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Foods Used by Rural Families in Ohio During a Three-year Period

Hughina McKay and Mary Ann Brown



OHIO
AGRICULTURAL EXPERIMENT STATION
Wooster, Ohio

The Ohio State University



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FOODS USED BY RURAL FAMILIES IN OHIO DURING A THREE-YEAR PERIOD

HUGHINA MCKAY AND MARY ANN BROWN

Account book records of expenditures for food and the amounts of food used in the home by rural families in Ohio were available for study for the 3-year period, 1926 to 1928, inclusive. These records included amounts and money value of foods produced on the farm and used in the home, as well as foods purchased for use in the home. Full details of the procedure followed are given in an earlier bulletin (4).

For the 3-year period, the account book records of food used by 113 families have been studied. Of this number, food records were available for 62 families for one year, for 33 families for 2 years, and for 18 families for 3 years. The number of families keeping the records varied during the 3-year period. During 1926, there were 47 families whose records were sufficiently detailed to justify study. For 1927 and 1928, the numbers were 68 and 67, respectively.

Of the 113 individual families whose food records were studied during the 3-year period, the size of the family groups varied, the smallest consisting of two members and the largest group of 11 members. The families whose diets were studied during 1926 averaged 4.79 individuals; in 1927 the average was 5.07, and in 1928 the average was 5.03.

The personnel of the groups also varied; the number of adults per family ranged from one to six and the number of children from none to seven. In 22 families there were no children; in 28 families there was one child only; for the remainder of the families, the number of children ranged from two to seven.

The family was considered to include all who had their meals in the home, including hired help, relatives, and boarders, as well as the immediate family.

The number of meals eaten away from home, as well as the number of meals served to guests in the home, was also considered. In some cases the two balanced fairly evenly; in other cases there was enough difference between the two to require recognition in calculation of the diet. One family, for example, recorded 167 meals out and 107 guest meals, a difference of 60 meals. Sixty meals would approximate the meals for one individual

for 3 weeks; on the basis of adult male units¹ this would be equivalent to .05 unit. This amount was, therefore, subtracted from the total number of consumption units represented by the family group. In cases where the guest meals outnumbered the meals eaten away from home, a figure equivalent to the number of consumption units represented in the additional meals was added.

Using the double dietary scale of Hawley (2), and according to the method previously described (4), the food needs of each of the 113 families were determined in terms of consumption units. For 1926, the 47 families represented an average of 4.0 adult male units per family in terms of energy needs and 4.6 adult male units per family in terms of protein and mineral requirements. For 1927, the 68 families averaged 4.25 adult male units per family on the basis of energy needs and 4.89 adult male units on the basis of protein and mineral needs. For 1928, the 67 families averaged 4.13 adult male units per family on the basis of energy needs and 4.70 adult male units on the basis of protein and mineral needs.

FOODS USED BY RURAL FAMILIES DURING A 3-YEAR PERIOD

From the data obtained from the account books, tables were compiled to show the amounts and the money value of foods produced on the farm and used in the home, as well as amounts and costs of the foods purchased for use in the home during the 3 years, 1926, 1927, and 1928.

The nutritive value of the foods used was computed on the basis of adult male units for each of the 3 years, and the results were compared with the commonly accepted standards. Table 1 shows the results of such computations for each of the 3 years. As shown by this table, the average food consumption was, in the main, well above the standard. The calories for 1927 and 1928, however, were somewhat below the standard. The iron provision for 1927 and 1928 was also somewhat low.

Examination of the figures of this table show that, for 1926, the figures of average nutritive value, as well as the cost of the diet, exceed corresponding figures for 1927 and 1928. There is a fairly close agreement between the figures for 1927 and 1928, both as regards nutritive value and cost of the diets. These facts lead to the assumption that the records were kept in a more nearly accurate manner during 1927 and 1928 than during the first year of the study and, therefore, represent more nearly the food habits of these rural people.

¹The moderately active man from 18 to 60 years of age is considered as one adult male unit on the basis of his food needs. Using the Hawley scale the food needs of each of the other members of the family are estimated in corresponding terms and the total food needs of each family group determined.

TABLE 1.—Average Daily Food Consumption of Ohio Families

Year	Number of families	Average number of individuals	Average number of children	Average number of adult male units per family		Food consumption per adult male unit per day					Average daily cost	
				Energy	Protein and minerals	Calories	Protein	Phosphorus	Calcium	Iron	Per family	Per adult male unit
1926.....	47	4.70	1.9	4.0	4.6	3517	100.2	1.712	1.153	.0174	<i>Dollars</i> 1.60	<i>Dollars</i> 0.41
1927.....	68	5.07	2.1	4.2	4.6	3255	87.1	1.505	0.992	.0152	1.38	0.32
1928.....	67	5.03	2.0	4.1	4.7	3198	84.5	1.502	1.003	.0150	1.35	0.33
Standard of good nutrition (10 per cent allowed for waste) ..						3300	74.0	1.450	0.75	.0165	.....	.....

For the purposes of this study, the foods recorded in the account books were grouped into several divisions; namely, (a) meat and other protein-high foods, (b) milk and cream, (c) fruits and vegetables, (d) cereal products, (e) sugar and other sweets, (f) fatty foods, and (g) "other groceries" and food adjuncts. The average amounts used per family per year, as well as the percentage of each group of food produced on the farm and used in the home, are shown in Table 2.

Practically all the milk and cream used in the home, approximately 85 per cent of the vegetables, about 80 per cent of the meat, from 60 to 75 per cent of the fruit, and over half of the fatty foods used in the home were produced on the farm. From 13 to 23 per cent of the cereal products used were produced on the farm. In the main, sugar and other sweet foods were purchased. As shown by Table 2, the amount of "other groceries" produced on the farm varied considerably from year to year. This is due largely to the fact that nuts were included in this group and the amounts used varied greatly from one year to another.

Calculations based on the figures given in Table 2 show that the rural families studied produced 74 per cent of all food used in the home in 1926 and 72 per cent in 1927 and in 1928. The total percentages of food produced on the farm for use in the home seemingly vary little from year to year, although proportions of certain foods produced do vary more widely; for example, during 1926, 76 per cent of the fruit used in the home was produced on the farm, during 1927 the corresponding percentage was 68, and for 1928 it was only 62.

MONEY VALUE OF FOODS USED BY RURAL FAMILIES

From the data in the account books, the average money value of each of the food groups previously referred to was calculated. (See Table 3 and Figure 1). In determining the money value of the foods purchased for use, the homemaker recorded the amount paid for them. For the foods which were produced on the farm and used in the home, she recorded the price for which they would have been sold. These prices were then checked against a price index for the year, by workers in the Department of Rural Economics of the Ohio Agricultural Experiment Station, and the prices changed accordingly. This method smoothed out any great differences between the prices recorded for foods produced on the farm and used in the home and the prices that similar foods would have cost if purchased.

TABLE 2.—Average Quantities of Foods Used and Percentage Produced on the Farm of the Different Food Groups During Each of the 3 Years, 1926, 1927, and 1928

Food group	1926			1927			1928		
	Average quantity used per year		Per cent produced	Average quantity used per year		Per cent produced	Average quantity used per year		Per cent produced
	Per family	Per adult male unit		Per family	Per adult male unit		Per family	Per adult male unit	
Meat and other protein-high foods	<i>Pounds</i> 832.8	<i>Pounds</i> 208.2	79.2	<i>Pounds</i> 935.1	<i>Pounds</i> 220.0	79.1	<i>Pounds</i> 867.4	<i>Pounds</i> 210.0	80.5
Milk and cream	2186.6	546.7	99.5	2308.6	543.2	99.2	2263.0	747.9	99.2
Fruits and vegetables:									
(a) Vegetables.....	1837.9	459.4	86.0	1837.1	437.4	82.8	1876.3	457.1	86.1
(b) Fruits.....	1527.4	381.8	75.9	967.9	227.7	68.2	928.4	224.8	61.9
Cereals	823.7	205.9	22.9	891.5	209.8	19.1	792.4	191.9	13.2
Sugar and other sweets	446.7	111.7	5.3	406.4	95.6	3.8	423.1	102.4	1.9
Fatty foods.....	160.7	40.2	66.8	126.2	29.7	50.3	105.5	25.5	55.1
Other groceries.....	160.8	40.2	35.2	68.0	16.0	2.5	96.6	23.4	1.0

Table 3 shows the average money value of each of the food groups used during each of the 3 years, per family, as well as per adult male unit. The proportion that the money value of food produced on the farm bears to the entire value of each food group is also shown; in other words, the money value of the contribution of the farm to the home living, as far as food is concerned, is shown.

MEAT AND OTHER PROTEIN-HIGH FOODS

From Table 3, it may be seen that meat and other protein-high foods form the largest item of expense among the food groups used by rural families. This is true for each of the 3 years. During 1926 the average money value of this food group for 47 rural families was \$141, or \$35 per adult male unit. For 1927, corresponding figures for 68 families were \$165 per family, or \$39 per adult male unit, and for 1928 the figures for 67 families were \$160 per family, or \$39 per adult male unit.

These amounts represent 26 per cent of the total money value of foods used for 1926 and 32 per cent of the total money value for 1927 and 1928.

