REVIEW OF LITERATURE RELEVANT TO FOOD CONSUMPTION ACTIVITY

by
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Zagazig University
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Assistance from the Agricultural Development Systems Project of the University of California, Egyptian Ministry of Agriculture, and USAID, is gratefully acknowledged, but the author is solely responsible for the views expressed in this paper.

Economics
Working Paper Series
No. 41

Note: The Research Reports of the Agricultural Development Systems: Egypt Project, University of California, Davis, are preliminary materials circulated to invite discussion and critical comment. These papers may be freely circulated but to protect their tentative character, they are not to be quoted without the permission of the author(s).

May, 1982

Agricultural Development Systems:
Egypt Project
University of California
Davis, Ca 95616
Review of Literature Relevant to Food Consumption Activity

Dr. Amin I. Abdou*

Team Members for the Food Consumption Activity are:

Principal Investigator: Sylvia Lane, Ph.D.
Professor, Department of Agricultural Economics
University of California, Davis

Co-Investigator: Carlos Benito, Ph.D.
Research Associate, Department of Agricultural and Resource Economics
University of California, Berkeley

Egyptian Team Leader: Mohamed A. El-Shennawy, Ph.D.
Economist
Ministry of Agriculture
Arab Republic of Egypt

Co-Investigator: Afaf Abdel Aziz Mohamed, Ph.D.
Economist
Ministry of Agriculture
Arab Republic of Egypt

Co-Investigator: Amin I. Abdou, Ph.D.
Economist
National Research Center
Arab Republic of Egypt

Co-Investigator: Marzouk Abdel Rahim Aref, Ph.D.
Professor of Rural Sociology
Faculty of Agriculture
Minia University
Arab Republic of Egypt

Co-Investigator: Bahgat M. Abdel Maksoud, Ph.D.
Lecturer, Department of Rural Sociology
University of Assiut
Arab Republic of Egypt
Review of Literature Relevant to Food Consumption Activity

Dr. Amin I. Abdou*

I. THE FOOD SHORTAGE PROBLEM


The Cereal area in Arab countries provides less than half the consumption requirements. However, potentials are still in favor of expansion as arable land is about double the present area (81 million hectares), in addition to vast water and human resources.

Egypt suffers a trade balance deficit for agricultural goods which increased from L.E. 85 million in 1970 to L.E. 115 million in 1975.

Highlights of the long-run agricultural policy: Raising cropping intensity over the 1.9 present figure. Rationing water and fertilizer use. Improvement of soil fertility for 492,000 fed. to 1977 and 1.42 million in 1983. Inducement of new varieties like Giza 157, and 158 and Sakha eight for wheat, and four new varieties for rice. Expansion of uniform types of machinery. Establishing freezers and solid barns to reduce losses reaching 6 percent for crops and 10 percent for fruits. Credit expansion in 5-year plan 1979-1983 to reach L.E. 203 million vs. L.E. 47 million for the past 5 years--the interest paying deposits and savings are expected to reach L.E. 100 million in 1983. Modification of the land tenure system for new land to encourage the private sector to contribute to land reclamation. Expansion of agricultural-industries for citrus, sugar beets, dairy products and livestock. A target of 2.8 million fed. reclaimed land by 2000, in addition to 912,000 faddans already reclaimed, most in Sinai, East Delta, New Valley and West Delta. Expansion of calves bred on milk substitutes since calves consume 10-15 percent of milk produced. Encouraging the private sector in the area of poultry production to reach 5,000 farms in 1982 through provision of chicks, feeds, and veterinary care. Production is expected to reach 90 million fowls in 1982. Establishing fish production units on 30,000 fed. using new methods to reduce losses. Increasing fishing efficiency in the Red Sea and North Coast fisheries.

*Dr. Amin I. Abdou is an Economist with the National Research Center, Arab Republic of Egypt. This paper was prepared as a working paper for the Agricultural Development Systems-Agricultural and Republic of Egypt, Egypt-University of California Project.
Potential production in 2000:

<table>
<thead>
<tr>
<th></th>
<th>Million Metric Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>12.4</td>
</tr>
<tr>
<td>Starchy Roots</td>
<td>1.5</td>
</tr>
<tr>
<td>Pulses</td>
<td>1.1</td>
</tr>
<tr>
<td>Sugar</td>
<td>0.9</td>
</tr>
<tr>
<td>Red Meat(*)</td>
<td>0.6</td>
</tr>
<tr>
<td>Poultry</td>
<td>0.3</td>
</tr>
<tr>
<td>Fish</td>
<td>0.3</td>
</tr>
<tr>
<td>Milk</td>
<td>3.6</td>
</tr>
</tbody>
</table>

(*) Provided that maintained growth rates are 2.5 percent for cattle and 3.5 percent for sheep.


