CANADA

DEPARTMENT OF TRADE AND COMMERCE

DOMINION BUREAU OF STATISTICS

FAMILY LIVING EXPENDITURES

in

CANADA

NUTRITIVE VALUES OF WAGE-EARNER FAMILY FOOD PURCHASES

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Minister of Trade and Commerce.

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NUTRITIVE VALUES OF WAGE-EARNER FAMILY FOOD PURCHASES

INTRODUCTORY

This preliminary release presents some of the nutritional values computed from records of family food purchases obtained during the Dominion Bureau of Statistics' survey of nutrition and family living expenditures in 1938-39. Data have been prepared in graphic as well as tabular form and are accompanied by brief textual comment. The purpose in view is threefold, (1) to indicate the relative importance of different food groups as sources of nutritive requirements entering into family food stocks, (2) to show the relationships between food purchases and Canadian Dietary Standard values of adequacy for calories, protein, iron and calcium as computed by the Canadian Council on Nutrition, and (3) to show the relation between nutritive values and food costs at different seasons and income levels.

Calculations have been based upon 1,569 family food records for one week in October-November 1938, 1,145 in February 1939 and 453 in June 1939. The shrinkage in numbers of families from survey to survey was due to the fact that only families who had contributed to the first survey were approached in the second, and likewise all third survey period families had contributed records in the first and second periods. Quantities and costs of purchases were entered each day of the week in journals printed for the purpose, after an explanation by specially instructed field agents.

The families furnishing records in all cases included husband and wife with one or more children living in the home. They had been self-supporting throughout the year, and family earnings in all cases were between $450 and $2,500 per annum for the year immediately preceding the October-November 1938 food survey. Families were selected upon a random sampling basis in the following twelve cities: Charlottetown, P.E.I., Saint John, N.B., Halifax, N.S., Quebec, P.Q., Montreal, P.Q., Ottawa, Ont., Toronto, Ont., London, Ont., Winnipeg, Man., Saskatoon, Sask., Edmonton, Alta., and Vancouver, B.C.

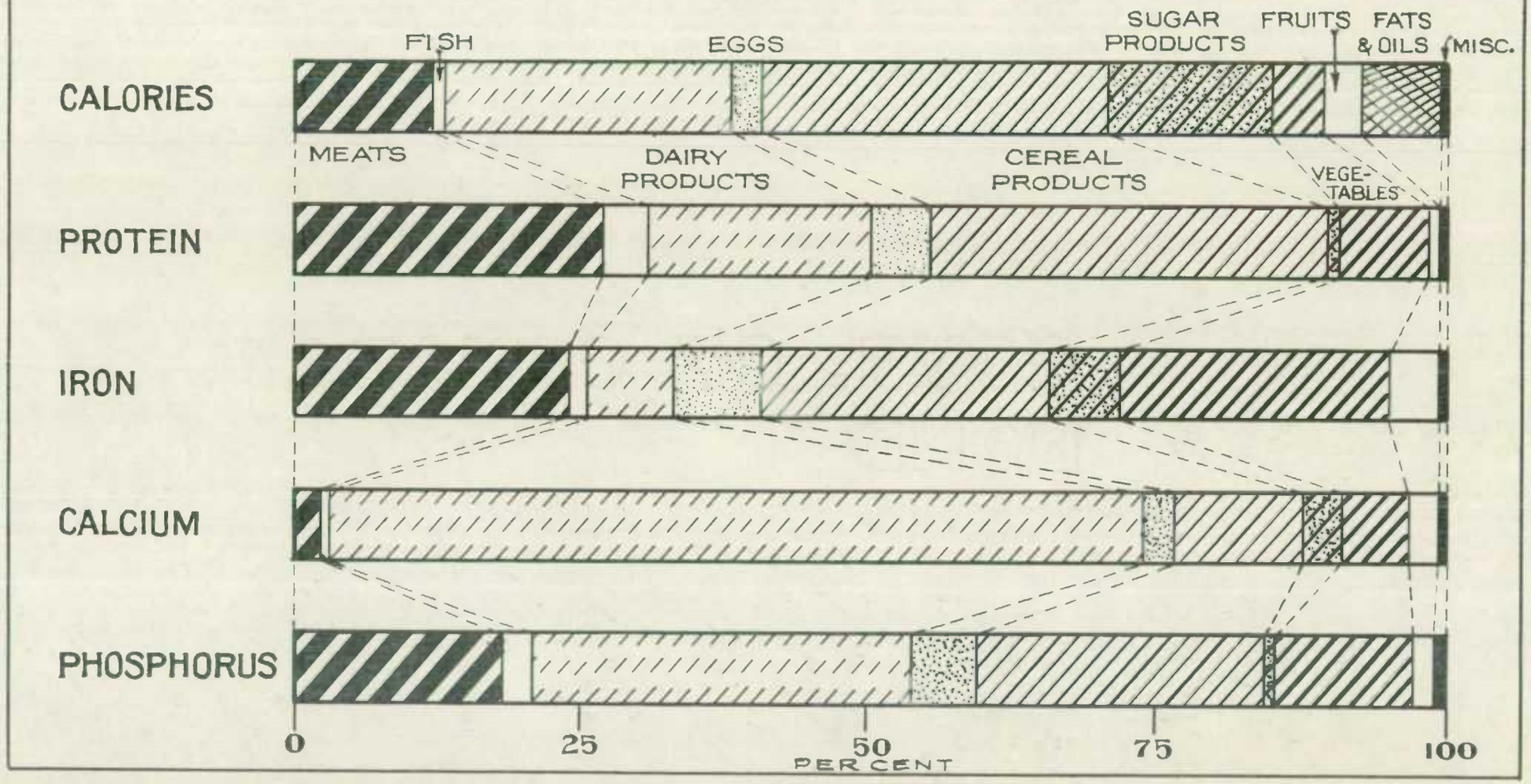
Analysis of nutritive requirements has been limited to estimates of calories, protein, iron, calcium, and phosphorus in food purchased for home consumption. No attempt was made to evaluate vitamin content. The values used in computing the nutritive content of different foods represented experimental Canadian and American data in the possession of the University of Toronto Department of Physiology and Hygiene. The Bureau is indebted to Dr. E. W. McHenry for making this material available.

Appraisal of the Data

Purchases of foods are by no means identical with consumption of foods, even for a long period. The data used in this analysis cover purchases for regular home consumption for only three weekly intervals and do not include foods purchased and eaten out of the home, or gifts of food, garden produce, etc., used during the weeks in question. There was also a small residue of regular food purchases for which no nutritive values were available. Careful estimates of all these unmeasured items placed their value at less than 15 per cent of average weekly food expenditure, but it is improbable that the nutritive content of this group was proportionate to cost, since it included such items as tea, coffee and soft drinks. Against the unmeasured residue of foods, waste from food purchases for regular use would form an offset of unknown value. Inferences from these data are affected by the fact that they are in the form of averages for many families. This favours a balance between foods used from stocks on hand at the beginning of the week, and purchases left over at the end of the week, and hence average purchases may be expected to be approximately equal to foods used for consumption. However, satisfactory averages from a nutritional point of view for a large group of families may hide conditions of malnutrition for considerable numbers of families and individuals. Averages of this type are influenced by the purchases of families who buy more than optimum nutritive requirements.