The value of the protein-high foods produced on the farm for use in the home represented 69 per cent of the total value of such foods used in the home in 1926. During 1927 and 1928, the corresponding figures were 72 and 74.

MILK AND CREAM

Although milk and cream retained the same relative position (namely, third, in order of money value) during each of the 3 years, the amount used per family and per adult male unit was greater during the first year than during either of the two following years; \$82 per family, or \$21 per adult male unit, were spent during the first year as compared to \$75 per family, or \$18 dollars per adult male unit, during the second year, and 72 dollars per family, or \$17 per adult male unit, during the third year.

The value of the milk and cream produced on the farm for use in the home remained fairly constant throughout the 3 years. In 1926, it was 96 per cent, during 1927, the corresponding figure was 94 per cent, and during 1928 it was 95 per cent.

Meat and milk retained the position of being two of the three items of greatest money value in the diet during all 3 years. The money value of meat, however, was more than twice as much as that of milk during 1927 and 1928 and over 70 per cent higher during 1926. Of two rules given by Sherman (9) for use, whatever

TABLE 3.—Money Value of Foods Used in Ohio Farm Homes

Food group	1926			1927			1928			1926-1928
	Average per year		Value of foods produced	Average per year		Value of foods produced	Average per year		Value of foods produced	Average value of foods produced
	Per family	Per adult male unit		Per family	Per adult male unit		Per family	Per adult male unit		
	<i>Dollars</i>	<i>Dollars</i>	<i>Per cent</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Per cent</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Per cent</i>	<i>Per cent</i>
Meat and other protein-high foods	140.89	35.23	68.66	165.38	38.91	71.86	159.76	38.68	74.07	71.53
Milk and cream	82.20	20.56	96.01	74.96	17.64	94.39	71.55	17.32	95.32	95.24
Fruits and vegetables	237.77	34.45	.....	103.50	24.35	.....	94.25	22.82	.....	.....
(a) Vegetables	(a) 172.89	(a) 18.23	(a) 79.43	(a) 58.75	(a) 13.82	(a) 74.02	(a) 52.19	(a) 12.64	(a) 74.21	(a) 75.88
(b) Fruits	(b) 64.88	(b) 16.22	(b) 60.67	(b) 44.75	(b) 10.53	(b) 53.18	(b) 42.06	(b) 10.18	(b) 45.19	(b) 53.01
Cereal products	59.01	14.75	5.69	59.91	14.10	6.03	57.34	13.88	4.03	5.25
Sugar and other sweets	36.43	9.11	11.64	35.06	8.25	7.64	33.53	8.12	4.31	7.86
Fatty foods	57.33	14.33	61.97	51.05	12.01	48.71	44.23	10.71	56.58	55.75
Other groceries	4.90	1.22	31.97	3.65	0.86	4.65	4.78	1.16	12.93	16.51
Food adjuncts	17.55	4.39	4.10	20.26	4.77	0.00	29.28	7.09	1.55	1.88
Total cost	536.08	134.04	59.40	513.77	120.89	56.11	494.72	119.78	55.40	.....
Value of foods produced on the farm and used in the home.....	318.44	79.61	59.40	288.26	67.83	56.11	271.84	65.82	55.40	.....

the level of expenditure for foods might be, the one in regard to the relative expenditures for milk and for meat—namely, “At least as much should be spent for milk, (including cream and cheese if used) as for meats, poultry, fish”—would undoubtedly serve to improve the quality of the diets used in rural homes, as elsewhere.

FRUITS AND VEGETABLES

The importance of fruits and vegetables is stressed by those who are interested in the adequacy of the diet. During the World War, the Food Administration suggested that approximately one-fifth of the food dollar be spent for fruits and vegetables (8). For 1926, the money value of fruits and vegetables used by the 47 Ohio farm families represented an average of 26 per cent of the food dollar. During 1927, the percentage of the food dollar so represented dropped to 20; a further drop to 19 took place during 1928.

Fruits.—The average money value for fruits used varied considerably during the 3-year period. In 1926, the average per family was \$65; per adult male unit the average was \$16. For 1927, the corresponding money values were \$45 per family, or \$11 per adult male unit. For 1928, the corresponding figures were similar to those for 1927, being \$42 per family and \$10 per adult male unit.

During the first year, fruits ranked fourth in relation to total money value; during the second and third years the money value of fruits dropped to sixth place.

The value of fruits produced on the farm for use in the home averaged approximately half of the total money value of fruits used in the home, being 61 per cent the first year, 53 per cent the second year, and 45 per cent the third year.

Vegetables.—The average money value of vegetables, as of fruits, varied considerably from year to year. For the first year, the average value of vegetables per family was \$73, or \$18 per adult male unit. For 1927 the average money value per family dropped to \$59, or \$14 per adult male unit. A further drop to \$52 per family, or \$13 per adult male unit, took place during the third year.

During 1926 the money value of vegetables ranked third in total money value, but for 1927 and 1928 such values dropped to fourth place in relative cost.

Rather surprisingly, the actual average money expenditure for vegetables for use in the farm home was approximately one-fourth of the total money value of vegetables used in the home. In other

words, the vegetables produced on the farm and used in the home represent only about three-fourths of the money value of all the vegetables used (See Table 3).

It is rather interesting to note a certain relationship between the money value of meats and other protein-high foods and the money value of fruits and vegetables. The two groups represent somewhat more than half the total money value of the food used but remain fairly constant from year to year. Such foods represented 52 per cent of the total of the money value for food used in 1926 and in 1927 and 51 per cent in 1928.

The relationship between these two groups varied however. As the money value of the protein-high group increased, the money value for fruits and vegetables used decreased. It is, therefore, probably not entirely fortuitous that the diets for 1927 and 1928, when the money value of fruits and vegetables was relatively less than in 1926, show a decreased nutritive value in regard to every factor (See Table 1).

Sherman's much quoted rule (9), "At least as much should be spent for fruits and vegetables as for meat, poultry, and fish", may probably be applied to dietary plans of rural homes with good results.

The money value of the three food groups, (a) meat and other protein-high foods, (b) milk and cream, and (c) fruits and vegetables, occupies the same relative position throughout the 3-year period and together greatly exceeds the money value of all the other food groups. A lower proportion of the food dollar represented by meat and a higher proportion by milk and by fruits and vegetables would without doubt improve the diets of rural families in general, not only in regard to the dietary factors which have been considered in this study but also in regard to the vitamin content of the diet.

CEREALS

The money value of cereals remained remarkably constant from year to year and ranked fourth throughout the 3 years of the study.

During 1926, \$59 per family, or \$15 per adult male unit, were represented by the money value of cereal products. For 1927, the amounts were \$60 per family, or \$14 per adult male unit. In 1928, corresponding figures were \$57 per family, or \$14 per adult male unit.

The money value of cereals represents 11 per cent of the total for food during 1926 and 12 per cent during 1927 and 1928. Where strictest economy is needed in food selection, it has been suggested that 20 cents or more of the food dollar be spent for cereal products. The fact that considerably less than the suggested 20 cents of the food dollar of rural families is represented by the money value of cereal products would seem to indicate that economy is not a significant motive in their selection of food, or that they do not realize that it is possible to provide an adequate diet more economically by the use of a larger amount of cereal products.

On the basis of money value, relatively small amounts of cereals were produced on the farm for use in the home.

SUGAR AND OTHER SWEETS

The money value of sugars and other sweets varied little during the 3 years of the study. The average for such foods was \$36 per family, or \$9 per adult male unit, during 1926. During 1927, corresponding figures were \$35 per family, or \$8 per adult male unit. For 1928, the figures were \$34 per family, or \$8 per adult male unit. The money value of the sugars and other sweets produced on the farm for use in the home varied considerably from year to year, being 12 per cent of the total value of such foods used in the home during 1926, 8 per cent during 1927, and 4 per cent during 1928.

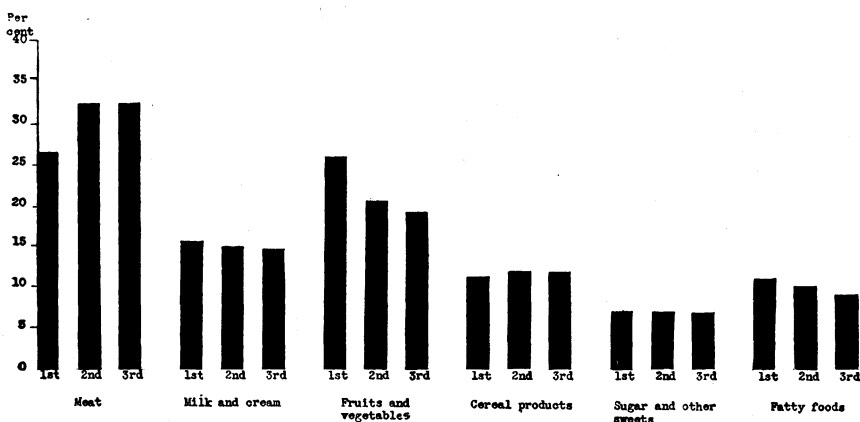


Fig. 1.—Comparison of relative money value for each food group for each of the three years

The money value of sugars and other sweet foods represented approximately 7 per cent of the total money value of food for each of the 3 years and remained sixth during each of the 3 years.