Through estimation of income demand elasticities, it was found that changes in income were accompanied by only slight changes in food expenditure, except for semi-necessary foods like meat, fruits and in some cases oils, fats, and legumes, especially in rural regions.

These results may be attributed to the low-income level of the Egyptian consumer, a fact that encourages the consumption of relatively expensive foods like meat and fruits with increased income. This phenomenon should be taken into consideration in the formulation of national policy for food supply.


Solving the food problem for developing countries must involve self-reliance in increasing production and not depending on foreign aid as a measure of involving risks.

Large farms and mechanization only fit countries with labor shortages.

Increasing food production is insufficient unless accompanied by increase of purchasing power for the poor.

The developing countries were food exporters until World War II, but ever since they have lost their self-sufficiency.

Developing countries suffer a deficit in cereal production reaching 95 percent of consumption, e.g., 108 million m.t. in 1985 and about 200 million m.t. in 2000.

About 88 million of the 1985 developing countries' population of 2.5 billion will suffer from food deficiency.
Egypt is a moderate income developing country needing a 5 percent rate of production growth to maintain self-sufficiency.

The Middle East and North Africa experienced a cereal deficit reaching 7.9 million m.t. in 1969-1975, 12 million m.t. in 1974-75, and expected to reach 22.5 million m.t. in 1985.

Egypt's population growth rate is 2.31 percent (1974-1985), the cereal production growth rate 1.92 percent in 1967-1974 and 2.54 percent in 1960-1974. If the latter rate continues the present deficit of 3.5 million m.t. will be maintained. Self-sufficiency until 1985 calls for increasing the production growth rate for cereals to 5.68 percent.

Egypt's cereal production development would have required about a 4.4 percent area increase during 1961-1974. But the area decreased by 2.9, 30.8 and 1.3 percent for barley, wheat, and maize, respectively. However, productivity increased by 20.7, 28, 7.4, 32.2, and 14.8 percent for cereals, wheat, barley, maize, and sorghum, respectively. The yield of rice decreased by 2.4 percent but the area increased by 33 percent. The sorghum area increased by 3 percent. Much improvement can be achieved through developing farming operations and adoption of improved varieties.


Egypt is the fifth largest wheat market in the world. Food imports are valued at $1 billion which is almost double export returns.

Wheat and wheat flour purchases reached 5.3 million tons (2-1/2 times the corresponding figure in 1970).

Corn imports rose from zero to 800,000 tons in 1978.

Imports of poultry, meat, and dairy products have risen 50 percent in 1978.

Cotton accounts for three-fourths of total value of agricultural exports ($1 billion).

Rice exports are declining (223,000 tons at 1977 dropped to 100,000 at 1979).

Citrus exports dropped from 200,000 tons in 1970 to 130,000 in 1978.

Production is, in general, increasing slightly but more slowly than consumption and, hence, the gap widens.

Vegetable oils production meets less than one-third the country's requirements.
Expansion of credit involved lowering the interest rate for agricultural credit to 6.4 instead of 12 percent.

Livestock production is to be stimulated by a number of means, such as allowing the private sector to import needed raw materials and install feed mills, and mostly carrying on with poultry breeding. On the other hand, government-owned companies will manufacture concentrated feeds, carry on research to develop other forage crops and provide veterinary attention.


Bread is "aish" (life), the gift to Egyptians of their enduring fertility symbol, the Nile River.

Levels of available per capita food stuffs have tended to stagnate over the last 15-20 years.

The major increases in grain production in the last two decades occurred in the case of rice and corn, while wheat failed to show an increase. The expansion of rice and corn production has principally resulted from the increased amounts of water stored since 1964 behind the High Dam (more area for rice and inducement of summer maize).

Barley, lentils, clover, and sugar cane have plateaued over the three or four decades, and yields of broadbeans have recently begun to decline.

It is at price of the long-term degradation of soil that levels of production have been maintained or marginally increased over the last 15 years. Diminishing returns on labor and fertilizer inputs have been evident for sometime.

About one-third the 900,000 fed. already reclaimed have reached marginal levels of productivity.