Chart 1

RELATIVE CONTRIBUTIONS OF URBAN FAMILY FOOD PURCHASES TO SPECIFIED NUTRITIVE REQUIREMENTS



CONTRIBUTIONS OF PRINCIPAL FOOD PURCHASES TO NUTRITIVE VALUES

The principal food groups comprising regular food purchases are here discussed in relation to their dietetic value. Averages of purchases in all three survey periods form the basis of calculations made. In addition, the proportions of total food expenditure for various food groups are noted to indicate the relative expensiveness of each as a source of different nutritive values. However, the question of costs is considered more fully in the third section.

Meats - Meat products accounted for about 20 per cent of the cost of the average family's weekly food purchases. The chief nutritive elements obtained from this source were protein, iron and phosphorus. Protein from meat products amounted to 28 per cent of the total received from all sources, while the iron content comprised almost 25 per cent of all iron received. Meats provided 19 per cent of the total phosphorus in regular food purchases, 12 per cent of the caloric content and 2 per cent of the calcium.

Fish - Purchases of fresh, dried, and canned fish formed a small proportion of family food purchases, amounting to only 2 per cent of all expenditures for regular use. Nutritive values available from this source were correspondingly low, being less than 4 per cent of all protein, 3 per cent of phosphorus, and less than one per cent of calories, iron and calcium.

Dairy Products - The average weekly outlay for dairy products comprised more than one-fourth of all food purchases, the highest cost shown for any of the commodity groups. Dairy products were an exceedingly rich source of calcium, supplying over 70 per cent of the total quantity purchased. Almost nine-tenths of this amount was obtained from milk, and most of the remainder from cheese. Dairy products also contained one-third of all phosphorus, one-fourth of calories, and almost one-fifth of the protein supply. A comparatively low iron content was shown for this group, which provided only 8 per cent of the iron obtained from all regular food purchases.

Eggs - Purchases of eggs formed 5 per cent of family food costs. The quantities purchased by survey families provided 8 per cent of their iron, 6 per cent of phosphorus, and 5 per cent of protein. They furnished only a small proportion of calories and calcium, approximately 2 per cent of the total in each case.

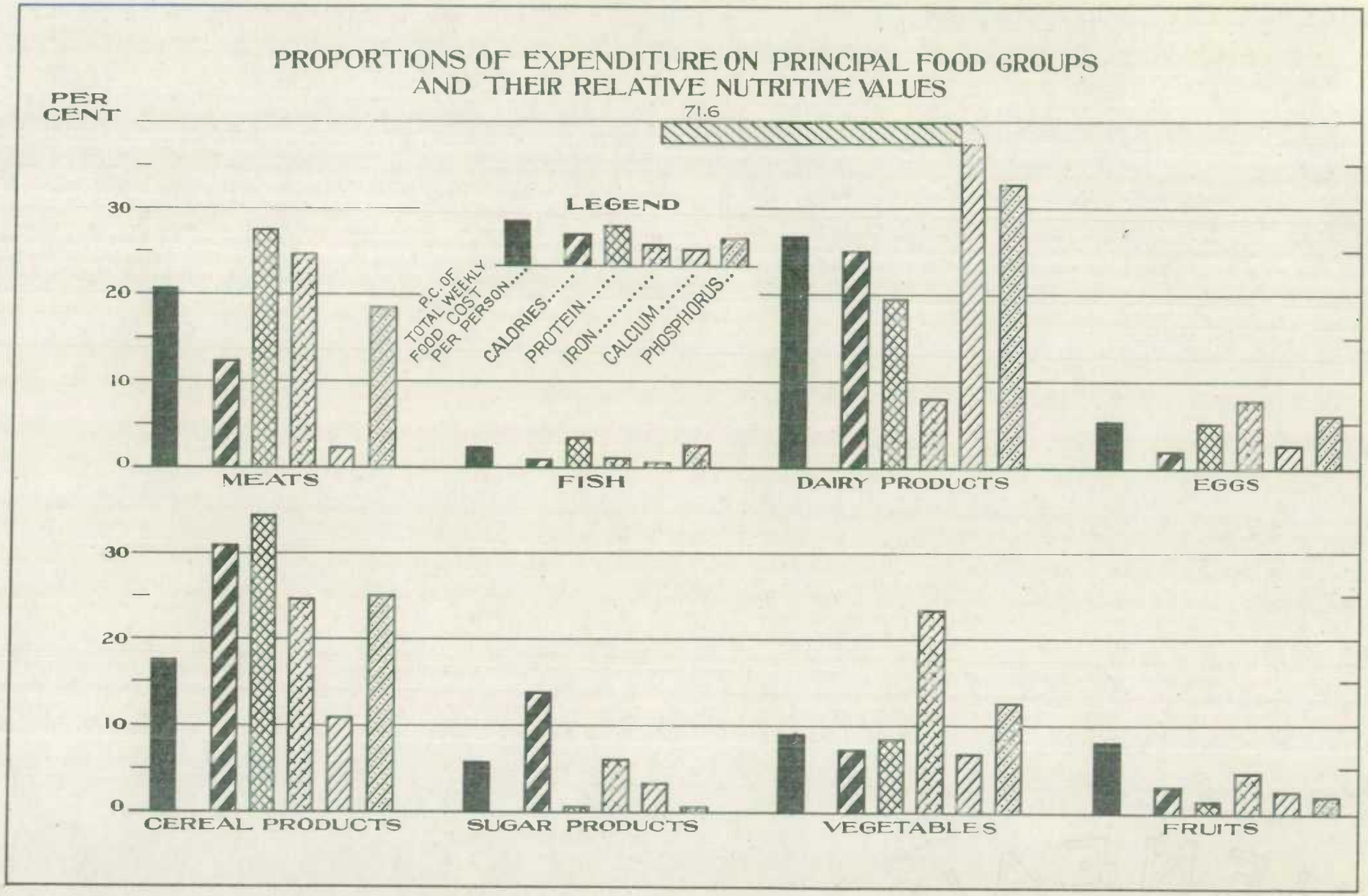
Cereal Products - Cereals formed one of the most inexpensive sources of nutritive requirements. This group accounted for 18 per cent of all food expenditures, yet provided much higher proportions of nutritive constituents, with the exception of calcium. Cereal products provided the principal sources of calories, protein, and iron. They furnished over 30 per cent of the total caloric content of food purchases, almost 35 per cent of all protein, and 25 per cent of iron and phosphorus. In addition this group supplied 11 per cent of all calcium.

Sugar Products - Less than 6 per cent of family food outlay was expended for sugar products, which contained about 14 per cent of total calories available. More than 6 per cent of all iron was derived from the same source, but only 3 per cent of calcium, and less than 1 per cent of protein and phosphorus.

Vegetables - Vegetables formed 9 per cent of the weekly cost of foods, but supplied 23 per cent of all iron, and 12 per cent of phosphorus. In addition this group also provided 8 per cent of all protein, and 7 per cent each of calcium and calories. As already noted, no attempt was made to estimate the vitamin content of vegetable purchases.