FATTY FOODS

The money value of fatty foods, such as butter, lard, and other fats, varied considerably during the 3-year period, dropping from \$57 per family, or \$14 per adult male unit, during the first year to \$51 per family, or \$12 per adult male unit, the second year and finally to \$44 per family, or \$11 per adult male unit, the third year. Although the money value of fatty foods used was less the second and third year than during the first year, such foods ranked fifth in order of money value each year. Total average money value of food was much less per family for the second and third years than for the first year.

Considerably over half the money value of the fatty foods used in the home was represented by the value of such foods produced on the farm for use in the home, the percentages being 62 per cent for the first year, 49 per cent for the second year, and 57 per cent for the third year.

“OTHER GROCERIES”

The money value of “other groceries”, not including food adjuncts, was slightly over one dollar per adult male unit for the first and third years and only 86 cents per adult male unit for the second year.

Expenditures for food adjuncts and meals out were somewhat larger than for “other groceries”, being a little over \$4 per adult male unit for the first two years and \$7 per adult male unit during the third year.

TOTAL MONEY VALUE OF FARM-PRODUCED FOODS

Total average money value of food used was less per family, as well as per adult male unit, during 1927 and 1928 than during 1926. The total money value of food was \$563 per family, or \$134 per adult male unit for the first year, \$514 per family, or \$121 per adult male unit for the second year, and \$495 per family, or \$120 per adult male unit, for the third year of the study.

In terms of money value, the food produced on the farm and used in the home represented 59 per cent of the total value of food used in the home during 1926. For 1927 and 1928 the corresponding figures were 56 and 55 per cent, respectively.

If the families included in this study are representative of Ohio farm families, the farm-produced foods represent somewhat over half the total money value of all foods used in the home.

In a study of foods used by rural families in Vermont, Muse and Brooks (5) report that 51 per cent of the total money value of foods used in the home was represented by the value of foods produced on the farm for home use.

Dickins (1) reports foods produced on the farm as representing 74 per cent of the total money value of foods used in home diets studied by her in Mississippi.

Studying the money value of foods used in 342 Nebraska farm homes, Rankin (6) reports that about a third of the value of the food used in the home was represented by the value of purchased food, with 68.9 per cent of the value of food used in the home represented by food produced on the farm.

For Minnesota rural families, Zimmerman and Black (11) report 48.9 per cent of the total value of foods used in the home as being represented by the value of foods produced on the farm for home use.

Of the three classes of rural families (namely, owners, tenants, and hired men) Kirkpatrick (3) reports the value of the foods produced on the farm for use in the home as averaging 66.9 per cent of the total value of foods used in the home in the 11 states included in his study.

The custom in rural homes as to the use of farm-produced foods seems to vary little in different sections of the country but to comprise about 50 to 75 per cent, or an average of about 60 per cent, of the total value of foods used in the home.

It is rather interesting, although it may not be significant, that of the 3 years of the Ohio study, the year during which the value of foods produced on the farm for use in the home was greatest in relation to total money value was also the year when the nutritive value of the average diet was greatest.

DISTRIBUTION OF CALORIES AMONG THE FOOD GROUPS

Of equal interest with the distribution of the food dollar among the various food groups, is the number of calories derived from each group, since the cost of an adequate diet is dependent to an extent upon the proportion of the food dollar allotted to each class of food. The calories derived from each of the food groups have, therefore, been computed and are shown in Table 4.

TABLE 4.—Average Percentage Distribution of Daily Calories in the Ohio Study Compared with the Distribution Suggested by Rose

Study	Meat, eggs, and cheese		Milk and cream		Fruits and vegetables		Cereal products		Sugar and other sweets		Fatty foods	
	Calories per man per day	Per cent of total	Calories per man per day	Per cent of total	Calories per man per day	Per cent of total	Calories per man per day	Per cent of total	Calories per man per day	Per cent of total	Calories per man per day	Per cent of total
Dietary without cost restrict ns*.....		10-15		20-25		18-24		20		10-12		15-20
Moderately priced dietary*.....		8-15		25		15-20		25-30		10-12		10-20
Very economical dietary*.....		5-10		20-25		12-15		30-40		10-12		10-12
McKay-Ohio 1926.....	615.8	17.5	491.5	14.0	578.1	16.4	846.7	24.1	545.3	15.5	407.9	11.6
McKay-Ohio 1927.....	693.6	21.4	491.0	15.1	428.0	13.2	858.8	26.4	464.9	14.3	298.6	9.2
McKay-Ohio 1928.....	680.1	21.2	511.9	16.0	463.7	14.5	778.2	24.3	500.7	15.6	248.4	7.8

*Rose, M. S. 1927. The Foundations of Nutrition. The MacMillan Company, New York.

MEAT AND OTHER PROTEIN-HIGH FOODS

For the diet with no cost restrictions, Rose suggests that 10 to 15 per cent of the total calories be derived from meat and other protein-high foods. For the moderate-cost diet she suggests a corresponding percentage of 8 to 15, and for the low-cost diet a corresponding percentage of only 5 to 10 (7).

The percentage of calories derived from protein-high foods among the families whose diets were studied during 1926 to 1928 is in decided contrast to the percentages suggested. During 1926, 18 per cent, and for 1927 and 1928, 21 per cent of the calories were derived from the group of protein-high foods, such as meat, fish, poultry, and eggs. (See Figure 2).

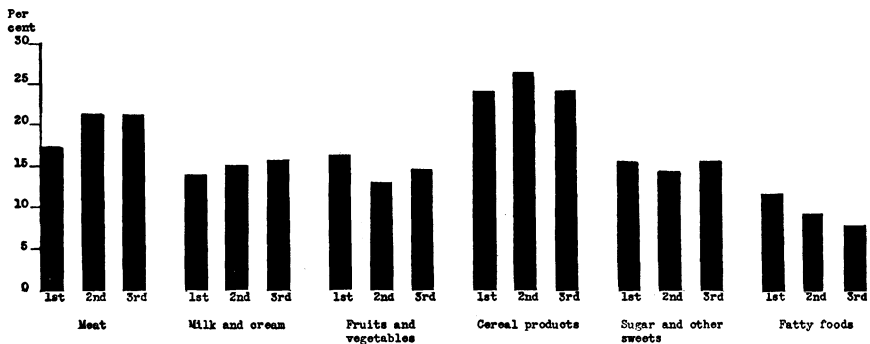


Fig. 2.—Average percentage distribution of calories in the Ohio study during each of the three years

MILK AND CREAM

A liberal provision of calories from milk is desirable in diets, regardless of the cost level. According to Rose, the calories derived from milk should not fall below 20 per cent of the total calories. Even in diets of very low cost, from 20 to 25 per cent of the calories are advantageously derived from milk. The Ohio diets studied could well be improved in this respect. For the first 2 years studied, milk supplied an average of only 15 per cent and for the third year 16 per cent of the total calories, instead of the 25 per cent recommended for diets of moderate cost.

FRUITS AND VEGETABLES

For the diet with no cost restrictions, Rose suggests that fruits and vegetables provide 18 to 24 per cent of the total calories, for diets of moderate cost from 15 to 20 per cent of the calories, and for diets of very low cost, 12 to 15 per cent of the total calories.

During the first year of the study of foods used by rural Ohio families, 16 per cent of the total calories were derived from fruits and vegetables. The percentage dropped to 13 during the second year, and increased to 14 during the third year. That is, for one year, the use of fruits and vegetables reached the lower limit of the amount recommended for a diet of moderate cost while for two years the amount suggested for the very low-cost diet was used.

The question of the use of fruits and vegetables in the diet as measured by the percentage of total calories derived from this group of foods is of interest in connection with the varieties and amounts of such foods recorded and the number of families using the fruits and vegetables.

Vegetables.—Although approximately 25 varieties of vegetables were recorded on the account books, the varieties in use by all the families were very few; for example, during 1926, only two vegetables (potatoes and lettuce) were found in all the records. During 1927, potatoes were the only vegetables recorded in all the account books. For 1928, cabbage, lettuce, and potatoes were found on all the records.

During 1926, only five vegetables (lettuce, cabbage, potatoes, tomatoes, and onions) were found in 90 per cent, or more, of the account books. During 1927, the number of vegetables found in 90 per cent, or more, of the account books was increased to six by the addition of corn and, in 1928, to eight by the further addition of sweet potatoes and string beans.

During 1926, 19 vegetables were found common to half or more of the account books. The number decreased to 18 in 1927 and increased to 19 in 1928.

The value of vegetables in the diet has been stressed by nutritionists. The need of an increased use of vegetables, especially of the green leafy ones, by rural families would seem to be indicated by the records.

Fruits.—In addition to jams and jellies and including canned, as well as fresh, fruits, 19 varieties of fruits were found listed in the account books. Of these fruits, bananas, grape fruit, lemons, oranges, pineapples, dried currants, raisins, prunes, and dates were purchased; and the others (namely, apples, berries, grapes, muskmelons, peaches, pears, plums, rhubarb, cherries, and quinces) were purchased in part and in part produced on the farm.

During 1926, apples and berries were found recorded in all the account books. All but one of the 47 families recorded the use of peaches and oranges; 45 families reported the use of bananas.

During 1927, the 68 families all reported the use of berries, 67 families the use of bananas, and 65 families the use of lemons, oranges, and raisins.

