cereals and eggs tied for third place. In the 30 per cent group, eggs held second place, breads third, and cereals fourth. These results show the importance of eggs as a means of increasing protein in the breakfasts.

The breakfasts which contained the lower amounts of protein were more apt to be low in other nutrients (except vitamin C) than those which contained more liberal amounts. The reason for this is that milk and eggs, which are excellect sources of high quality protein, are also good sources of a number of other nutrients.

MIDMORNING EATING

Differences in the caloric content of the breakfasts caused no noticeable differences in the tendency to eat during the morning. In fact, there was not a great deal of midmorning eating on school days, but more on Saturdays and Sundays. In one school, where candy was sold during the morning, midmorning eating was more frequent. Most of the eating between meals was done after lunch, on the way home from school in the afternoons, and in the evenings at social gatherings. No relationship could be shown between the kind of breakfasts which the children ate and the amount of between meal eating which they did.

NUTRITIVE VALUE OF DIETS FOR THE WHOLE DAY

In order to classify the diets for the whole day they were divided into groups according to the percentage of the NRC recommended daily allowances which they supplied. The results are shown in Table 6 and Chart 3. In the girls' diets vitamin C, calcium, and iron were the nutrients most apt to be deficient. In the boys' diets vitamin C, calcium, and

calories were especially apt to be low. Considering all nutrients, the girls' diets showed a definite tendency to be lower than the boys' in protein, iron, and vitamin B_1.

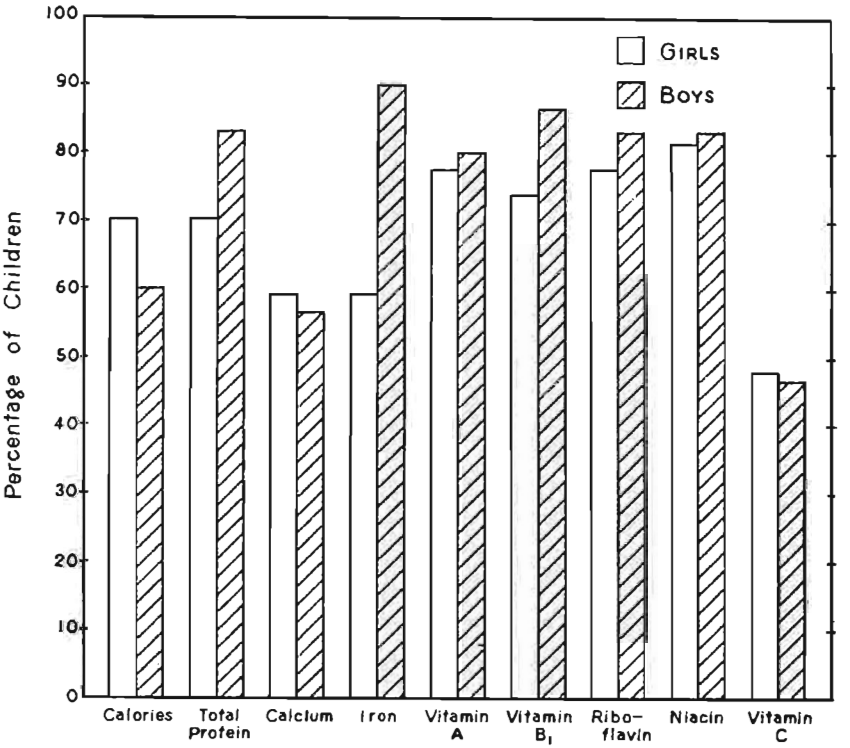

CHART 3

Percentage of Children Who Received 80 Per Cent or More of the NRC's Recommended Daily Allowances of Different Nutrients in Their Total Day's Food

The nutrients which were apt to be deficient in the day's meals are those which could be furnished by using more citrus fruits or juice, eggs, milk, and whole grain or enriched cereals (especially wheat) in the breakfasts. Extra iron could be supplied by cooking raisins with the cereal, and extra niacin by serving peanut butter with toast.