Fruits - Purchases of fruits appeared expensive to wage-earner families in relation to the proportion of total food values obtained. However, fruits are an important source of vitamins, vitamin C in particular being characteristic of citrus and other fruits. This group accounted for about 8 per cent of food costs, and provided 4 per cent of iron, 3 per cent of calories and calcium, 2 per cent of phosphorus and 1 per cent of protein.

Chart 2


PROPORTIONS OF EXPENDITURE ON PRINCIPAL FOOD GROUPS
AND THEIR RELATIVE NUTRITIVE VALUES
PER CENT
71.6
30
20
10
0
LEGEND
P.C. OF TOTAL WEEKLY FOOD COST PER PERSON....
CALORIES.....
PROTEIN.....
IRON.....
CALCIUM.....
PHOSPHORUS..
MEATS
FISH
DAIRY PRODUCTS
EGGS
CEREAL PRODUCTS
SUGAR PRODUCTS
VEGETABLES
FRUITS

Nutritive Values Obtained from Weekly Purchases of Specified Food Groups
(Expressed as Percentage of Specified Nutritive Requirements Obtained)
(Average of 3 Seasons)

Commodity Group	Percentage of Total Weekly Food Costs for Regular Use	Calories	Protein	Iron	Calcium	Phosphorus
Meats	20.7	12.4	27.5	24.7	2.2	18.6
Fish	2.1	0.8	3.5	0.9	0.4	2.5
Dairy Products ..	26.7	25.0	19.5	7.6	71.6	32.8
Eggs	5.3	1.7	4.9	7.7	2.5	5.6
Cereal Products..	17.7	31.1	34.5	24.8	10.9	25.0
Sugar Products ..	5.5	13.6	0.5	6.1	3.1	0.4
Vegetables	8.7	7.3	8.3	23.3	6.6	12.4
Fruits	7.9	2.9	1.0	4.6	2.5	1.9
Fats & Oils	1.4	4.9	-	-	-	-
Miscellaneous[x]...	4.0	0.3	0.3	0.3	0.2	0.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

[x] Includes tea, coffee, salt, pepper, and other items, most of which have no appreciable food values.

FOOD PURCHASES IN RELATION TO THE CANADIAN DIETARY STANDARD

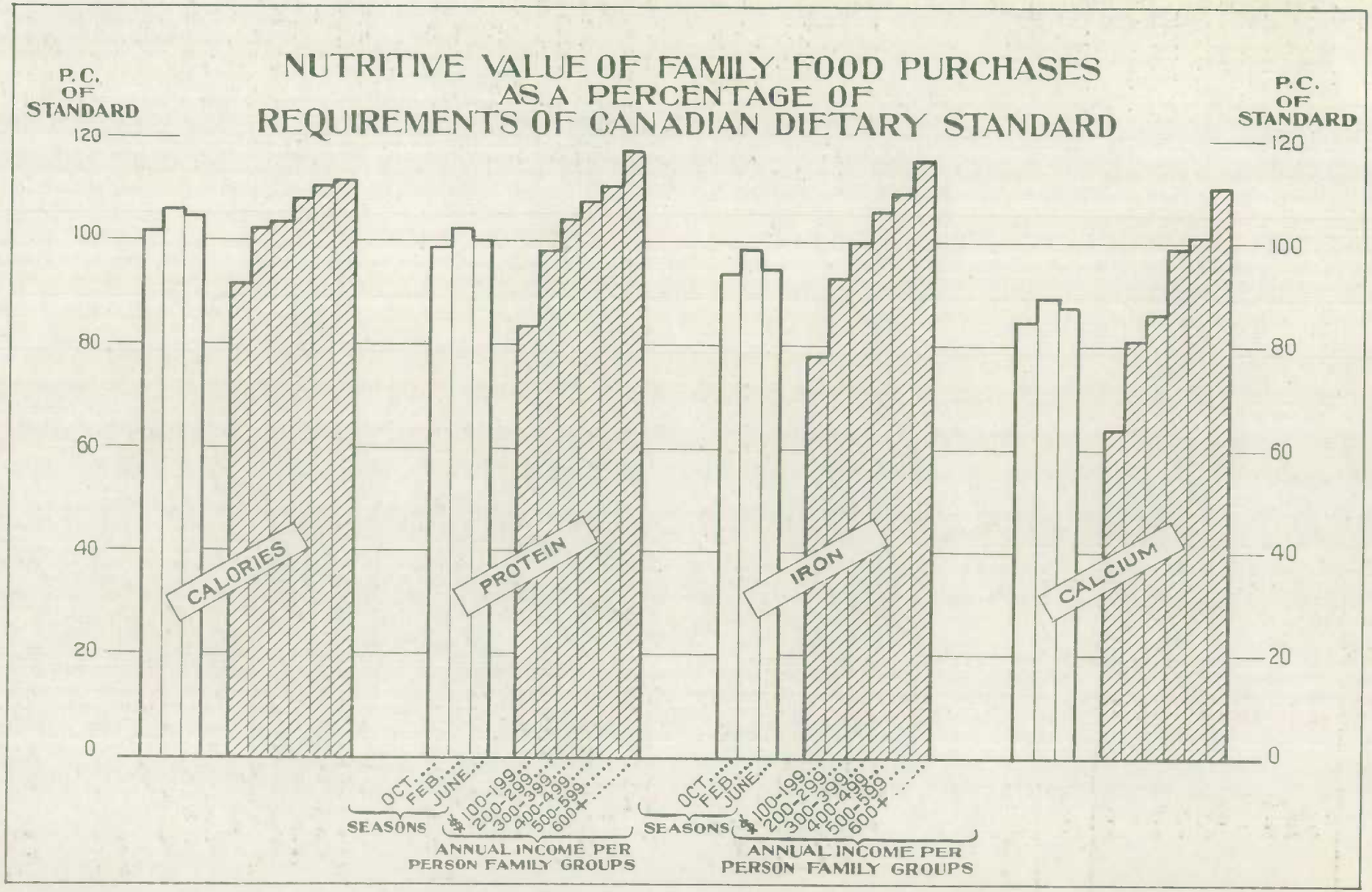
Nutritive values of weekly food purchases of Canadian urban wage-earner families were computed at different seasons of the year, and also at progressive levels of family income per person for the October-November 1938 period. The available supply of principal nutritive requirements including calories, protein, calcium, etc., was calculated from the quantities of foods purchased by the survey families for regular use. As noted in the introduction, food consumption was affected also by foods purchased and eaten out of the home, home garden produce, gifts, etc. Nutritive values of food purchases were compared with the intake requirements as outlined in the Canadian Dietary Standard established by the Canadian Council on Nutrition.

In general, results showed that a closer approach to nutritional adequacy could be obtained from February food purchases than from those in October or June. Differences were small, however, and of doubtful significance. The favourable showing of February 1939 over October 1938 may have been influenced by a fall of approximately 3 per cent in the level of retail food prices between these dates. It is also possible that the October survey may have stimulated interest in the problem of nutrition and thereby influenced the results later obtained. However, this was not apparent in any appreciable increase in the purchases of such foods as milk or tomato juice. Further, the February increase in calories was just as large as for iron or calcium, but such would not have been the case if purchases had been influenced by an effort to improve the balance between these dietotic needs. The October calory supply was adequate in aggregate, whereas that for iron and calcium was not.