For 1928, raisins were reported by each of the 67 families, apples and berries each by 66 families, and bananas and oranges each by 65 families.

Although, as shown in the preceding paragraphs, the use of locally grown fruit was recorded by fewer families than was the use of such fruits as are shipped in, the amounts of locally grown fruit used exceeded greatly the amounts of other fruits used.

Apples and peaches were used in larger amounts than were any of the other fruits during all three years. Pears and cherries occupied third and fourth places in order of amounts used during 1926, and pears and berries occupied a similar position during 1927 and 1928.

The amounts of locally grown fruits used decreased during 1927 and 1928, the difference being due undoubtedly to a decreased production. The production of apples in Ohio dropped from 11,900 bushels in 1926 to 5,600 bushels in 1927 and to 5,880 bushels in 1928, with peaches and pears showing a corresponding drop, according to Ohio Agricultural Statistics for 1928.²

CEREAL PRODUCTS

The cereal grains and their products are the most inexpensive sources of calories. When there are no cost restrictions, Rose suggests that cereals provide 20 per cent of the total calories. For the diet of moderate cost she suggests that from 25 to 30 per cent of the total calories be provided from cereals. Where extreme cost restrictions are necessary, cereal products may be used to provide from 30 to 40 per cent of the total calories.

As shown by Table 4, an average of about 25 per cent of the total calories was derived from the cereal products.

This percentage remains approximately the same during the 3 years, a fact which seems to indicate that the custom of providing about 25 per cent of the calories from cereal products is well established among rural families.

SUGAR AND OTHER SWEETS

The use of sugar and other sweets to the extent of 10 per cent of the total calories is suggested by Rose for the diet with no cost restrictions; for the moderately priced and for the very low-cost diets from 10 to 12 per cent of the calories are suitably derived from

²Ohio Agricultural Statistics for 1928, Ohio Agr. Exp. Sta. Bull. 442.

sugar and other sweets. The amount of sugar used by the Ohio families studied seems high in comparison with the suggested amounts. During 1926, 16 per cent of the total calories was derived from this food group. For 1927 and 1928 the percentages were 14 and 16, respectively.

As has been pointed out elsewhere (10), sugar and similar sweet foods are what may be termed "one-sided foods", being energy or fuel foods solely. Their use in excess is likely to crowd out the important vitamin- and mineral-carrying foods so important for physical well being. The over-abundance of sugar and sweet foods in the diet of the rural families studied may account for the deficiency in iron noted in many of the diets.

FATS AND OILS

The number of calories derived from these foods was much lower for each of the 3 years of the study than the percentages suggested by Rose (see Table 4). It is probable, because of the generous amounts of pork used, that the fat content of the diets was greater than that indicated by the percentages shown in Table 4.

IMPROVEMENT OF THE DIETS

A rearrangement of the diets with a higher percentage of the calories derived from milk, fruits, and vegetables, and possibly from cereals, and with a lower percentage of calories from meat and other high-protein foods and from sugar would undoubtedly improve the quality of the diets at the points where improvement is most needed; namely, in regard to mineral and vitamin provision.

DETAILED STUDY OF THE DIETS OF 18 OF THE FAMILIES

During the 3-year period, 1926 to 1928 inclusive, 182 yearly records of foods used in the home were studied. Of the 182 records, those of 18 families were complete for the 3-year period. These 54 records, one for each of the 3 years for each of the 18 families, were grouped, and a detailed study was made of them.

NUTRITIVE VALUE OF THE DIET

For the entire group of eighteen families included in the study, the average nutritive value of the diet was computed. As shown in Table 1 the average diet of the group studied was equal to, above, or only slightly below the standards in all the factors considered except iron. For 1927 and 1928 the amount of iron in the average diet of the 135 families was below that of the standard.

For the 18 families, each diet was considered individually in regard to calorie, protein, calcium, phosphorus, and iron provision. The results of such computation for each of the 3 years, as well as the average for each family for the 3-year period, are shown in Table 5.

TABLE 5.—Nutritive Value of Diets Used by 18 Families During a 3-year Period

Family	Calories	Protein	Phosphorus	Calcium	Iron	Cost
Family 1						<i>Dollars</i>
1926.....	4910	103.9	1.934	1.456	0.0217	0.73
1927.....	3399	112.4	1.948	1.105	0.0198	0.41
1928.....	3123	97.9	1.753	1.079	0.0184	0.36
Average.....	3811	104.7	1.878	1.213	0.0200	0.50
Family 2						
1926.....	5267	124.9	2.204	1.287	0.0200	0.61
1927.....	4040	112.4	1.948	1.105	0.0198	0.44
1928.....	3578	97.9	1.753	1.079	0.0184	0.46
Average.....	4295	111.7	1.968	1.157	0.0194	0.50
Family 3						
1926.....	3360	110.7	2.069	1.720	0.0208	0.44
1927.....	3420	123.7	2.460	2.177	0.0225	0.40
1928.....	3353	120.4	2.332	1.842	0.0224	0.45
Average.....	3378	118.3	2.287	1.913	0.0219	0.43
Family 4						
1926.....	3921	119.0	2.166	1.510	0.0189	0.42
1927.....	3392	117.5	2.251	1.503	0.0215	0.34
1928.....	3043	110.3	2.058	1.498	0.0176	0.33
Average.....	3452	115.6	2.158	1.504	0.0193	0.36
Family 5						
1926.....	3502	101.4	1.745	1.053	0.0235	0.43
1927.....	3646	102.8	1.557	0.848	0.0209	0.38
1928.....	2999	81.6	1.452	0.900	0.0198	0.32
Average.....	3382	95.3	1.585	0.934	0.0214	0.38
Family 6						
1926.....	4833	114.3	1.850	1.002	0.0205	0.53
1927.....	4359	94.9	1.518	0.763	0.0176	0.41
1928.....	3272	73.5	1.295	0.803	0.0138	0.33
Average.....	4155	94.2	1.554	0.857	0.0173	0.42
Family 7						
1926.....	3848	105.2	1.761	1.290	0.0190	0.38
1927.....	3290	116.8	2.254	1.320	0.0222	0.33
1928.....	2749	87.9	1.636	1.125	0.0147	0.31
Average.....	3296	103.3	1.884	1.245	0.0186	0.34
Family 8						
1926.....	4765	103.4	1.395	0.650	0.0143	0.38
1927.....	4404	112.9	1.841	0.753	0.0209	0.39
1928.....	4885	134.2	2.192	0.965	0.0248	0.41
Average.....	4685	116.8	1.809	0.789	0.0200	0.39
Family 9						
1926.....	4031	84.0	1.330	0.696	0.0155	0.37
1927.....	4494	97.1	1.509	0.733	0.0172	0.32
1928.....	4378	99.8	1.562	0.822	0.0168	0.37
Average.....	4301	93.6	1.467	0.750	0.0165	0.35
Family 10						
1926.....	4323	119.3	2.325	2.026	0.0184	0.52
1927.....	3747	112.4	2.264	2.007	0.0158	0.39
1928.....	3815	95.7	1.665	1.251	0.0145	0.38
Average.....	3962	109.1	2.085	1.761	0.0162	0.43

TABLE 5.—Nutritive Value of Diets Used by 18 Families During a 3-year Period—Continued

Family	Calories	Protein	Phosphorus	Calcium	Iron	Cost
						<i>Dollars</i>
Family 11						
1926.....	4296	129.6	2.149	1.493	0.0205	0.54
1927.....	2721	98.1	1.678	1.116	0.0170	0.37
1928.....	2771	86.7	1.586	1.090	0.0160	0.32
Average.....	3262	104.8	1.804	1.233	0.0178	0.41
Family 12						
1926.....	3521	79.2	1.413	1.123	0.0123	0.32
1927.....	2950	74.0	1.381	0.991	0.0128	0.25
1928.....	3103	82.0	1.473	1.082	0.0130	0.26
Average.....	3191	78.4	1.422	1.065	0.0127	0.28
Family 13						
1926.....	3214	84.5	1.362	1.041	0.0123	0.37
1927.....	2358	65.8	1.101	0.900	0.0095	0.29
1928.....	2999	76.7	1.244	0.934	0.0119	0.29
Average.....	2857	75.7	1.236	0.958	0.0112	0.32
Family 14						
1926.....	4214	115.3	2.062	1.694	0.0175	0.51
1927.....	2784	79.5	1.450	1.166	0.0139	0.37
1928.....	2776	79.9	1.473	1.238	0.0140	0.35
Average.....	3258	91.6	1.662	1.366	0.0151	0.41
Family 15						
1926.....	3554	99.0	1.397	1.084	0.0114	0.29
1927.....	3393	81.6	1.409	0.845	0.0149	0.25
1928.....	3525	90.5	1.606	1.185	0.0140	0.26
Average.....	3491	90.4	1.471	1.038	0.0134	0.27
Family 16						
1926.....	3284	77.0	1.306	1.005	0.0099	0.37
1927.....	3479	79.6	1.434	1.144	0.0115	0.29
1928.....	3265	71.1	1.334	1.144	0.0098	0.28
Average.....	3343	75.9	1.358	1.098	0.0104	0.31
Family 17						
1926.....	2226	46.8	0.777	0.346	0.0091	0.26
1927.....	2483	52.6	0.755	0.354	0.0082	0.23
1928.....	2363	59.4	0.995	0.619	0.0101	0.22
Average.....	2357	52.9	0.842	0.440	0.0091	0.24
Family 18						
1926.....	2890	74.8	1.042	0.427	0.0136	0.34
1927.....	3611	103.9	1.338	0.464	0.0183	0.38
1928.....	3619	112.5	1.315	0.316	0.0173	0.30
Average.....	3437	99.3	1.256	0.404	0.0167	0.34
Average for 18 families						
1926.....	3887	99.6	1.683	1.161	0.0166	0.43
1927.....	3443	96.6	1.672	1.072	0.0169	0.35
1928.....	3312	92.1	1.596	1.054	0.0160	0.33
Average.....	3547	96.1	1.650	1.096	0.0165	0.37

Calories.—As shown by Table 5, eight families, or less than half the group, were providing adequately for their energy requirements during each of the 3 years. In regard to calories, any amount above 3200 was assumed to be adequate. When the average for each of the 18 families for the 3-year period was taken, all but three were providing adequately for their calorie needs.