The poor quality of soils, the enormous costs of infrastructure in the form of roads, housing, schools, irrigation and drainage and limits in the amounts of water availability or further reclamation case in doubt that reclamation can offer Egypt a way out of its present agricultural problems.

Almost 60,000 fed. are lost every year to urbanization (roads, houses, factories, etc.).

The food problem is up to now an issue of maldistribution in the nutritional sense.

The deficit in Egypt's foreign trade balance is expected to last until the end of the century. Total sacrifice of cotton production to corn and rice (1.7 million fed.) would increase production for the two by 1.9 and 1.8 million tons, respectively, reducing the end-of-the-century grain import deficit to 3 million. Secondly, full mechanization, to free some of the
3 million fed. of clover for wheat requires intensive investment and an enormous amount of foreign currency beside obligatory consolidation and facing a larger deficit in green fodder needed for livestock breeding.

A threefold strategy involves increasing production and hence exports of manufactured goods to supplement food importation, holding the line and maintaining current agricultural production, and integration with Arabs.

It is only through increased Arab economic integration that Egypt will be able to feed its population in the future. Self-sufficiency would be at cost of distorting its comparative advantage for export goods. Reliance on U.S.A., Canada, or Australia will not be permanently suitable since it is expected that for some years these countries will not be able to deliver large enough exportable surpluses to meet the aggregate growing demands of the food-deficit nations.
II. INCOME, FOOD EXPENDITURE, THE DEMAND FOR FOOD AND NUTRITIONAL OUTCOMES


In comparison of the results of the three budget surveys 1958-59, 1964-65 and 1974-75 showed that per capita real expenditure declined after increasing due to inflation since 1974. Accordingly, even those who earn double the average income continued to suffer animal protein deficiency due to low consumption of animal products which are relatively expensive.

No substantial improvement occurred during the entire period, since the slightly favorable change detected in 1964-65 was offset after 1973, and a decline occurred at a degree permitted by estimated income elasticities.

The problem is far more serious in rural regions, partly because income levels are lower, and partly because of the wide gap in consumption between high and low income strata. A cause for the latter might be the reliance of the low income strata in rural regions on markets with fluctuating prices, while the rural rich hold land and rely, to a great extent on their own production which enables them to overconsume. The latter conclusion was verified by detection of the rural rich's consumption of cereals at a level which exceeded the corresponding estimate for urban high income strata.


A procedure is developed to estimate nutritional and food demand implications of a changing income distribution. Findings from an empirical application to the population of Cali, Colombia suggest that changes in income distribution can effectively improve human nutrition, even in the absence of food supply expansion. Demand for individual food commodities are also affected. Demand projections must be based on an individual strata rather than averages for societies with changing income distributions. Methodology relied mostly on estimation of protein and calorie demand elasticities mathematically derived from corresponding estimates for the original commodities, for different income strata. Different elasticities for different income strata lead to changes in nutrient intake through different methods of intervention, i.e., either increasing income of all or some strata, increasing food supply, or both. It was found that the less effective policy was an overall income increase with stability for both income distribution and food supply. The effect of increasing prices may offset the income increase for the low-income strata, and encourage greater consumption for the high income strata which initially had no nutritional deficiencies. However, the operating key factor lies in differences in magnitude among the income and price elasticities estimated for each stratum.
This was an investigation of the most effective agricultural and nutrition intervention program set for improvement of the nutritional status for the poor rural households of Puebla in Mexico. The study was framed in a four-stage process. First observation of the prevailing nutritional status, and patterns of food consumption, auto-consumption and food production. Secondly, a theoretical model was formulated on the basis of statistical inference from anthropological studies. Thirdly, the model was validated through comparison of empirical projections with observed data. Fourthly, the model was used in evaluation of the effectiveness of alternative programs influencing nutritional status. Programs evaluated included price policies, subsidy programs and agricultural credit. The typical diet was composed of corn and beans as suppliers of energy and protein, respectively.

Observed data inferred inadequate intakes for both calories and protein, and the latter was worse.

A vicious circle exists since low nutritional levels lead to weakness and inability to increase income which, in turn, affects food consumption and hence nutritional status.

Programs were ranked according to their cost-effectiveness in improving nutritional status (cost incurred by a unit change in calorie and/or protein intake) first was credit availability, for poor rural households, at lower interest rates, for the adoption of technologically superior production methods and implementing complementary communication and organizational projects or projects contributing to a higher level of infrastructure. The second was input subsidies though requiring high governmental expenditure for additional cash subsidies.