Calories - Food purchases of the average wage-earner family appeared to supply sufficient calories for an adequate diet. The caloric value of food purchases by survey families afforded a daily average of 2,468 calories per person regardless of age or sex. By converting survey family age distributions into man value units on the basis of the Canadian Dietary Standard scale of values, it was found that food purchases provided a daily average of 2,912 calories per man value. This calculation was based on the Standard's requirement of 2,800 calories per day for an adult male employed in "light manual work". Occupations of survey family heads approached this category more closely than any other. On this basis, the caloric value of foods purchased by these families was 4 per cent above the requirements set by the Canadian Standard. However, it should be noted that any appraisal of the type of work done by the family head is arbitrary in character, and the differences in caloric requirements for males engaged in "moderate", "hard", and "very hard" labour would lead to noticeable changes in the foregoing percentage comparison with Standard requirements.

Protein - The Canadian Dietary Standard calls for 84.0 grams of protein per day for men engaged in light manual work. The protein content of foods purchased by wage-earner families allowed 84.5 grams daily per man value, indicating a sufficient available supply, if the assumption noted above concerning type of work done by male wage-earners was correct. However, as shown in a later section, protein per man value available at

Chart 3


NUTRITIVE VALUE OF FAMILY FOOD PURCHASES
AS A PERCENTAGE OF
REQUIREMENTS OF CANADIAN DIETARY STANDARD
P.C. OF STANDARD
120
100
80
60
40
20
0
CALORIES
PROTEIN
IRON
CALCIUM
OCT.
FEB.
JUNE
SEASONS
100-199
200-299
300-399
400-499
500-599
600+
ANNUAL INCOME PER PERSON FAMILY GROUPS

progressive income levels differed, and a noticeable protein deficiency was apparent in the lower income ranges, with an oversupply available at higher income levels.

Survey data indicated that of the 84.5 grams of protein per man value available daily, 38 grams or almost 2/5 of the total came from animal sources including meats, fish, dairy products and eggs. This fraction was slightly in excess of the 1/3 prescribed by the Canadian Dietary Standard (28 grams in this instance).

Iron - The diets of survey families appeared to be slightly deficient in the amount of iron supplied from their regular food purchases. For the average family, the iron content of food purchases amounted to 9.5 milligrams per man value or 95 per cent of the requirements shown by the Canadian Dietary Standard.

Calcium - The most pronounced deficiency in food values was in the calcium available to survey families. Only among families at high income levels was the supply of calcium found to be adequate. For the average family, however, the calcium content of foods purchased was 87 per cent of the Canadian Dietary Standard. It amounted to 0.52 grams per man value daily, as against a computed requirement of 0.60 grams per man value for these families.

Applying the Dietary Standard of milk consumption requirements to the age and sex distribution of survey families, it was found that 0.35 grams of calcium per man value should be supplied from this source daily. The amount shown as being provided from milk purchases was somewhat lower, averaging 0.24 grams per man value, or about 70 per cent of the standard. Average milk purchases of survey families amounted to 0.34 pints per man value daily, while Dietary Standard requirement for these families was 0.50 pints. The average purchase per person amounted to 0.65 pints per day.

Seasonal Variation in Food Purchases in Relation to the Dietary Standard

The nutritive value of wage-earner family food purchases was greatest during the winter survey period in February, and least during that in October. However, variations were not large, and the nutritive value of family food purchases expressed as a percentage of Standard requirements did not vary more than 5 per cent between the seasons considered. These percentages are shown in the following table, along with the averages already noted for the three periods combined.

Nutritive Values of Family Food Purchases in Relation to Intake Requirements of the Canadian Dietary Standard

	Nutritive Contents as a Percentage of Standard Requirements			
Seasons	October 1938	February 1939	June 1939	Average
Calories	101.7	105.6	104.7	104.0
Protein	98.8	102.5	100.4	100.6
Iron	93.8	98.1	94.1	95.3
Calcium	84.7	89.3	87.8	87.2

Income and Food Purchases in Relation to the Dietary Standard

Families with annual incomes between $100 and $199 per person showed deficiencies in all nutritive requirements when compared with the Canadian Dietary Standard. These ranged from an 8 per cent deficiency in calories, to one of 36 per cent in calcium. As incomes moved higher, there was a consistent improvement in nutritive values obtained. Families with incomes ranging between $200 and $299 per person received an adequate supply of calories and were only 2 per cent deficient in protein. However, there was still a noticeable deficiency of calcium, and to a lesser extent, of iron. At the $300-$399 income level, families were receiving sufficient amounts of all nutritive requirements, with the exception of calcium which showed 14 per cent below Standard requirements. Families from the $400-$499 income per person group upwards obtained satisfactory nutritive content of all types, and at the $600 and over income level were receiving 17 per cent over the Standard for protein, 16 per cent for iron, and 11 per cent each for calcium and calories.

Nutritive Value of Family Food Purchases in Relation to Requirements of the Canadian Dietary Standard at Progressive Levels of Income per Person
(October-November, 1938)

(Food Value Content Expressed as Percentage of Standard Requirements)

Income per Person	$100-199	$200-299	$300-399	$400-499	$500-599	$600+
Calories	91.9	102.3	103.6	108.0	110.7	111.1
Protein	83.6	98.1	104.3	107.7	110.8	116.5
Iron	78.0	93.0	100.3	106.1	109.6	115.9
Calcium	64.0	81.0	86.3	99.1	101.3	111.0

It will be noted from this table that the greatest increase was that experienced in the calcium content of wage-earner family food purchases, and the least, that in the caloric content. Increased consumption of milk by families at higher income levels explains in part this pronounced advance in calcium supply. However, in no income group did the amount of milk purchases reach the Canadian Dietary Standard. For families with incomes between $100-199 per person, milk purchases amounted to only 49 per cent of the Standard's requirements. Those with incomes of $600 and upwards showed a more satisfactory supply of 93 per cent of the Standard.

Calcium Obtained from Milk Purchases[x] in Relation to Canadian Dietary Standard Requirements
(According to Income per Person)

Income per Person	$100-199	$200-299	$300-399	$400-499	$500-599	$600+
Calcium from milk as percentage of standard requirements ...	49.3	64.6	68.3	80.6	88.6	93.1

[x] This does not include condensed and powdered milk, or fresh cream.

ECONOMY OF URBAN WAGE-EARNER FAMILY FOOD PURCHASES

A further aspect of the relationship between food costs and food values, is that concerned with the economy of purchases at different seasons of the year, and among families in different income positions. To gain some idea of such relationships, the nutritive values derived from principal food groups were examined in relation to the actual outlay expended to obtain them. This made possible a comparison of the units of different nutritive requirements received per dollar expenditure upon the various food groups.

Results of this comparison indicated that nutritive value obtained per dollar expenditure was greatest during the survey week in February, and least during that in June. Also it was shown that families at lower income levels received more food value per dollar of food purchases than those in the higher income groups, although as already shown, nutritive deficiencies apparently were most frequent at lower income levels. Differences at the three seasons of the year were not pronounced. Survey families received approximately 9,900 calories per dollar of expenditure in October, 10,100 in February and 9,800 in June. A similar relationship was noted for protein, iron, calcium and phosphorus.