TABLE 6

Percentage of Children Who Received Various Percentages of the NRC's Recommended Daily Allowances of Different Nutrients in Their Total Day's Food

Nutrients	Girls (27)				Boys (30)			
	80.0% or more	60.0 to 79.9%	40.0 to 59.9%	Below 40.0%	80.0% or more	60.0 to 79.9%	40.0 to 59.9%	Below 40.0%
Calories	70.4	29.6	0.0	0.0	60.0	23.3	16.7	0.0
Total protein	70.4	29.6	0.0	0.0	83.3	6.7	6.7	3.3
Calcium	59.3	18.5	14.8	7.4	56.7	20.0	16.7	6.7
Iron	59.3	37.0	3.7	0.0	90.0	10.0	0.0	0.0
Vitamin A	77.8	14.8	3.7	3.7	80.0	13.3	3.3	3.3
Vitamin B_1	74.1	25.9	0.0	0.0	86.7	3.3	10.0	0.0
Riboflavin	77.8	18.5	3.7	0.0	83.3	6.7	6.7	3.3
Niacin	81.5	14.8	3.7	0.0	83.3	6.7	10.0	0.0
Vitamin C	48.1	18.5	14.8	18.5	46.7	23.3	20.0	10.0

BREAKFAST MENUS FOR TEEN-AGERS

The following breakfast menus for girls and boys, 13-15 years of age, will supply 25 per cent or more of the NRC recommended daily allowances for nine nutrients.

	Amount Per Serving	
Food	Girl	Boy
1. Orange juice, fresh or frozen*	¾ cup†	⅞ cup
Instant Ralston, enriched whole wheat cereal	1 cup after cooking	1 cup after cooking
Milk, whole, on cereal	½ cup	½ cup
Light cream, on cereal	3 tablespoons	3 tablespoons
Toast, enriched white bread	2 slices	3 slices
Butter	2 teaspoons	3 teaspoons
Cocoa (made with ¾ milk)‡	⅔ cup	⅔ cup
2. Orange juice, fresh or frozen*	¾ cup	⅞ cup
Wheaties, enriched whole wheat flakes	⅞ cup	1 cup
Milk, whole, on cereal	½ cup	¾ cup
Egg, boiled or poached	1 medium	1 medium
Toast, enriched white bread	2 slices	3 slices
Butter	2 teaspoons	3 teaspoons
Cocoa (made with ¾ milk)‡	⅔ cup	⅔ cup
3. Mixed orange and grapefruit juice, fresh or frozen*	¾ cup	⅞ cup
Oatmeal	½ cup	1 cup
Milk, whole, on cereal	½ cup	½ cup
Egg, boiled or poached	1 medium	1 medium
Toast, enriched white bread	2 slices	3 slices
Butter	½ tablespoon	2 teaspoons
Peanut butter	2 teaspoons	½ tablespoon
Postum (made with ¾ milk)‡	⅔ cup	⅔ cup
4. Tomato juice*	⅞ cup	1 cup
Sausage	1 patty (2 in. diam.)	1 patty (2 in. diam.)
Pancakes, made with enriched white flour	2 (4 in. diam.)	4 (4 in. diam.)
Butter	½ tablespoon	¾ tablespoon
Table syrup	1½ tablespoons	2 tablespoons
Milk	1 cup	1 cup

* The amounts of citrus juices given in menus 1, 2, and 3 will supply approximately 90 per cent of the NRC recommended daily allowance of vitamin C. The amounts of tomato juice given in menu 4 will supply approximately 50 per cent.

† Standard measuring cup used for all measurements of cups.

‡ Cocoa or postum may be replaced by the same amounts of milk. This substitution would slightly increase several nutrients in the breakfasts.

In planning the above breakfast menus it was found to be difficult to supply 25 per cent of the recommended daily allowances of vitamin A and niacin without using butter or fortified oleomargarine, cream, eggs, or tomato juice for vitamin A, and meat or peanut butter for niacin. However, when breakfasts fail to furnish sufficient amounts of these nutrients they can be supplied later in the day.

SUMMARY

A study of the breakfasts of 27 teen-age girls and 30 boys indicates the following:

1. The foods eaten most often for breakfast were: milk, bread and toast, butter, citrus fruits and juice, cereals, sugar, eggs, doughnuts, cocoa (girls), coffee (boys), bananas, and bacon.
2. In relation to the total day's food intake the breakfasts were more apt to be low in calories, protein, iron, vitamin A, and niacin than in calcium and vitamins B_1, riboflavin, and C.