A seasonal investigation would allow specification of cash flows and labor allocation between farm and off-farm activities.

Food real expenditure increased by 8.9 percent between 1958-59 and 1964-65 but declined by 21 percent in 1974-75. Thus, percentages of total expenditure were 48.8, 46.6 and 43.5 percent for the urban sector in the successive periods.

Average real expenditure decreased for cereals, dairy products, fruits and sugars, and increased for meat poultry, eggs and vegetable oils.

For rural regions, the relative importance of food expenditure dropped from 65.2 to 59.3 to 54.7 percent for the successive periods. Reasons were the increasing proportion of middle and high income strata, in addition to increasing subsidies for food.
As in the urban area, in rural regions expenditure decreased for cereals, legumes, dairy products and sugars, and increased for the meat group, vegetable oils and vegetables.

Expenditure on meat is highest in the urban sector followed by cereals and starchy roots. The case is reversed for the rural sector.

Legumes, vegetable oils, sugars and vegetables are more important in rural regions, while dairy products and fruits are more important in urban.


The Egyptian diet is unbalanced because of the dominance of cereals.

There is a shortage of protective foods in the diet causing a deficiency in high quality protein.

Quantities of important minerals and vitamins are inadequate.

The diet lacks diversity and consists mainly of cheap items such as bread, broadbeans, and bean cake (taamia).

The diet contains relatively large quantities of spices and chili which are harmful to health.

Higher farm prices for rich protein foods may strongly motivate producers to increase their production of such items.

Programs set for upgrading people's nutritional consciousness are vitally required, as well as guidance to least-cost highly nutritive diets.

Programs of school meals and any other leading to governmental nutritional support for the low-income class need expansion.
III. FOOD CONSUMPTION


The study investigated consumption patterns, purchase incentives and impact of storing habits on natural and chemical properties of food stuffs such as spinach, potatoes, eggs, meat and butter.

Expenditure and consumption patterns differed with levels of income, education, residence areas and existence of children.

In general, food shared the greatest part of expenditure reaching 50.7 percent, 13.1 percent was spent for lodging, 10.7 percent for clothing and transport, 6.8 percent for savings, 4.3 percent for recreation and 5.4 percent for education.


The food consumption patterns of rural landholders differed with agronomic zones and geographical locations, mostly during different cropping patterns reflected in auto-consumption.

Levels of basic foods consumption were positively influenced by levels of income (featured by total consumption expenditure) and size of landholdings. Additionally, basic food distribution of the observed households mostly coincided with corresponding distributions for total expenditure and landholdings.

Consumption patterns revealed were in general compatible with the national figures, and generally exceeded these generated for the whole rural sector by the Family Budget Survey (1974-75). Cereals continued to represent the greatest part of rural landholders' diet (70 percent). Consumption of animal products was still low and inconsistent among observations in each village as well as among zones. Such a result could be due to variations of size of landholdings and mostly of livestock assets.

Consumption income arc elasticity estimates corresponded to the economic logic to a reasonable extent. Cereals still had the lower estimates and meat, dairy products, and fruits had the highest estimates in most cases.

Auto-consumption concept had a high impact on consumption patterns and standards, that is since observed high standards for some food items in some areas occurred along with full dependence on farm production, and this case was explicitly revealed for dairy products. Over-consumption of cereals in most cases could also have resulted from production of such foods eliminating the need to rely on the market.
Comparing the food consumption standards in less developed countries with standards prevailing in more developed countries revealed the superiority of the latter. This result was highly valid for animal products in particular. That is since the maximum level per capita share of meat consumption in landholders' diets dropped to less than 12 percent of the corresponding figure for U.S.A., and for dairy products (milk equivalent) it dropped to less than 18 percent of the standard prevailing in the Netherlands. On the other hand, consumption of cereals was slightly in favor of the landholders' diet, which is logical considering that cereals form 70 percent of the diet.

Nutritional assessment indicated calorie inadequacy for a percentage of individuals (consuming unit equivalents) varying from 17 to 62 percent according to differences between villages and zones. And over-intake reached 360 percent of requirements for 10 percent of consuming units in some particular zones. Total protein intake followed a similar pattern in most cases. On the other hand, a drastic problem was apparent for animal protein intake for almost 85 percent of consuming units, in general, since consumption of legumes was lower than required to compensate—along with cereals—for such a low intake of high quality protein.