Average Nutritive Values Received per Dollar of Food Expenditure According to Seasons

	October	February	June	Average
Calories	9,940	10,140	9,830	9,970
Protein (Gr.)	299	305	292	299
Iron (Mgm.)	50	51	48	50
Calcium (Gr.)	2.9	3.0	2.9	2.9
Phosphorus (Gr.) ..	4.9	5.0	4.7	4.9

Differences among families at progressive levels of income per person were more appreciable. Those with incomes between $100 and $199 per person obtained an average of 11,800 calories per dollar of food expenditure. This amount dropped steadily to 8,400 calories for families with incomes ranging from $600 per person upwards. Similar trends were observed for other food constituents. For example, the amount of protein obtained in food purchases by families in the $100-$199 group averaged 340 grams. This was reduced to 268 grams and 273 grams respectively, for those with incomes between $500 and $599 per person and $600+ per person (quantities per dollar of expenditure in all cases).

Average Nutritive Values Received per Dollar of Food Expenditure at Progressive Income per Person Levels

Income per Person	$100-199	$200-299	$300-399	$400-499	$500-599	$600+
Calories	11,810	10,710	9,720	8,990	8,700	8,420
Protein (Gr.)...	340	317	301	275	268	273
Iron (Mgm.)	57	53	50	47	45	46
Calcium (Gr.) ..	3.2	3.1	2.8	2.7	2.6	2.7
Phosphorus (Gr.)	5.3	4.8	4.8	4.5	4.3	4.5

The following is a brief summary of the relative nutritive values obtained from each of the principal food groups per dollar of food expenditure.

Calories - Fats and oils provided the most abundant source of calories per dollar of food purchases. Approximately 30,400 calories were received from this source for each dollar of expenditure. The most expensive source of calories appeared to be eggs, followed closely by fruits and fish. Per dollar of purchases, only 3,200 calories were obtained from eggs, 3,600 from fruits, and 3,800 from fish. Sugar products and cereals ranked next to fats and oils in providing calories, and supplied 24,200 and 17,500 per dollar of food expenditure respectively.

Protein - Cereal products provided the richest source of protein in relation to cost. These were followed closely by fish and meats, in that order. A total of 582 grams of protein were provided from each dollar purchase of cereal products, 501 grams from fish, and 407 grams from meats. Vegetables, eggs, and dairy products averaged somewhat lower, supplying 284, 283, and 217 grams per dollar of cost respectively. As already noted, very little protein value was obtained from sugar products and fruits. The latter supplied only 37 grams of protein per dollar of expenditure, and the former, 28 grams.

Iron - Vegetable products contained almost twice the amount of iron per dollar as that supplied by the next cheapest source, eggs. An average of 132 mgms. of iron was provided from an average dollar purchase of vegetables. Eggs, cereal products, meats, and sugar products, showed very similar averages of 75 mgms., 69 mgms., 61 mgms., 54 mgms. respectively. Fruits, fish and dairy products were more expensive sources of iron, and dollar expenditures in these groups provided small respective amounts of 29 mgms., 20 mgms., and 14 mgms.

Calcium - Dairy products proved by far the most satisfactory source of calcium in relation to family food costs. For each dollar of food expenditure in this group families obtained an average of 7.9 grams of calcium. Vegetables supplied a smaller amount of 2.3 grams, and this group was followed in turn, by cereals with an average of 1.8 grams., sugar products 1.7 grams., eggs 1.5 grams, and fruits 1.0 grams. Meats and fish each provided less than one gram of calcium per dollar of expenditure.

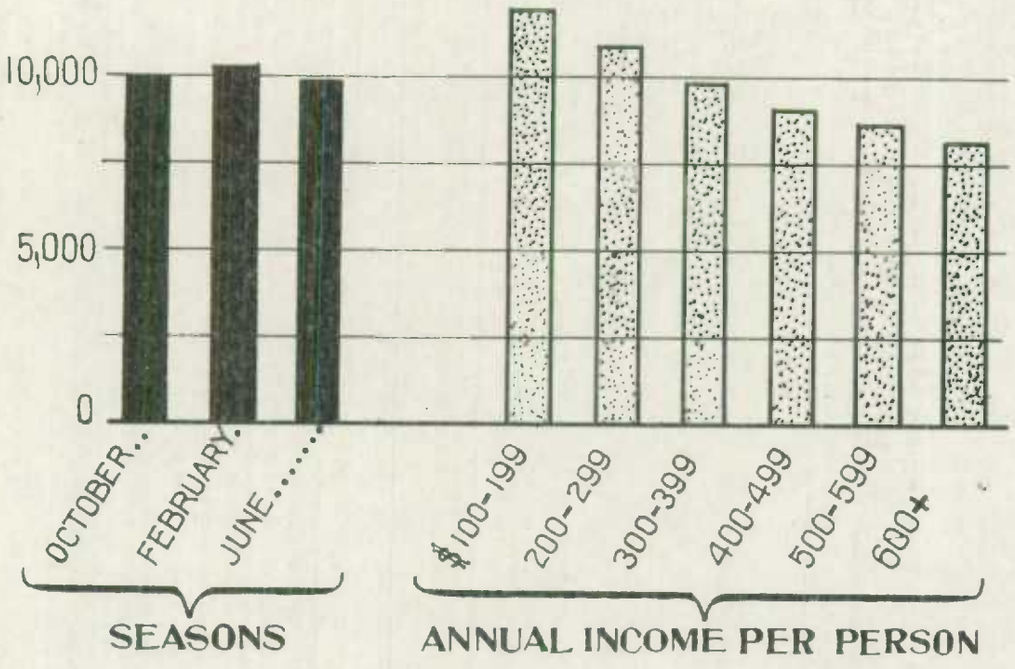
Phosphorus - All food groups, with the exception of fruits and sugars, appeared to give a substantial amount of phosphorus per dollar of food outlay. These ranged from 6.9 grams and 6.8 grams for vegetables and cereal products respectively, to 4.5 grams for meats. Fruits provided 1.2 grams of phosphorus per dollar, and sugar products only 0.3 grams.