The average money value of each of these three diets was low, being 28 cents per adult male unit per day, as compared to an average money value of 39 cents per adult male unit per day for the diets in which the calorie provision was adequate.

Protein.—Only three of the 18 families were using less protein than the standard during any one of the 3 years, and, when the average for the 3-year period was taken, only one family was using less than the desirable amount of protein. The statement, so frequently made, that the average diet is usually well provided with protein seems to be supported by these results.

In regard to protein deficiency, as with calorie deficiency, a close relation between adequacy and money value of the diet was noted. The diet containing less than the amount of protein indicated in the standard had a money value of 24 cents per adult male unit per day, an amount less than that of any of the other diets.

Calcium.—Four of the 18 families were using a diet containing less than the desirable amount of calcium during one or more of the 3 years. When averages for each family for the entire 3-year period were computed, only two families were using less than the amount given in the standard.

The average money value of the diets which were inadequate in calcium was less than the money value of the adequate diets, being 29 cents, as compared to an average of 38 cents per adult male unit per day for those diets well protected in regard to calcium.

Phosphorus.—Eight of the 18 families were using a diet containing less than the desirable amount of phosphorus during one or more years of the study. When the average for the 3-year period was computed, this number had dropped to five. The diets adequately provided with phosphorus averaged 40 cents per adult male unit per day, as compared to an average money value of 30 cents per adult male unit per day for the diets containing less than the amount of phosphorus indicated in the standard.

Iron.—For 12 of the 18 families, the amount of iron used during one or more of the 3 years was less than the amount of the standard. When the average iron intake for the 3-year period for each of the 18 families was computed, the number having less than the standard was changed to six.

The diets which were adequate in regard to iron averaged a money value of 40 cents per adult male unit per day, as compared to a corresponding money value of 30 cents for those diets containing less than the amount of iron indicated in the standard.

Total nutrients.—These figures of the nutritive value of the diets of 18 families for a 3-year period follow the same trend as figures for 47 families for a year's period as reported in an earlier bulletin (4). As shown by these two studies for the nutrients con-

sidered, rural families in Ohio provide first for their protein needs, second for calcium needs, third for energy requirement, fourth for phosphorus, and lastly for iron.

DIVISION OF THE FOOD DOLLAR

Table 6 shows the average percentages of the food dollar which were represented by the different food groups during each of the 3 years. It also shows the percentage of total nutrients derived from each of the groups.

As shown by this table the division of the food dollar among the food groups remains practically the same from year to year. Average money value of fruits and vegetables shows the most change, dropping from 22 per cent of total money value in 1926 to 20 per cent in 1927 and to 18 per cent in 1928. At the same time the money value of meat and other protein-high foods increased from 30 per cent in 1926 to 33 per cent in 1927 and in 1928.

ADEQUACY OF THE DIET IN RELATION TO COST

Only two of the 18 families had average diets which were adequate during each one of the 3 years. For 11 of the families the average diet for the 3-year period was adequate in every factor considered. The diets of the remaining seven families were inadequate in from two to five factors.

Average money value of the eleven adequate diets was 41 cents per adult male unit per day. The average money value of the seven diets inadequate in two or more factors was 31 cents. The diet which was found to be inadequate in all factors for the 3-year period, as well as for each of the 3 years, had a money value less than any of the other diets, averaging only 24 cents per adult male unit per day.

DISTRIBUTION OF CALORIES

The average distribution of calories among the various food groups [namely, (a) meat and other high-protein foods, (b) milk and cream, (c) fruits and vegetables, (d) cereal products, and (e) fatty foods] was computed for each of the 11 families whose average diet for the 3-year period was adequate. A similar distribution was made for the seven families for whom the average diet for the 3-year period was found to be inadequate. This was done for each of the 3 years; as well as for the entire 3-year period.

TABLE 6.—Average Money Value and Food Values from Each Food Group in Percentages as Used by 18 Families for Each of 3 Years

Type of food	Relative cost			Calories			Protein			Phosphorus			Calcium			Iron		
	Year			Year			Year			Year			Year			Year		
	1926	1927	1928	1926	1927	1928	1926	1927	1928	1926	1927	1928	1926	1927	1928	1926	1927	1928
1 Meat, fish, eggs, cheese	29.84	32.51	32.66	18.41	23.62	22.56	35.65	39.72	37.52	20.81	25.92	24.97	8.29	9.28	8.95	33.09	35.02	34.23
2 Milk and cream...	15.86	13.97	16.09	13.48	14.39	15.22	22.37	21.65	22.02	38.70	34.89	36.30	69.36	69.40	70.52	9.74	8.90	9.45
3 { Vegetables	12.66	12.04	10.81	8.56	8.61	9.32	10.60	9.84	10.92	16.09	14.88	16.16	10.55	10.64	10.37	28.43	28.40	31.57
{ Fruits.....	9.09	8.08	6.99	6.21	4.15	3.72	2.20	1.45	1.36	4.63	2.79	2.63	4.50	3.29	3.20	8.76	5.60	4.90
4 Cereal products ..	10.37	11.00	11.45	24.86	25.21	24.82	27.13	26.41	26.63	18.30	20.36	18.43	5.65	5.94	5.56	16.81	19.28	17.50
5 Sugars and other sweets	6.49	6.94	5.82	16.30	15.71	16.04	0.10	0.13	0.08	0.13	0.14	0.11	0.76	0.91	0.61	1.89	2.14	1.40
6 Fatty products...	9.39	9.83	10.10	11.05	8.04	7.67	0.61	0.55	0.76	0.57	0.47	0.53	0.38	0.40	0.39	0.50	0.45	0.49
7 Food adjuncts and "other groceries"	6.30	5.63	6.09	1.13	0.27	0.66	1.34	0.24	0.72	0.78	0.54	0.87	0.50	0.16	0.40	0.79	0.21	0.45

TABLE 7.—Percentage of Calories Derived from Each Food Group for 11 Families whose Diets were Adequate for the 3-year Period

Family	Meats, fish, eggs, cheese	Milk and cream	Fruits and veget- ables	Cereals	Sugar and other sweets	Fatty foods	Other groceries	Cost
Family 1								<i>Dollars</i>
1926.....	14.35	14.47	19.35	16.76	21.84	12.53	0.70	0.73
1927.....	13.40	17.92	15.33	21.72	18.25	13.26	0.12	0.41
1928.....	14.07	19.79	20.03	19.43	20.15	6.45	0.09	0.36
Average.....	13.94	17.39	18.24	19.30	20.08	10.75	0.30	0.50
Family 2								
1926.....	20.76	11.63	24.53	20.55	13.64	6.36	2.54	0.61
1927.....	27.20	13.40	16.55	24.96	13.99	3.59	0.32	0.44
1928.....	27.23	14.75	20.13	19.05	13.81	4.79	0.25	0.46
Average.....	25.06	13.26	20.40	21.52	13.81	4.91	1.04	0.50
Family 3								
1926.....	12.75	19.38	21.33	19.77	13.24	13.12	0.41	0.44
1927.....	13.34	25.28	16.41	20.44	15.01	9.08	0.44	0.40
1928.....	13.46	21.12	24.03	20.09	13.22	7.48	0.60	0.45
Average.....	13.18	21.93	20.59	20.10	13.82	9.89	0.48	0.43
Family 4								
1926.....	16.23	17.12	13.76	27.38	14.07	11.29	0.15	0.42
1927.....	25.31	20.40	14.23	22.51	11.11	6.37	0.07	0.34
1928.....	29.19	22.65	8.12	21.62	9.66	8.66	0.10	0.33
Average.....	23.58	20.06	12.04	23.84	11.61	8.78	0.11	0.36
Family 5								
1926.....	23.60	8.68	25.18	13.20	12.30	14.51	2.53	0.43
1927.....	33.66	7.60	16.19	16.92	15.75	9.77	0.10	0.38
1928.....	15.50	9.55	25.84	14.78	22.23	11.83	0.26	0.32
Average.....	24.25	8.61	22.40	14.97	16.76	12.04	0.96	0.38
Family 6								
1926.....	23.56	9.69	14.95	25.45	13.64	10.60	2.11	0.53
1927.....	37.62	11.04	9.72	22.53	13.32	5.49	0.27	0.41
1928.....	8.60	14.54	12.51	33.29	18.99	10.88	1.20	0.33
Average.....	23.26	11.76	12.39	27.09	15.32	8.99	1.19	0.42
Family 7								
1926.....	13.13	14.37	19.17	28.42	16.63	7.78	0.50	0.38
1927.....	20.70	16.03	17.21	24.15	15.66	5.91	0.34	0.33
1928.....	20.54	16.91	15.79	22.50	16.40	6.25	1.61	0.31
Average.....	18.12	15.77	17.39	25.02	16.23	6.65	0.82	0.34
Family 8								
1926.....	15.91	6.71	8.63	42.50	13.63	12.08	0.54	0.38
1927.....	25.35	7.21	11.21	35.12	11.80	9.06	0.26	0.39
1928.....	25.31	7.39	10.25	33.26	12.40	10.45	0.94	0.41
Average.....	22.19	7.10	10.03	36.96	12.61	10.53	0.58	0.39
Family 9								
1926.....	18.12	20.81	11.69	20.30	9.43	17.34	2.31	0.37
1927.....	28.32	8.28	13.43	25.55	22.08	2.04	0.29	0.32
1928.....	27.17	10.45	12.35	28.20	19.52	1.99	0.31	0.37
Average.....	24.54	13.18	12.49	24.68	17.01	7.12	0.97	0.35
Family 10								
1926.....	18.82	25.20	12.85	18.05	16.33	8.19	0.56	0.52
1927.....	18.59	24.89	8.41	22.02	16.82	8.69	0.58	0.39
1928.....	17.30	19.72	11.51	24.49	17.95	8.48	0.54	0.38
Average.....	18.24	23.27	10.92	21.52	17.03	8.45	0.56	0.43
Family 11								
1926.....	12.46	13.15	15.68	29.92	20.83	7.38	0.58	0.54
1927.....	17.59	14.62	13.45	26.94	16.91	9.64	0.84	0.37
1928.....	13.01	14.09	15.23	24.82	21.87	10.29	0.69	0.32
Average.....	14.35	13.95	14.79	27.23	19.87	9.10	0.70	0.41