Income redistribution in favor of poor landholders and providing aid to increase their livestock assets represent measures which may be expected to improve the nutritional status for the rural landholders as a whole.


Comparisons between farm and non-farm households were based on Engel curves for major consumer categories. Both OLS and TSLS were adopted, but the second was preferable since total consumption expenditure (C), a proxy for income (X), was an explanatory variable dependent on income. Therefore, C was regressed on Y and expenditures on different items (X's) regressed on C.

Differences were clearly revealed but not on a regional basis. Level and stability of income were not important factors contributing to the revealed differences.

Income elasticities for total food and home-prepared were higher in farm households than for urban or rural non-farm (by either OLS or TSLS). The opposite held for other items (by OLS).

Income variability is mainly responsible for substantial underestimates of income elasticities for farm households.

Per capita intake of calories and total protein considerably exceeds requirements, and was increasing during period 1948-1966. Yet, per capita intake of animal protein was quite stable and below one-third the recommended allowances.

Food demand-income elasticity is about 0.67, which is very high compared to corresponding figures for developed countries such as the United States and countries in Western Europe (0.2-0.3). High elasticities are common in poor undeveloped countries.

Likewise, elasticities are higher in the rural parts of Egypt, as income levels are lower.

Considered food items, estimated elasticities for fruits, dairy products, meat, fish and eggs were relatively high (considered semi-necessities or relatively expensive foods). Elasticities were relatively low for cereals and legumes.

With extension of urbanization, expensive food items become a larger percentage of total food expenditure.


Objectives were to investigate the impacts of bonus food stamps, income and household size on food expenditures using a sample of households containing 8-12 year old children in the state of Washington, with a greater then proportionate representation of Blacks and Mexicans (26 and 25 percent, respectively).

Findings infer a significant but relatively small effect of income on the value of consumed food (income elasticity = 0.04). Two explanations for the weak impact are given, not including very low-income classes and inclusion of food other than purchased food. Additionally, assets (value of property) are correlated with income (r = .52) and may capture some of the latter's effect.

On the other hand, the asset effect is significant only for Anglos (high income classes) who have large amounts of assets and may be caused by low tendency to spend on increasing their assets and hence directing more to consumption.

Household size inversely affects per capita share of food expenditure, but by less than 10 percent, but the gross impact on household expenditure is positive.

Length of income pay periods inversely influences food expenditure.
Amounts of owned assets should be considered as a criterion in determining eligibility standards for food distribution programs, such as food stamps and free school lunches.

IV. THE EGYPTIAN DIET


<table>
<thead>
<tr>
<th>Present Poor Egyptian's Diet</th>
<th>Best Diet</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Bread</td>
<td>60</td>
<td>Bread, rice, and potatoes</td>
</tr>
<tr>
<td>Legumes and some vegetables</td>
<td>20</td>
<td>Legumes and vegetables</td>
</tr>
<tr>
<td>Fats</td>
<td>5</td>
<td>Fats</td>
</tr>
<tr>
<td>Meat</td>
<td>5</td>
<td>Meat, fish, and eggs</td>
</tr>
<tr>
<td>Fruits</td>
<td>5</td>
<td>Fruits</td>
</tr>
<tr>
<td>Dairy products</td>
<td>5</td>
<td>Dairy products</td>
</tr>
</tbody>
</table>

Chili spices and salted fish must be excluded from food habits for the sake of better health.


I. Methodology and implementation:

a. Social Survey: investigation of the environment, information gathering for stores, institutions, population, livestock and land assets, etc. A preliminary house-to-house survey carried out for family income distribution formed the frame of the stratified sample.

b. Dietary Survey: Four surveys conducted in January, April, July, October, and a fifth in September to include a feast day, and also some other short surveys during fasts and feasts on 18 days plus "Ramadan," adding up to 13 percent of the whole year. The method used involved frequent daily visits, weighing food, and taking samples of composite dishes for chemical analysis.