Food Values per Dollar of Expenditure on Specified Food Groups
(Average of 3 Seasons)

Food Group	Calories	Protein (Gr.)	Iron (Mgms.)	Calcium (Gr.)	Phosphorus (Gr.)
Meats	6,110	407	61	0.3	4.5
Fish	3,770	501	20	0.6	5.8
Dairy Products...	9,270	217	14	7.9	5.9
Eggs	3,210	283	75	1.5	5.3
Cereal Products..	17,520	582	69	1.8	6.8
Sugar Products ..	24,210	28	54	1.7	0.3
Vegetables	8,410	284	132	2.3	6.9
Fruits	3,640	37	29	1.0	1.2
Fats and Oils ...	30,430	-	-	-	-
Average	9,970	300	50	2.9	4.9

Chart 4

CALORIES OBTAINED PER $1.00 OF WEEKLY FOOD PURCHASES BY WAGE-EARNER FAMILIES



CALORIES OBTAINED PER $1.00 EXPENDITURE ON SPECIFIED FOOD GROUPS

(Average of the Seasons)

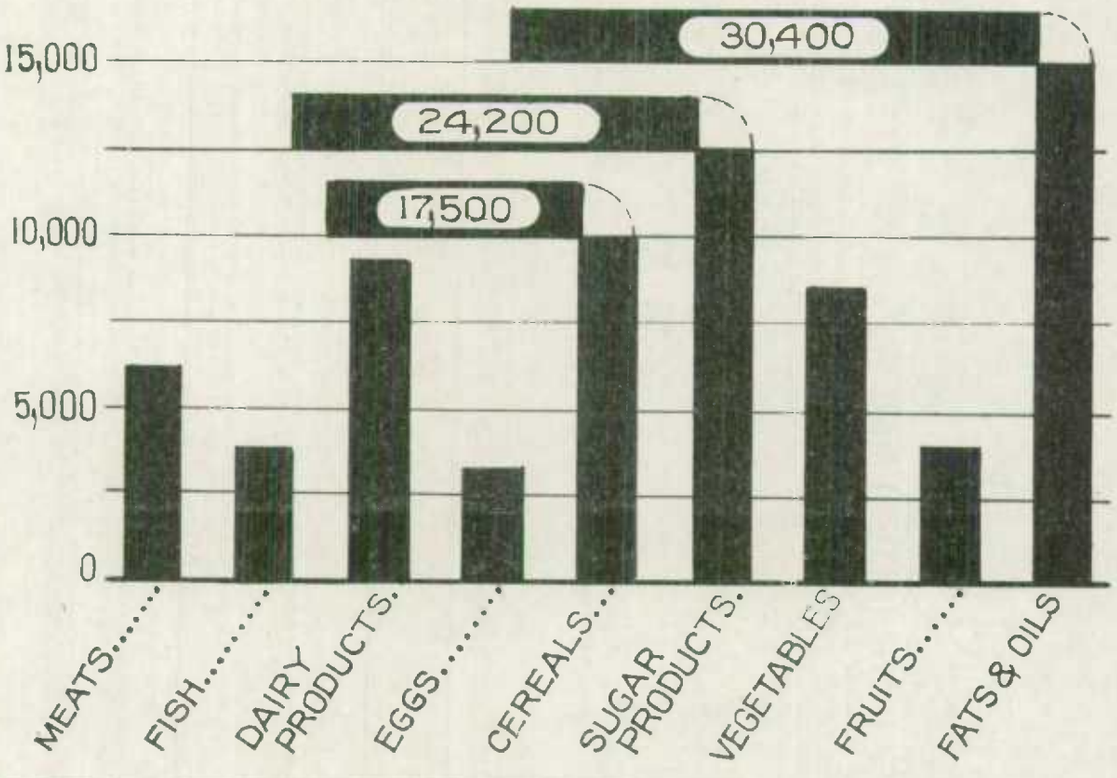
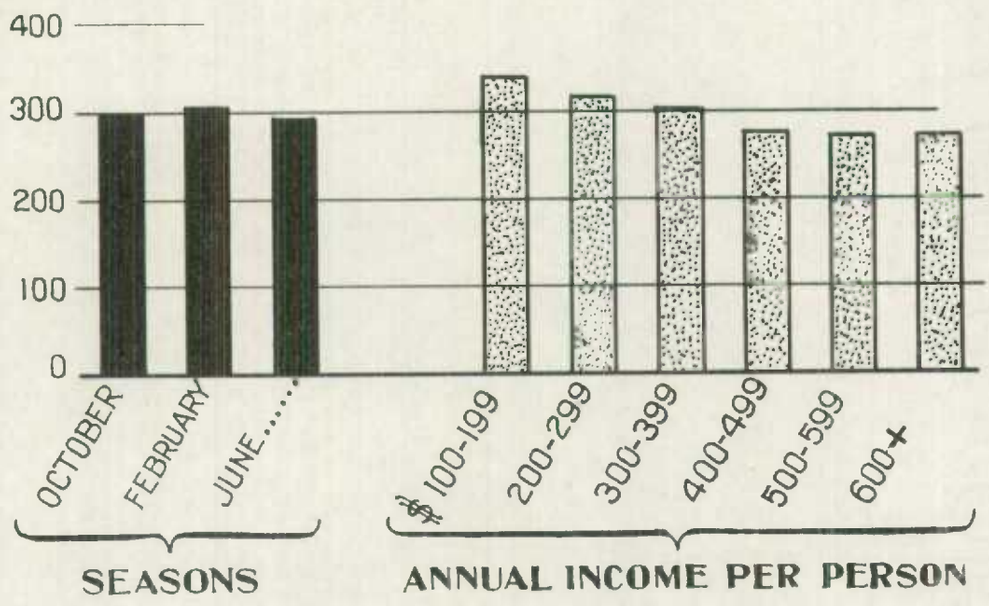


Chart 5

PROTEIN OBTAINED PER $1.00 OF WEEKLY FOOD PURCHASES BY WAGE-EARNER FAMILIES



PROTEIN OBTAINED PER $1.00 EXPENDITURE ON SPECIFIED FOOD GROUPS

(Average of the Seasons)