TABLE 8.—Percentage of Calories Derived from Each Food Group for 7 Families whose Diets were Inadequate for the 3-year Period

Family	Meat, fish, eggs, cheese	Milk and cream	Fruits and vegetables	Cereals	Sugar and other sweets	Fatty foods	Other groceries	Cost
Family 12								<i>Dollars</i>
1926.....	13.25	17.61	15.97	25.64	17.70	8.19	1.64	0.32
1927.....	19.22	18.65	11.77	22.59	22.22	5.15	0.41	0.25
1928.....	24.21	18.78	12.10	20.07	19.38	5.30	0.16	0.26
Average.....	18.89	18.35	13.28	22.77	19.77	6.21	0.74	0.28
Family 13								
1926.....	26.09	16.03	8.59	16.97	15.40	15.01	1.90	0.37
1927.....	11.78	19.48	9.49	26.38	21.20	11.32	0.35	0.29
1928.....	23.76	16.01	10.13	25.94	15.40	8.27	0.49	0.29
Average.....	20.54	17.17	9.40	23.10	17.33	11.53	0.91	0.32
Family 14								
1926.....	18.12	20.81	11.69	20.30	9.43	17.34	2.31	0.51
1927.....	17.92	21.44	17.62	25.35	9.41	8.17	0.09	0.37
1928.....	16.94	22.50	16.02	20.47	8.17	10.63	5.26	0.35
Average.....	17.66	21.58	15.11	22.04	9.00	12.05	2.55	0.41
Family 15								
1926.....	11.09	15.98	11.89	34.93	12.36	13.41	0.35	0.29
1927.....	16.10	17.49	9.23	33.53	14.00	8.56	1.09	0.25
1928.....	19.03	10.55	11.04	35.14	13.68	10.52	0.04	0.26
Average.....	15.41	14.67	10.72	34.53	13.35	10.83	0.49	0.27
Family 16								
1926.....	14.80	20.14	6.38	30.88	17.35	9.98	0.47	0.37
1927.....	14.34	20.58	9.43	34.23	13.10	8.12	0.20	0.29
1928.....	13.66	22.14	9.60	30.23	13.73	10.36	0.28	0.28
Average.....	14.27	20.95	8.47	31.78	14.73	9.49	0.32	0.31
Family 17								
1926.....	38.51	15.44	12.91	4.62	20.84	5.59	2.10	0.26
1927.....	31.72	15.09	7.62	21.49	17.12	6.43	0.54	0.23
1928.....	34.75	18.39	10.18	14.39	16.26	5.53	0.50	0.22
Average.....	34.99	16.31	10.24	13.50	18.07	5.85	1.05	0.24
Family 18								
1926.....	27.31	5.38	9.85	16.09	19.93	20.16	1.28	0.34
1927.....	41.50	3.46	11.77	14.46	9.21	19.55	0.04	0.38
1928.....	58.62	2.24	4.04	18.86	10.79	5.31	0.14	0.30
Average.....	42.48	3.69	8.55	16.47	13.31	15.01	0.49	0.34

In Tables 7 and 8 is shown the range of the distribution of calories among the food groups. The distribution of calories suggested by Rose for diets with no cost limitations, diets of moderate cost, and extremely low-cost diets is shown in Table 4. Certain interesting comparisons attract the attention.

Meat and other protein-high foods.—For the diets which were found to be adequate in the factors considered, the number of calories derived from meat and other protein-high foods varied greatly, the range being from 13 to 25 per cent, with an average of 20 per cent.

As far as the data obtained in regard to the 11 families are concerned, there seems to be no special relation between the amount of protein-high foods used and the cost of the diet. The distribution of calories among the other groups varied in such a way as to mask any differences in money value which might have been due to the use of large amounts of the protein-high foods.

Among the seven inadequate diets, a still larger range in the percentage of calories from the group of protein-high foods was noted, the range in this case being from 14 to 42 per cent, with an average of 23 per cent.

The larger average percentage of calories derived from what is usually considered the most expensive group of foods, coupled with the fact that the average cost of the inadequate diets was less than that of the adequate diets, is probably of significance and points to one of the methods of improving the diet without increasing the cost.

Milk and cream.—For the 11 families, the number of calories derived from milk and cream varied also, ranging from 9 per cent to 23 per cent, with an average of 15 per cent. This average falls below the limits of the amounts suggested by Rose for the percentage of total calories to be derived from milk and cream for high, medium, and low cost diets.

As with meat there seemed to be no relation between money value of the diet and the percentage of calories derived from milk; those diets in which less than 20 per cent of the calories were derived from milk and cream having practically the same money value as those diets in which more than 20 per cent of the calories were so derived.

Rather surprisingly, the average percentage of calories derived from milk and cream for the seven inadequate diets was approximately the same as for the 11 adequate diets, but the range was much greater, being from 4 to 22 per cent.

Fruits and vegetables.—The percentage of total calories derived from fruits and vegetables ranged from 10 to 21 per cent, with an average of 16 per cent of the total calories for the 11 adequate diets and from 8 to 15 per cent, or an average of 11 per cent, of the total calories for the seven inadequate diets.

Rose suggests that from 12 to 24 per cent of the total calories be derived from fruits and vegetables, the smaller percentage being recommended for the low-cost diets and this percentage increasing as the cost of the diet increases.

Of the 11 adequate diets, those containing above 15 per cent of the calories from fruits and vegetables averaged a money value of 43 cents per adult male unit, as compared to an average money value of 39 cents for those diets having less than 15 per cent of the calories derived from fruits and vegetables.

Cereal products.—For the diet of moderate cost, Rose suggests that 25 to 30 per cent of the total calories be derived from cereal products. Four of the 11 adequate diets showed such a distribution

of calories. For one of the 11 diets, 37 per cent of the total calories was derived from cereals. This was one of the lower cost diets. Two of the 11 diets averaged less than the 20 per cent of total calories derived from cereal products suggested for diets with no cost restrictions. One of these two diets was among the higher cost diets; the other was among the low-cost diets. For the 11 families an average of 24 per cent of the total calories was derived from cereal products.

The smaller group of seven families whose diets were inadequate in two or more factors averaged a similar percentage of calories derived from cereal products as the group of 11 families whose diets were adequate. For two of the seven families also, less than 20 per cent of the calories was so derived.

As might be expected, those adequate diets in which less than 20 per cent of the total calories was derived from cereal products averaged a higher money value per adult male unit per day than those diets in which the percentage of calories derived from cereal products was higher, the money value of the former being 44 cents, as compared to 38 cents for the latter.

Sugar.—The percentage of calories derived from sugar and other sweet foods seems high, being from 12 to 20 per cent, with an average of 16 per cent, of the total calories for the 11 adequate diets and from 9 to 20 per cent, with an average of 15 per cent, for the seven inadequate diets, in comparison with the 10 to 12 per cent suggested by Rose for diets of any price level.

Fatty foods.—The percentage of total calories derived from the group of fatty foods was rather low for the 11 adequate diets, as well as for the seven inadequate diets; in both cases they averaged slightly less than the amounts suggested by Rose for diets of low cost.