II. Results:

For the two selected villages of "Kalubia" governorate; Kafr El-Hosafa and Mansouriet Namoul, results indicated a diet pattern for the rural household similar, to some extent, to the national diet as provided by food balance sheets. However, it is differently characterized by lower consumption of wheat, sugar, pulses, fruits and fish. Besides, the wheat/maize consumption ratio was 1:5 compared to 1:09 for nation in the same period. The importance of introducing summer vegetables in the area beside
greater consumption of legumes, wheat and cheap fruits was indicated. Likewise, for the sake of nutritional improvement, flour enrichment with iron, calcium and possibly riboflavin was recommended. Moreover, income differences were reflected in consumption, as the lower income classes tend to consume less meat, eggs, milk, pulses, fat, sugars and fruits and, thus, have much lower intake of calories and animal protein. On the other hand, cereal consumption was not too different for different income classes.


Some previous studies revealed that zinc deficiency is one of the factors causing growth retardation in Egypt.

Thus, in the study of factors contributing to growth retardation, a sample of 90 school boys (11-18 years old) of Sindion Preparatory School with heights 1 and 2 s.d. below Cairo and Iowa standards, respectively, was selected for detailed socio-economic, medical, and quantitative dietary analysis in different seasons. The study included a chemical analysis of composite food samples.

Results of the socio-economic study showed that the average monthly per capita income in families of physically retarded group was L.E. 3.65, while it was L.E. 7 in the control group.

The diet of the retarded group was found to be inadequate in calories, calcium, iron, vitamin A, riboflavin and ascorbic acid, while in the taller group, nutrients in the daily dietary intake are only slightly below recommended daily allowances in the case of vitamin A and calcium. The diet of the taller group was better in quality, and all nutrients were significantly higher in amounts than in the diets of the physically retarded. However, there was no difference in amount of zinc in the diet of both groups which was found to be normal for both diets.

Subsequently, it may be concluded that growth retardation in the Egyptian village is not a matter of genetic difference, as it is difficult to believe that one-third of the school boys are genetically constituted to be dwarfs. In fact, it is rather a matter of social, economic, environmental and nutritional differences between upper and low classes compatible with chronic under-nutrition and malnutrition.
V. THE PROTEIN PROBLEM


Cotton seed flour was incorporated as a protein supplement into bread, different bakery products and most popular national foods and dishes. The resulting products had a high protein content. The biological value (B.V.) and acceptability of various enriched preparations were found to be substantially improved.


Through adoption of LP it was possible to propose a diet satisfying protein quantity and quality requirements with full reliance on vegetable foods which were: bread, rice and legumes at a cost of L.E. 20/year per capita, based on international prices disregarding both local marketing costs and price subsidies, which were both in favor of chosen foods.

The selected diet also satisfies 84 percent of caloric daily requirements.

Other economic solutions are inferior to the solution proposed. Bread supplemented with lysine is only satisfactory if consumed in irrationally large amounts.

Consequently, with the expectation of continually increasing animal food prices, the solution proposed in the study can be effective.


There is a growing trend in Egypt towards the adoption of bread, one of the cheapest available foods, as a regular item in the diet. This, in turn, leads to the import of increasing amounts of wheat, which is economically undesirable.

The work described here was undertaken to evaluate the potential use of five relatively cheap native Egyptian foodstuffs as alternatives to wheat, and more especially as sources of protein that could compensate for any shortages of animal protein. Such foodstuffs were lentils, kidney beans, broadbeans, cowpeas, and fenugreek.

Results show that the first four have some value as sources of protein, though they could not be recommended as wheat substitutes. Broadbeans became contaminated, and hence could not be fully analyzed, and therefore results for broadbeans were inclusive.

Increase energy requirements by 5 percent for each 10° of temperature decline, and vice versa.

Increase energy requirements by 15-25 percent for moderate activity changing to very active.

Protein requirements are 0.57, 0.52 gm/kg of body weight per reference men and women, respectively, provided that protein is ideal (B.V. = 100). But reliance on cereals keeps B.V. at 55 appx., therefore, protein figures must be multiplied by 100/55 for Egypt and underdeveloped countries.

Energy requirements for age 20-39 years, temperature 10°:

<table>
<thead>
<tr>
<th>Body Weight (k.g.)</th>
<th>Light Activity</th>
<th>Moderate Activity</th>
<th>Very Active</th>
<th>Exceptionally Active</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>2100</td>
<td>2300</td>
<td>2700</td>
<td>3100</td>
</tr>
<tr>
<td>55</td>
<td>2310</td>
<td>2530</td>
<td>2970</td>
<td>3410</td>
</tr>
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<td>60</td>
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<td>70</td>
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<td>3220</td>
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<td>4340</td>
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<td>75</td>
<td>3150</td>
<td>3450</td>
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<td>4650</td>
</tr>
<tr>
<td>80</td>
<td>3360</td>
<td>3680</td>
<td>4320</td>
<td>4960</td>
</tr>
</tbody>
</table>