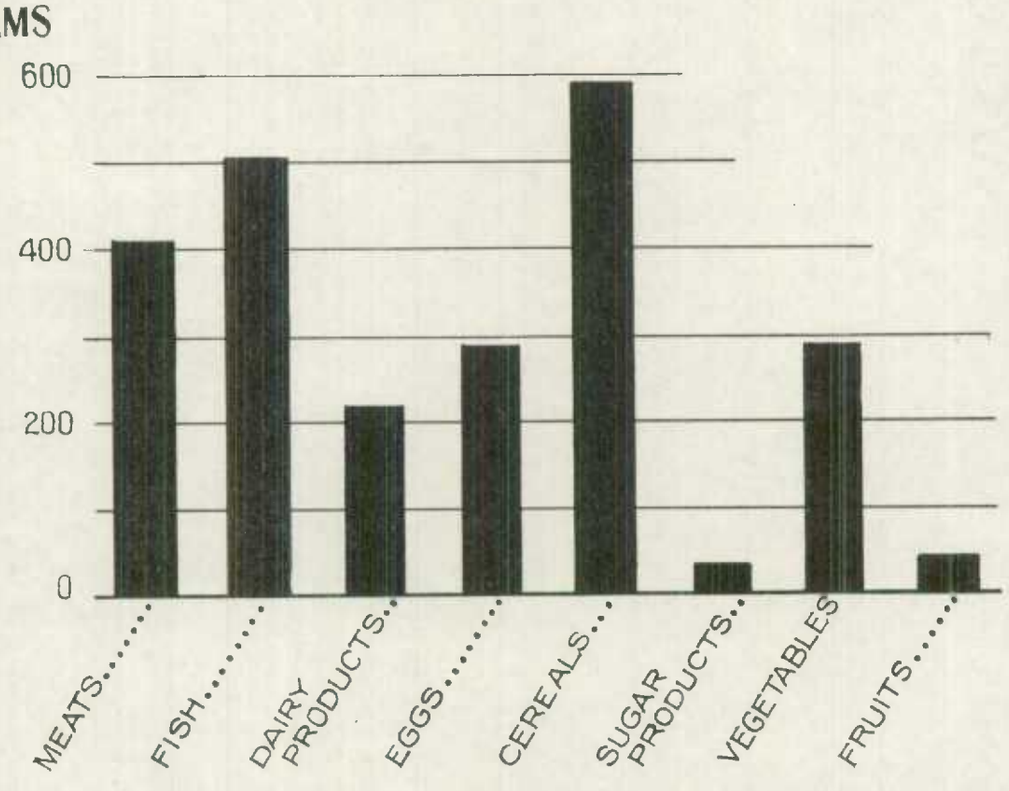
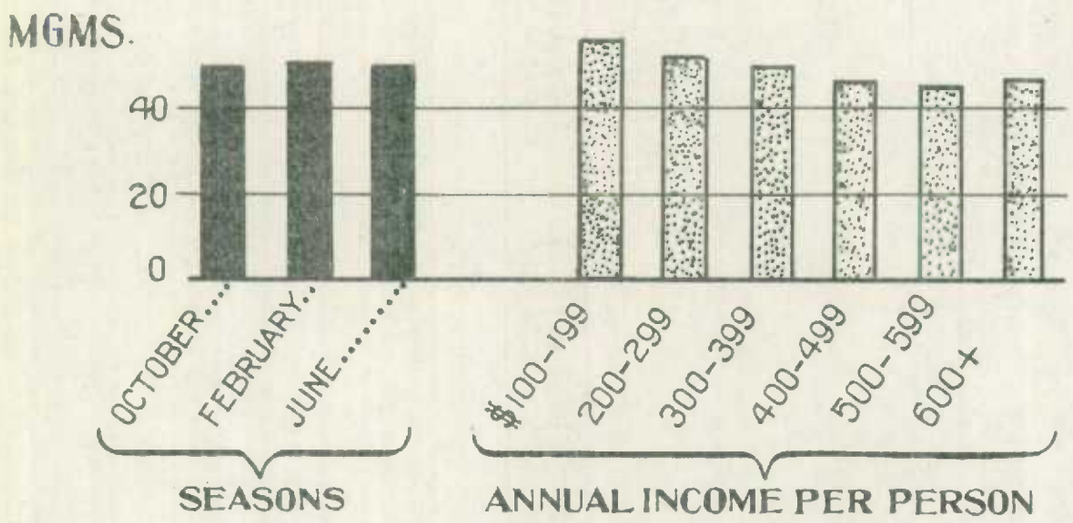


Chart 6

IRON OBTAINED PER $1.00 OF WEEKLY FOOD PURCHASES BY WAGE-EARNER FAMILIES



IRON OBTAINED PER $1.00 EXPENDITURE ON SPECIFIED FOOD GROUPS

(Average of the Seasons)

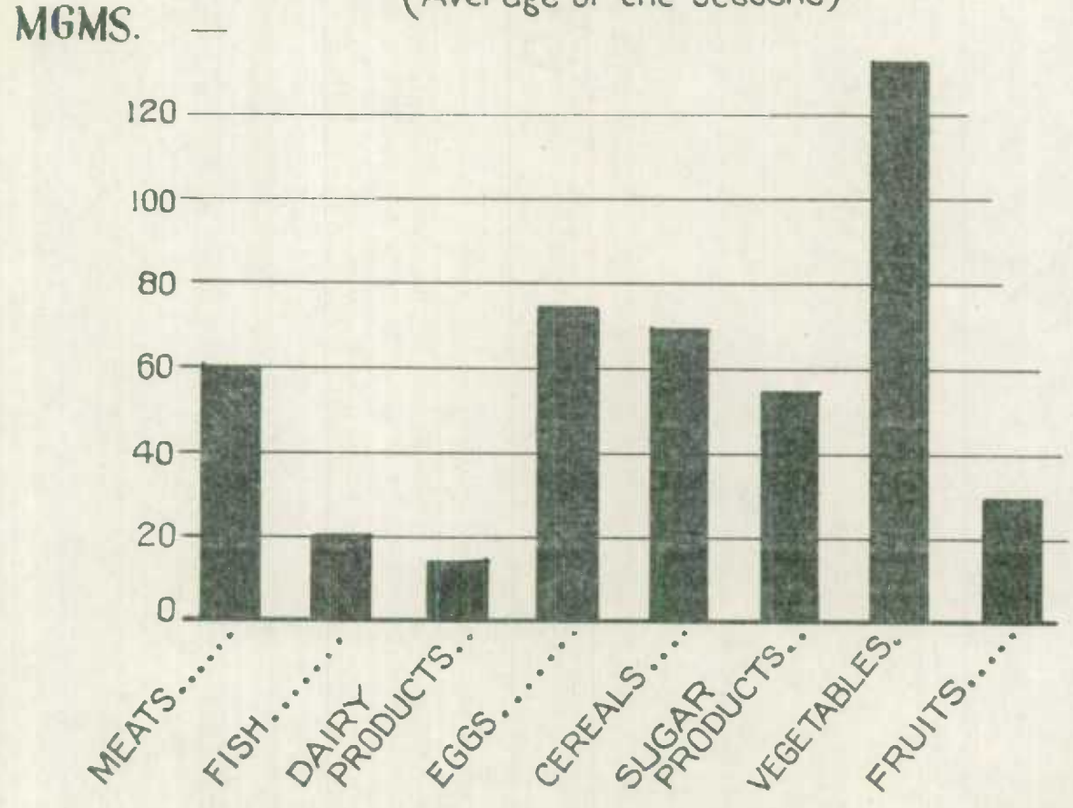
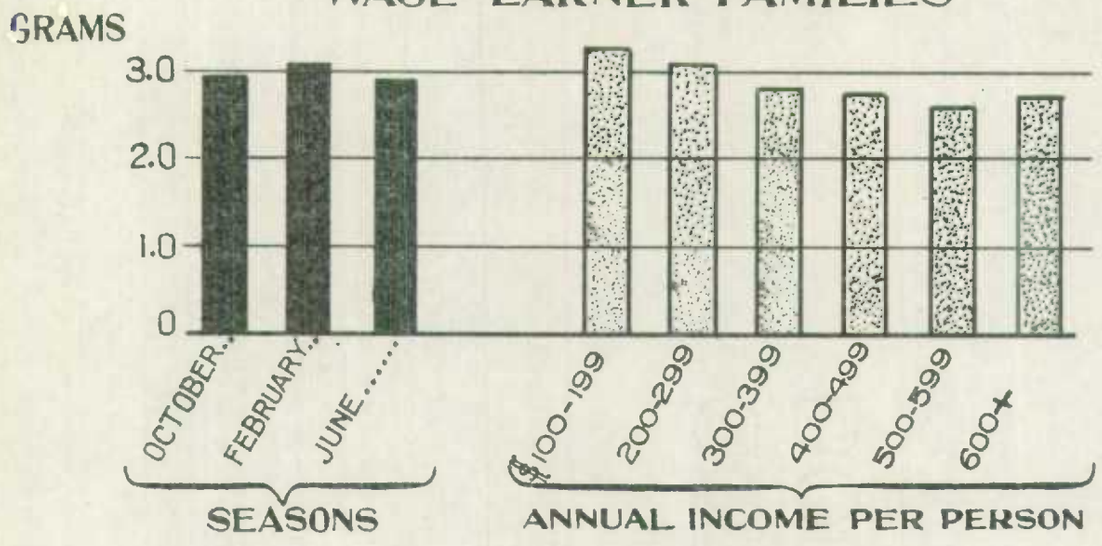