Range in distribution of calories.—As has been stated, the range in the percentage of calories derived from the different nutrients is large. In regard to the nutrients which were considered, there seems to be no definite limitation as to the way in which total calories may be distributed among the food groups and an adequate diet be maintained.

COST OF THE DIETS

For the 11 adequate diets the money value ranged from 34 to 50 cents per adult male unit per day with an average of 41 cents. For the seven inadequate diets, the average money value per adult

male unit was 31 cents per day. That an adequate diet can be procured for this amount has been demonstrated, but to do so requires some care in food selection.

By following the distribution of calories as suggested by Rose, it has been possible to plan diets adequate in all factors (as far as now known), digestible and palatable, and with a pleasing variety for less than 31 cents. Prices fluctuate from year to year but the principle of building the diet around cereals and milk, with the other foods used as supplements, remains as the basis of the low-cost, adequate diet.

QUANTITY FOOD BUDGETS

For 11 families, the diets used for the 3-year period were adequate in all the factors considered; namely, calories, protein, calcium, phosphorus, and iron.

The average amounts of the foods used by each of the 11 families and costs of the diets for the 3-year period are given in Table 9. The average for the 11 families is also given. This table is of interest in that it may be considered as a quantity food budget, showing the amounts of foods representative farm families have used during a 3-year period and also showing how these amounts may vary even among adequate diets.

Although all the diets were adequate in the factors considered, there was a fairly wide variation in degree of adequacy among the different families. In some cases the average diet for the 3-year period was very close to the standard. In other cases there was a wide margin of safety.

Five families averaged above 20 per cent more calories than the standard. One family averaged less than 20 per cent but more than 10 per cent more calories than the standard; whereas five families were using just about the number of calories indicated in the standard.

The average money value of the high-calorie diets (more than 10 per cent above the standard) was 43 cents per adult male unit per day, as compared to a money value of 38 cents per adult male unit per day for those families using the lower calorie diet.

The diets of the 11 families all contained above 20 per cent more protein than the amount of the standard. For eight of the families, the protein provided in the diets was from 40 to 60 per cent in excess of the standard. The average cost of these eight diets was 42 cents, as compared to a cost of 38 cents per adult male unit per day for those diets containing the smaller amount of protein.

TABLE 9.—A Quantity Food Budget
Average amount of foods used per adult male unit by 11 farm families whose diets were adequate for a 3-year period

Food	Family 1	Family 2	Family 3	Family 4	Family 5	Family 6	Family 7	Family 8	Family 9	Family 10	Family 11	Average for 11 families
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Meat and other protein-high foods												
Beef	54.0	55.1	24.5	12.8	36.5	17.0	56.4	35.6	24.0	19.8	76.6	37.5
Pork	43.6	144.8	.....	136.4	131.7	129.9	53.7	172.5	185.6	102.8	11.0	110.1
Poultry	6.2	60.4	60.3	35.6	17.2	26.2	32.4	35.1	23.1	24.1	52.5	33.9
Fish	0.7	7.7	5.8	7.9	0.8	8.4	10.4	4.1	0.2	2.3	8.9	5.2
Eggs	34.2	74.1	144.8	45.5	49.9	39.3	98.1	42.6	67.6	80.0	49.3	65.9
Cheese	28.2	8.5	25.8	2.0	21.4	8.0	6.1	6.7	2.2	16.8	12.0	12.5
Milk and cream												
Milk, whole	4.2	640.1	768.2	775.3	278.5	92.6	575.5	286.6	397.7	507.9	514.0	440.1
Milk, skimmed	564.1	1.5	64.3	.....	8.1	218.4	6.3	10.1	.....	573.9	0.6	131.6
Cream	158.4	0.3	14.6	.....	17.9	122.9	4.3	32.1	29.2	91.6	1.3	43.0
Fruit and vegetables												
Apples	107.5	131.8	266.9	92.7	162.0	49.8	236.4	113.4	106.2	135.3	21.9	129.5
Bananas	2.6	6.1	13.5	1.7	0.3	5.5	22.8	11.2	7.8	21.7	5.8	9.0
Berries	69.8	26.4	52.6	14.1	21.8	14.0	19.5	48.5	5.4	25.7	5.3	27.6
Cherries	6.7	5.3	60.0	0.2	27.6	14.6	6.4	.....	6.2	18.9	40.0	16.9
Dried fruits	2.9	5.6	11.7	1.6	4.9	6.0	5.7	1.5	8.9	2.4	13.2	5.9
Grapes	3.5	29.7	56.6	9.4	46.5	14.9	10.6	7.0	.....	4.4	0.2	16.6
Citrus fruits	8.8	12.3	13.7	6.3	1.3	14.9	12.3	4.3	6.1	17.2	45.6	13.0
Peaches	38.4	49.0	50.3	19.0	44.3	29.2	41.9	81.9	30.2	27.4	21.2	39.3
Pears	20.7	44.4	81.9	44.4	62.4	22.3	68.6	11.3	32.3	25.7	17.9	39.3
Plums	0.8	17.5	3.5	5.5	19.1	13.3	11.2	11.3	9.3	10.0	7.8	9.9
Pineapple	4.6	0.8	4.5	0.7	1.1	4.8	3.8	3.9	3.3	1.5	5.8	3.2
Melons	10.8	3.5	.....	1.8	2.1	9.3	32.3	5.8	13.0	4.0	17.7	9.1
Rhubarb	4.4	2.4	18.1	.....	7.8	4.2	0.3	5.1	.....	0.8	3.4	2.6
Beans, green	12.9	32.8	24.1	3.3	16.2	24.4	5.4	36.3	35.9	24.5	13.8	20.9
Beans, navy	10.9	19.3	2.0	1.2	2.0	5.5	5.6	7.8	9.6	12.2	2.6	7.2
Beans, lima	6.7	6.1	1.5	4.3	4.9	12.6	7.6	.....	11.1	3.8	2.3	5.5
Cabbage	41.8	39.6	75.7	12.9	48.5	36.1	56.5	33.9	18.4	23.7	18.3	36.9
Root vegetables	23.8	45.0	63.0	5.6	97.8	16.8	3.8	32.3	31.5	15.2	24.8	32.7
Onions	13.2	12.2	22.2	8.0	37.3	19.7	10.9	10.7	10.2	3.2	3.0	13.7
Corn	62.6	9.7	26.8	5.5	32.0	17.7	14.8	19.7	31.0	11.5	0.5	21.1
Lettuce	7.3	11.5	20.1	2.2	34.0	11.0	1.9	5.6	7.6	3.5	12.7	10.7
Spinach	17.3	7.3	20.2	0.8	40.3	13.2	4.0	9.1	.....	0.5	9.3	11.1
Potatoes, Irish	328.2	242.9	87.9	289.1	329.9	165.8	175.4	163.0	216.1	127.6	237.3	214.8
Potatoes, sweet	5.4	4.0	3.8	1.6	2.1	1.5	10.3	11.1	12.6	13.7	0.2	6.0
Celery	0.3	5.4	1.0	2.5	8.8	0.7	6.2	10.0	1.1	0.6	1.2	3.9
Peas	23.0	11.0	15.9	9.9	17.2	27.6	9.6	3.0	7.3	9.1	5.4	12.6
Asparagus	12.6	7.4	1.7	.....	4.0	2.0	0.1	.....	.....	0.1	2.9	2.8
Tomatoes	48.4	73.5	35.1	45.8	49.1	137.3	59.5	113.3	29.6	27.8	22.6	58.4
Pickles	97.0	.....	0.8	12.7	21.8	80.6	20.4	26.3	41.6	6.7	3.0	28.3

TABLE 9.—A Quantity Food Budget—Continued
Average amount of foods used per adult male unit by 11 farm families whose diets were adequate for a 3-year period

