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9. ABSTRACT

A very brief outline of progress in UNICEF's corn-soy-milk mixture (Mx-86) project (excellent nutritional value), Peru's wheat-chick pea-soy mixture (HPF-16) (moderately high nutritional value), Brazil's Mandioca-soy protein isolate mixture (mixed results), Ralston-Purina's soy protein isolate (results not yet complete), International Milling's wheat-based product, PBB (modest nutritional value), a fish protein concentrate (results not yet complete), and research on the low intestinal lactase activity in non-white races (on-going). Short reports of expenditures and the proposed budget also are included.

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SUBJECT: Progress report June 30, 1971-February 15, 1972
Report of expenditures June 30, 1971-December 31, 1971
Proposed expenditures January 1, 1972-June 29, 1972
June 30, 1972-June 29, 1973
Research Contract AID/csd-2946
Critical evaluation of new (or enriched) protein sources
(for the prevention of malnutrition)

Progress Report

During the first few months of operation of this contract we have continued evaluations already under way and have begun others.

A corn-soy-milk mixture from UNICEF (Mx-86) has been completely evaluated and found to be of excellent nutritional value. Its digestibility is definitely superior to that of CSM and the biological value is also superior, resulting in a significantly higher net protein utilization. Of particular interest is the fact that this product was used successfully to initiate recovery in children suffering from kwashiorkor and marasmus, something we could not achieve with CSM.

A wheat-chick pea-soy mixture developed by Nestle for Peru (HPF-16) was evaluated only in comparative studies and found to be of moderately high nutritional value.

A Mandioca-soy protein isolate mixture from Brazil has been evaluated. It is obvious from our studies that we are mostly measuring the nutritional value of the isolated soy protein and this is definitely high. Digestibility is good and so is nitrogen retention if the losses of calories into the stool from the Mandioca are not too large. In some children the Mandioca was relatively well digested but in most of them we documented a marked increase in stool weight, stool water and stool fat, undoubtedly the result of the poor digestibility of the starch in Mandioca. Although we realize that Mandioca consumption is a reality in large areas of Brazil we feel that simple fortification with isolated soy protein, although undoubtedly a great improvement, is not enough. If you can promote technological research which might improve the digestibility of the Mandioca, such as that achieved by Mx-86 in comparison with CSM, we would be most interested in studying such a product.

In our evaluation of a soy protein isolate from the Ralston-Purina Company (Supro) we have been stymied in our efforts to demonstrate a conclusive supplementary effect of methionine. When we dilute dietary protein down to the levels at which we should be able to show such effect, loss of appetite develops promptly. This is not unlike similar reactions encountered in the past with fish protein concentrate and we have no adequate explanation at the moment.

Using ordinary rice flour from Peru we have demonstrated a supplementary effect of lysine-containing "nutricubes" from Roche.

A wheat-based product from International Milling Company (PBB) has undergone comparative studies. It is of modest nutritional value. Studies of the supplementary effect of lysine are pending. Much time was wasted because the manufacturer never provided us with the exact ingredients and on the basis of their amino acid analyses we had assumed that methionine was first-limiting. This we proved not to be the case as there was no supplementary effect of methionine.

We have received a new batch of fish protein concentrate from the Bureau of Commercial Fisheries and are presently giving the finishing touches to a protocol for the study of the peculiar adverse reactions previously encountered with this product when dietary protein was diluted.

Because of the important interrogants recently raised about the high incidence of low intestinal lactase activity in most of the non-white races of the world we have considered it desirable to study the nutritional significance of this phenomenon. Cow's milk, particularly when skimmed, is still a very important item in most attempts to improve the diets of children in underdeveloped areas. Whether it is to remain so and whether the faith placed on this product is justified, are both of great importance to the future of new protein foods. We have already documented a very high incidence (almost 100%) of low lactase activity in children over the age of 5 years in Peru. Between the ages of 2 and 5 years there is a precipitous drop in the incidence of high lactase activity (normal lactose tolerance). Whether this is purely a genetic phenomenon or whether lack of exposure to lactose plays an important part is not yet clear. We also documented the fact that lactose loads considerably smaller than those generally used will identify children with low lactase activity quite readily. We are in the process of determining whether they may not give a high incidence of falsely negative values in normal children. Our preliminary evidence suggests that this is the case and that a relatively large lactose load must be used for adequate screening. We are also involved in a detailed study of the metabolic consequences of lactose ingestion by children who have low intestinal lactase activity. For the studies we are using intakes of lactose which are equivalent to those found in milk-based diets. Results to date suggest that over and

above the obvious loss of calories from non-utilized lactose, there are significant losses of other nutrients and a very real danger of dehydration and electrolyte disturbances. These studies are still underway.

Report of Expenditures
June 30, 1971-December 31, 1971

During the first six months of operation total expenditures have proceeded at the expected rate with 51% of the amount budgeted for the first year having been spent. In the personnel category we have been spending at a rate below that originally budgeted. On the other hand, in the subject hospitalization category we have been spending at a rate considerably in excess of that originally budgeted. We have requested authority to transfer funds from one category to the other and also to transfer a small additional amount to the category "other direct costs". With these adjustments we estimate that our expenses at the end of the year will be within the budget in each category.

Proposed Budget
January 1, 1972-June 29, 1972

As indicated above, with the modification in the budget categories requested, we should be within a very small amount of the budget for each category. We expect personnel expenses to be slightly lower than during the first semester. In the travel category expenses during the second semester should be roughly one half of what they were during the first semester, corresponding to only one trip to Peru by the principal investigator instead of two. The principal investigator will travel to Peru and be there during most of the month of March but his expenses will be covered from another source. It is anticipated that another trip during the month of May will be charged to this research contract.

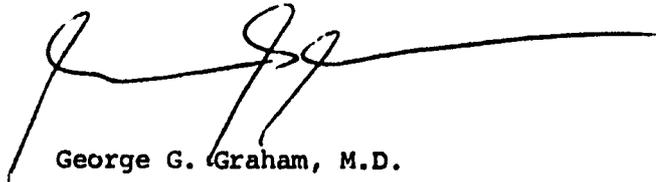
It is estimated that expenses for subject hospitalization and out-patient costs will be at a slightly lower rate than during the first semester. Expenses for the month of January will probably be quite high because we admitted a large number of patients with diarrhea and malnutrition for a study of the use of different dietary sugar sources in their initial dietary treatment. We feel that this is of great pertinence to the development of food mixtures.

Expenses for materials and supplies should be higher than during the first semester because of depletion of some of our important laboratory supplies. Expenses under "other direct costs" should be moderately lower. The amount for administrative costs is a fixed amount and will not change.

Proposed Budget

June 30, 1972-June 29, 1973

The total amount budgeted for this year is the same as that of the original proposal and in the contract. The different budget categories, however, have been changed to conform with our experience thus far. Thus, the personnel category has been reduced from \$50,610 to \$46,000. The budget for international travel and transportation remains the same as in the contract. The figure for subject hospitalization and outpatient costs has been increased from the \$12,800 in the contract to \$17,110. The amount for equipment, material and supplies remains unchanged at \$5,167. The amount for "other direct costs" has been increased from \$1,200 to \$1,500, while the amount for administrative costs remains unchanged at \$3,600 per year.



George G. Graham, M.D.

Principal Investigator

February 15, 1972

GGG/mk