Chart 7

CALCIUM OBTAINED PER $1.00 OF WEEKLY FOOD PURCHASES BY WAGE-EARNER FAMILIES



CALCIUM OBTAINED PER $1.00 EXPENDITURE ON SPECIFIED FOOD GROUPS

(Average of the Seasons)

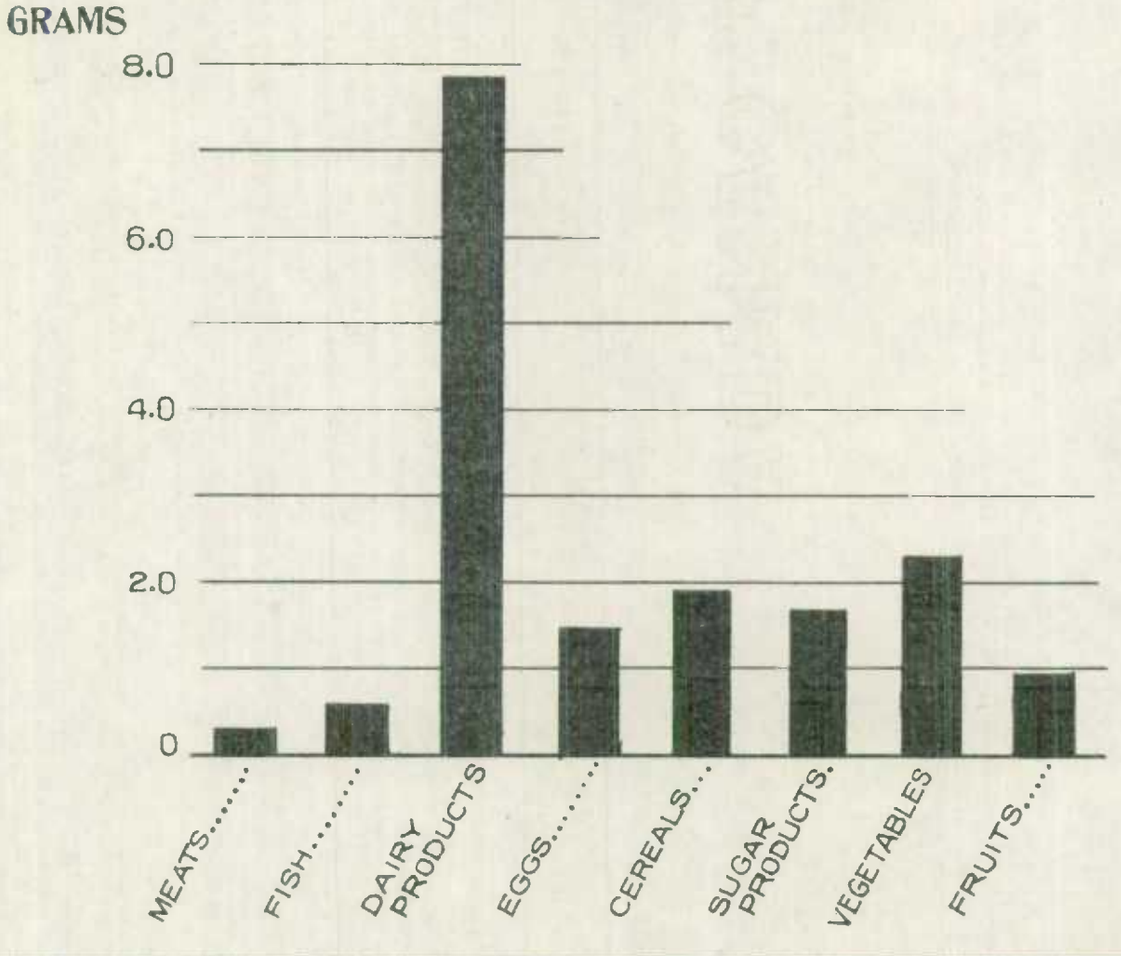
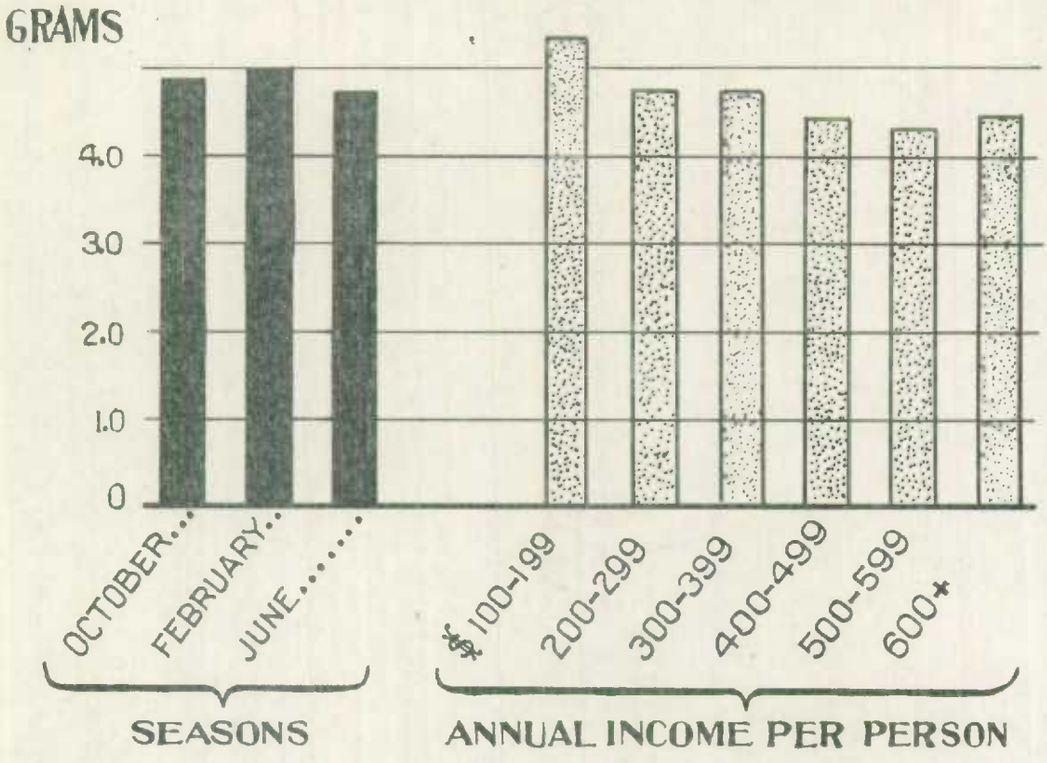


Chart 8

PHOSPHORUS OBTAINED PER $1.00 OF WEEKLY FOOD PURCHASES BY WAGE-EARNER FAMILIES



PHOSPHORUS OBTAINED PER $1.00 EXPENDITURE ON SPECIFIED FOOD GROUPS

(Average of the Seasons)