   The nutrients most liberally supplied were those furnished by milk, enriched bread, cereals, and citrus fruits and juices.

   The girls' breakfasts were more apt to be very low in iron and niacin than those of the boys. The boys' breakfasts were more apt to be very low in vitamin C.
3. In relation to the NRC recommended daily allowances the breakfasts were apt to be low in calories, protein, iron, vitamin A, and niacin. The breakfasts of the girls were more apt to be very low in these nutrients than the boys.

   Approximately 40 per cent of both girls and boys had less than 15 per cent of the NRC recommended daily allowances for vitamin C in their breakfasts.
4. In relation to the NRC recommended daily allowances the girls' diets as a whole were especially apt to be low in vitamin C, calcium, and iron: the boys' diets were especially apt to be low in vitamin C, calcium, and calories. Considering all nutrients the girls' diets showed a tendency to be lower than the boys' in protein, iron, and vitamins B_1 and riboflavin.

CONCLUSIONS

1. The eating of inadequate breakfasts by teen-agers tends to result in deficiencies in their food intake for the day.
2. Improvement of the breakfasts of low nutritive value by the use of more citrus fruits and juices, eggs, milk, and whole grain and enriched cereals would do a great deal to improve the diets as a whole.

LITERATURE CITED

1. Babcock, M. J. June 1950. Simplification of the "long method" for calculating the nutritional value of diets. N. J. Agr. Exp. Sta. Bul. 751.
2. Bonting (Jr.), S. L. 1950. De vermeende schadelijkheid van coffeine-houdende dranken (The supposed harmful effects of beverages containing caffeine). Nederland. Tijdschr. Geneesk. 94:3693-3697. Nut. Abs. and Rev. 1951-20:997.
3. Bricker, M. L., Smith, J. M., Hamilton, T. S., and Mitchell, H. H. 1949. The effect of cocoa upon calcium utilization and requirements, nitrogen retention and fecal composition of women. J. Nut. 39:445-461.
4. Clark, L. C., Ryer, H., and Murlin, J. R. 1949. Relative to egg biological values and replacement values of some cereal proteins in human subjects. J Nut. 38:405-420.
5. Daum, K., Tuttle, W. W., Martin, C., and Myers, L. 1950. Effect of various types of breakfasts on physiologic response. J. Am. Diet. Asso. 26:503-509.
6. Deuel (Jr.), H. J., Greenberg, S. M., Savage, E. E., and Bavetta, L. A. 1950. Studies on the comparative nutritive value of fats. 13. Growth and reproduction over 25 generations on Sherman diet B where butterfat was replaced by margarine fat, including a study of calcium metabolism. J. Nut. 42:239-255.
7. Griswold, R. M. 1951. Effect of heat on the nutritive value of proteins. J. Am. Diet. Asso. 27:85-93.
8. Leverton, R. M. April 1949. Breakfast with high quality protein. Nut. News 12 (No. 4):13.
9. Leverton, R. M. and Gram, M. R. 1949. Nitrogen excretion of women related to the distribution of animal protein in daily meals. J. Nut. 39:57-65.
10. Mitchell, H. H. and Block, R. J. 1946. Some relationships between the amino acid contents of proteins and their nutritive values for the rat. J. Biol. Chem. 163:599-619.
11. Morgan, A. F. 1931. The effect of heat upon the biological value of cereal proteins and casein. J. Biol. Chem. 90:771-792.
12. Orent-Keiles, E. and Hallman, L. F. December 1949. The breakfast meal in relation to blood-sugar values. U. S. Dept. of Agriculture Cir. No. 827.
13. Tuttle, W. W., Daum, K., Myers, L., and Martin, C. 1950. Effect of omitting breakfast on the physiologic response of men. J. Am. Diet. Asso. 26:332-335.
14. Tuttle, W. W., Wilson, M., and Daum, K. 1949. Effect of altered breakfast habits on physiologic response. J. Applied Physiol. 1:545-559.
15. U. S. Dept. of Agriculture. June 1950. Composition of foods—raw, processed, prepared. Agriculture Handbook No. 8.
16. U. S. Public Health Service. January 1947. Food value tables for calculation of diet records. Federal Security Agency, Washington, D. C.