<p>| WOMEN             |               |                   |             |                      |
| 40                | 1440          | 1600              | 1800        | 2200                 |
| 45                | 1620          | 1800              | 2120        | 2480                 |
| 50                | 1800          | 2000              | 2350        | 2750                 |
| 55                | 2000          | 2200              | 2600        | 3000                 |
| 60                | 2160          | 2400              | 2820        | 3300                 |
| 65                | 2340          | 2600              | 3055        | 3575                 |
| 70                | 2520          | 2800              | 3290        | 3850                 |</p>
<table>
<thead>
<tr>
<th>Age</th>
<th>&lt; 6</th>
<th>6-12</th>
<th>12-18</th>
</tr>
</thead>
<tbody>
<tr>
<td>BOYS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>112-91</td>
<td>87-67</td>
<td>67-49</td>
</tr>
<tr>
<td></td>
<td>kilocalories</td>
<td>kilocalories</td>
<td>kilocalories</td>
</tr>
<tr>
<td></td>
<td>per kg. (*)</td>
<td>per kg.</td>
<td>per kg.</td>
</tr>
<tr>
<td>GIRLS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>112-85</td>
<td>80-57</td>
<td>57-42</td>
</tr>
<tr>
<td></td>
<td>kilocalories</td>
<td>kilocalories</td>
<td>kilocalories</td>
</tr>
<tr>
<td></td>
<td>per kg. (*)</td>
<td>per kg.</td>
<td>per kg.</td>
</tr>
</tbody>
</table>

(*) kilocalorie per each kilogram of body weight.

Protein requirements for children:

<table>
<thead>
<tr>
<th>Age</th>
<th>&lt; 6</th>
<th>6-12</th>
<th>12-18</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>boys</td>
<td>girls</td>
<td>boys</td>
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<tr>
<td></td>
<td>1.1</td>
<td>0.85</td>
<td>0.80</td>
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<td>gm/kg.</td>
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Eighteen point eight percent of agricultural land is devoted to livestock. Clover (berseem) provides 96 percent of their food requirements during winter. But summer feed composed of crop by-products, straw, hay, and bran, and concentrated feed provide only 39 percent of requirements. Deficits are equal to 3.1 million m.t., starch equivalent, or 4 million m.t. of corn.

Small livestock breeders, each holding less than 3 heads, possess 95 percent of total livestock assets.

Farmers took deleterious actions in the allaying of the feed problem. Such measures, like retarding cotton production to obtain several months of catch clover, violating regulations prohibiting berseem irrigation after May 10, improper early harvests of maize, etc.

The best measure for unraveling the problem appears to be livestock feeding on agricultural and industrial by-products (cotton, beans, soybeans, flax, bran, rice straw, molasses, etc.).


Current annual meat production reaches 320,000 m.t., of which 85 percent is beef and buffalo and 15 percent mutton. Poultry production reaches 120,000 m.t.

Calves and forage animals are meat sources comprising 25-30 percent of the total number which is about 4 million head. Forty to fifty percent of the 3.2 million head of sheep are meat sources.

Increasing meat production calls for increasing both the number and weight of slaughtered animals.

The fertility rates are about 70 and 60 percent for cows and buffalo, respectively.

The main problem is a deficit of 3 million m.t. of concentrated feeds, which do not exceed 1.2 million m.t. at the present.

To meet the feed shortage, one way is to increase productivity of maize interplanted with soybeans with allotment of the latter area to other fodder (about 140,000 feddan).

Specifying 300,000 feddans developed at Nasser Lake territory for forage production may be sufficient to produce 360,000 m.t. of meat.

Meat producing animals must be raised on green fodder, and then on concentrated feed for the last five months before slaughter.
VI. SELECTED NUTRITION STUDIES


The nutritive value of lentils, as a possible substitute for animal protein, was investigated by determination of different nutritive components, and specifically the amino acid content among which the S-containing and tryptophan represented the first and second limiting amino acids, respectively.

The chemical score calculated was found to be relatively high (43.4). However, PER of raw and roasted lentils were low (0.66 and 1.15, respectively). Roasting improved both PER and digestibility beside avoidance of fatty degeneration of the liver incurred by eating raw lentils.


The calculated chemical score for the Egyptian lupinus-termis equalled 52.7, and PER gave 0.91.