Food	Family 1	Family 2	Family 3	Family 4	Family 5	Family 6	Family 7	Family 8	Family 9	Family 10	Family 11	Average for 11 families
	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.	Lb.
Cereal products												
Bread	37.7	112.8	115.2	62.8	3.4	205.2	26.1	10.9	55.0	79.2	25.5	66.7
Flour	104.5	69.3	19.9	59.0	107.6	42.4	132.2	331.7	171.8	81.9	136.2	114.2
Cake	0.7	2.8	13.3	4.9	.....	4.0	3.7	2.1	0.5	3.2	.....	3.3
Crackers	1.9	11.5	9.1	15.3	.....	4.2	8.6	6.0	2.3	12.6	6.6	7.2
Cereals, uncooked	21.3	8.5	14.9	6.4	3.0	4.6	1.1	1.9	30.2	5.7	23.8	11.0
Cereals, ready-to-eat	1.1	3.1	5.1	36.6	0.2	28.4	3.3	6.2	1.2	10.2	3.3	9.0
Macaroni	0.4	3.9	0.9	1.2	0.7	2.8	2.0	0.6	3.1	1.6	2.0	1.7
Rice	0.2	2.1	2.0	1.1	.....	2.2	2.4	0.5	4.6	1.0	4.9	1.9
Cornmeal	2.9	21.6	.....	11.5	.....	4.1	10.4	34.2	1.9	13.9	0.9	9.2
Tapioca .....	.....	0.2	1.1	.....	.....	0.1	0.4	.....	.....	.....	1.3	0.3
Sugar and other sweets												
Sugar	139.1	108.9	85.4	76.3	105.6	122.4	93.9	110.9	152.5	109.7	127.5	112.0
Molasses	17.5	5.5	5.7	1.5	9.1	4.8	10.1	4.9	0.8	24.0	1.2	7.7
Candy	1.9	5.6	4.6	3.8	4.2	2.2	4.2	4.5	3.0	6.6	1.7	3.8
Fatty foods												
Lard	15.0	4.2	0.3	4.6	5.3	12.8	3.2	6.8	6.2	11.2	.....	6.3
Butter	26.1	15.0	35.0	25.0	36.2	21.9	19.3	42.4	9.5	19.1	28.8	25.3
Peanut butter	0.1	2.4	.....	1.2	0.2	1.2	.....	1.1	1.1	3.7	0.6	1.1
Salad oils and dressings .....	.....	0.5	.....	.....	.....	0.2	0.1	.....	.....	0.1	0.6	0.1
Other groceries												
Cornstarch	0.1	0.3	2.0	.....	0.2	0.6	0.3	0.6	.....	0.6	1.3	0.5
Cocoa, chocolate	0.6	1.0	0.2	0.1	0.3	1.3	0.6	0.7	1.0	1.7	0.5	0.7
Nuts	0.2	16.6	1.5	0.7	11.6	4.8	7.1	6.3	6.9	3.3	2.7	5.6
Food adjuncts												
Coffee	10.1	1.1	0.8	2.4	6.6	11.4	1.7	5.8	2.9	0.9	3.7	5.6
Tea	1.3	0.1	.....	0.4	.....	0.1	.....	0.1	1.7	0.1	0.7	0.4
Baking powder	0.7	0.4	0.5	0.6	0.6	1.3	0.1	0.5	0.1	1.7	1.8	0.8
Salt	5.6	2.0	3.5	3.7	23.3	6.9	5.8	4.9	11.5	2.5	11.1	7.3
Soda	0.2	0.3	.....	0.4	0.6	0.4	0.2	0.2	0.2	0.6	0.3	0.3
Spices	0.3	0.6	0.1	0.4	0.4	1.0	0.1	0.5	0.2	0.1	0.6	0.4
Cost per adult male unit per day	0.50	0.50	0.43	0.36	0.38	0.42	0.34	0.39	0.35	0.43	0.41	0.41
Nutritive value of diets												
Calories	3811	4295	3378	3452	3382	4155	3296	4685	4301	3962	3262	3816
Protein	104.7	111.7	118.3	115.6	95.3	94.2	103.3	116.8	93.6	109.1	104.8	106.1
Calcium	1.213	1.157	1.913	1.504	0.934	0.857	1.245	0.789	0.750	1.761	1.233	1.214
Phosphorus	1.878	1.968	2.287	2.158	1.585	1.554	1.884	1.809	1.467	2.085	1.804	1.862
Iron	0.0200	0.0194	0.0219	0.0193	0.0214	0.0173	0.0186	0.0200	0.0165	0.0162	0.0178	0.0189

Only two diets contained less than 10 per cent more calcium than the amount indicated in the standard. One diet contained more than 10 per cent but less than 20 per cent more than the standard. The other diets all contained more than 20 per cent more calcium than the amount of the standard. Those diets containing the larger amounts of calcium averaged a cost of 42 cents, as compared to a cost of 39 cents per adult male unit per day for the diets containing 20 per cent, or less, in excess of the standard.

Of the 11 diets, eight contained more than 20 per cent more phosphorus than the amount indicated in the standard. The average money value of these eight diets was 42 cents, as compared to an average money value of 38 cents per adult male unit per day for those diets which contained a smaller excess of phosphorus.

Only four of the 11 diets contained 20 per cent or more iron than the amount of the standard. For these four diets the average money value was 42 cents, as compared to an average money value of 40 cents per adult male unit per day for the diets containing a smaller amount of iron.

SUMMARY AND CONCLUSIONS

Account-book records of foods used during a 3-year period by 113 Ohio families have been studied. A detailed study was made of the foods used by 18 families who had kept records during the entire 3-year period.

I. Foods Used by 113 Families During a 3-year Period.

A. Adequacy of the diets.

For the first year, 1926, the average diet was found to be adequate in every factor. During 1927 and 1928 the energy value and the iron content of the average diet were found to be somewhat below the standards.

B. Foods produced on the farm for use in the home.

As measured in pounds, the percentage of food produced on the farm for use in the rural homes varied little during the 3-year period, averaging 74.5 per cent during 1926, 72.3 per cent during 1927, and 72.2 per cent during 1928.

C. Money value of the diets.

1. Per adult male unit the money value of the diets averaged \$134 for 1926, \$121 for 1927, and \$120 for 1928.

2. The money value of the food produced on the farm for use in the home represented 59 per cent of the

total money value of food used in the home during 1926. For 1927, the corresponding percentage was 56, and for 1928 it was 55.

3. Protein-high foods ranked higher than any of the other food groups in money value.

4. Fruits and vegetables ranked second to the protein-high foods in money value.

5. The combined money value of the protein-high foods and fruits and vegetables remained practically constant throughout the 3 years.

6. Milk and cream ranked third in order of money value for the 3 years. The figures representing the money value for the first year being higher than for the second and third years.

7. The combined money value of protein-high foods, fruits and vegetables, and milk and cream exceeded the combined money value of all the other foods used.

8. The money value of cereal products varied little from year to year, averaging approximately \$14 per adult male unit for each of the 3 years. Relatively small amounts of cereal products were produced on the farm for use in the home.

9. The money value of sugar and other sweets remained remarkably constant from year to year, being \$9 per adult male unit during the first year, and \$8 per adult male unit for 1927 and 1928. A relatively small percentage of these foods was produced on the farm for use in the home.

10. The money value of fatty foods was \$14 per adult male unit during 1926, \$12 during 1927, and \$11 during 1928. Over half the value of all fatty foods used in the home was represented by the value of such foods produced on the farm for use in the home.

11. The money value of "other groceries" was comparatively small, averaging slightly over one dollar the first and third years and only 86 cents the second year, per adult male unit. Food adjuncts and meals out averaged approximately \$4 the first 2 years, and \$7, per adult male unit, the third year.

D. Distribution of the calories.

The division of the total calories among the various food groups differed materially from the divisions suggested by Rose, in that the percentage of calories derived from meat and other protein-high foods and from sugar and other sweets was much higher, and the percentage of calories derived from milk and cream was considerably lower, than those suggested.

II. Detailed Study of the Diets of 18 of the Families.

A. Nutritive value of the diets.

The nutritive value of the diet of each of the 18 families for each of the 3 years was computed and the results compared with the standard.

1. Calories.

For only eight of the 18 families were the energy requirements adequately provided for during each year. When the 3-year period was considered, the number was raised to fifteen.

2. Protein.

Protein provision was adequate for 15 of the 18 families during each of the 3 years and for 17 families when the 3-year period was considered.

3. Calcium.

Fourteen of the 18 families were using as much or more than the amount of calcium indicated by the standard during each of the 3 years. When the 3-year period was considered, 16 of the families were using as much or more calcium than the standard.

4. Phosphorus.

Ten families were using as much or more than the desirable amount of phosphorus during one or more years of the study. When the average for the 3-year period was taken, the number was increased to thirteen.

5. Iron.

For only one-third of the families was the iron provision equal to the standard during each of the 3 years. For the entire 3-year period, two-thirds of the families averaged an amount of iron equal to the standard.

6. Adequacy of the diets.

In regard to the dietary factors considered, only two of the 18 families had diets which were adequate during each of the 3 years. Average figures for the 3-year period, however, showed that for 11 families, the average diet for the 3 years was adequate. For seven of the 18 families, the average diet for the 3-year period was inadequate.

B. Distribution of calories.

1. A wide range in the distribution of calories among the food groups was found.

a. The average percentage of calories derived from meat and other protein-high foods was higher for the inadequate than for the adequate diets.

b. Average percentage of calories derived from milk and cream was approximately the same for the adequate as for the inadequate diets.

c. An average of 15 per cent of the total calories was derived from fruits and vegetables in the adequate diets, as compared to a corresponding percentage of 11 for the inadequate diets.

d. The average percentage of total calories derived from cereal products was approximately the same for the adequate diets as for those diets which were inadequate in two or more factors.

e. The average percentage of total calories derived from sugar and other sweet foods was the same for the two groups of diets.

2. A consideration of the distribution of calories among the food groups, as shown by this study, leads to the conclusion that, in regard to the nutrients considered, there seems to be no definite limitation to the way total calories may be distributed among the food groups and the adequacy of the diet maintained.

C. Money value of the diets.

1. The 11 adequate diets averaged a money value of 41 cents per adult male unit per day, as compared to a corresponding money value of 31 cents for the inadequate diets.

2. A change in the spending plan, a larger proportion of the food dollar being spent for milk, fruits and vegetables, and cereal products, would undoubtedly make possible adequate diets at no greater cost than that of the inadequate diets of this study.

D. Quantity food budgets.

Average amounts of food used during the 3-year period by each of the 11 families, for whom the diets were adequate, are given. The nutritive value of each diet is also shown. The use of these lists of foods as quantity food budgets is suggested.

The average of the amounts of food used by the 11 families is also given.

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