Soaking the seeds in water for 4 days improved PER to 1.25 without improvement in digestibility, denoting the removal of water soluble toxins through soaking.


A mixture of wheat and chickpeas (7:3), if properly prepared, will support the rate of growth of infants comparable to that obtained with milk. The addition of 10 percent dried milk in place of wheat improved the protein quality of the mixture.

Laubina mixtures have great value as diet supplements but are not intended to be complete foods, since they are particularly deficient in ascorbic acid and iron.

In addition to chickpeas, lentils show promise as an ingredient for high quality wheat-based protein-rich food mixtures.

The use of protein-rich food mixtures for infants may contribute significantly to solving the problem of protein-calorie malnutrition in the Middle East.
There is no persistent need in the present to enrich wheat flour with vitamins. However, it is desirable to adopt calcium and iron enrichment to overcome the incidence of crickets and anemia.

Because of the present high international prices for wheat, there is a possibly increasing trend toward maize consumption. Therefore, cornflour enrichment with niacin, in addition to iron and calcium, must be considered.

Flour enrichment with lysine is an issue still calling for extensive study.

More thought must be given to salt supplementation with iodine, especially since such a practice is prevalent all over the world.

It may be fruitful to study the feasibility of flour enrichment with high quality protein, such as dried fish, where the protein content reaches 80 percent.

Proteolan (a by-product of corn in the starch industry) is chemically composed of 27.4, 7.5 and 47.8 of protein, fat and carbohydrates, respectively.

Most essential amino acids, except sulphuric, exist in optimal concentrations.

Animal experiments indicated high figures of digestibility (91.2) but low figures for the biological value and net protein utilization (45.9, 41.5) versus (85.9, 84.6 and 72.2) for casein in the same order.

Mixing proteolan with barley rootlets, a by-product of malting, led to noticeable increases for the B. V. and N.P.V. to 67.9 and 49.2, respectively.

Comparing the protein quality of broad beans and kidney beans with that of soybeans, the latter comes first in digestibility. B. V. and N.P.U. were estimated to be 83.7, 72.9 and 61.0, respectively, an average for the Hampton and Clark varieties, while estimates for broadbeans were 73.3, 57.3 and 41.8; for kidney beans 83.8, 66.5, and 55.7; and for casein 94.8, 74.5, and 70.6. However, heat treatment of the leguminous seeds caused noticeable reductions in levels of methionine, cystine, lysine and tryptophan.

Treatments of broadbeans showed drop of P.E.R. (Protein Efficiency Ratio) and N.P.U. (Net Protein Utilization), respectively, to 94, 98 percent for soaked, 94, 87 percent for germinated then boiled and 59, 79 percent for autoclaved beans (1h.). The last treatment also reduced lysine and sulphur acids by 10 and 35 percent, respectively.

The most favorable mixture was composed of bread supplemented with methionine, lysine and threonine bringing P.E.R. up to Albumin (eggs) level. Next was, bread and raw beans with a 40:60 nitrogen ratio, and last was bread mixed with stewed broadbeans at a 70:30 nitrogen ratio. The worst was bread and delta-methionine, 0.5 percent. Methionine supplementation to broadbeans had an effect equal to adding bread.


Kishk (paraboiled wheat and sourmilk mix) was found to have a high protein content (23.5/100 grams of dry material).

It contains high amounts of lysine, phenylalanine, leucine, iso-leucine, and threonine, but contents of other sulphur amino acids and tryptophan are low.

Net protein utilization, digestibility and biological value were 59, 90 and 66, respectively.


On germination of wheat and during the first day of fermentation, concentration values increased for essential amino acids except for tryptophan and phenylalanine.

The situation was reversed on the second and third days of fermentation except for tryptophan which started to increase.

Free amino acids increased during the germination of wheat, and further through fermentation of bouza.

Animal experiments indicated an increase of protein utilization for a diet of stewed beans and bouza from 43 to 52 percent when supplemented with a first day sample of bouza. Lentils and rice mix (koshari) manifested a slight increase of protein utilization from 48.4 to 50 when supplemented with third day samples of bouza.
Protein of milk compensates for the lysine deficiency of wheat, 50 gms. of kishk meets man needs.

Milk and wheat supplement each other with vitamins and minerals as wheat compensates milk iron deficiency.

Kishk could be a strong supplement to cereal diets in school feeding programs, as well as military canteens.