

AGENCY FOR INTERNATIONAL DEVELOPMENT
 WASHINGTON, D. C. 20523
BIBLIOGRAPHIC INPUT SHEET

FOR AID USE ONLY

Batch 37

1. SUBJECT CLASSIFICATION	A. PRIMARY Agriculture	AS10-9200-G750
	B. SECONDARY Food composition--Cereals and bakery products--Thailand	

2. TITLE AND SUBTITLE
 Nutritional improvements of rice by fortification in Thailand, report on travel to Thailand

3. AUTHOR(S)
 Altschul, Aaron; Forman, M. J.; Howe, E. E.

4. DOCUMENT DATE 1970	5. NUMBER OF PAGES 14p.	6. ARC NUMBER ARC
--------------------------	----------------------------	----------------------

7. REFERENCE ORGANIZATION NAME AND ADDRESS
 AID/TA/N

8. SUPPLEMENTARY NOTES (*Sponsoring Organization, Publishers, Availability*)
 (Evaluation of the Harvard-Thailand Rice Fortification Project, CSD-2170 Res.)

9. ABSTRACT

10. CONTROL NUMBER PN-AAC-296	11. PRICE OF DOCUMENT
12. DESCRIPTORS Project evaluation Rice Supplements Thailand	13. PROJECT NUMBER
	14. CONTRACT NUMBER AID/TA/N
	15. TYPE OF DOCUMENT

CSD 2170.9
AID/TAIN
PN-AAC-296

REPORT ON TRAVEL TO THAILAND

NOVEMBER 16-20, 1970

Dr. Aaron Altschul
Special Assistant to the Secretary of
Agriculture for Nutrition Improvement

Dr. Martin J. Forman
Director, Office of Nutrition
Agency for International Development

Dr. Eugene E. Howe
Director of Experimental Biology
Quinton Research Laboratories
Merck & Company
Member, AID Nutrition Advisory Committee

Encl. # 9

REPORT ON TRAVEL TO THAILAND

NOVEMBER 16-20, 1970

Introduction

The objective of our travel was to investigate the status of the feasibility tests being conducted by Harvard University in cooperation with Mission personnel and the Ministry of Health on fortification of rice in the villages with vitamins, minerals and amino acids. Additionally we had the opportunity to see what is being done in other innovative approaches towards improving the protein nutrition in Thailand. Therefore our comments will include the other approaches as well for any benefit that these might have to the USAID Mission or officials of the Government of Thailand.

The Protein Problem

We conceive of the protein problem as to be multi-faceted and to be tied up with the total food problem. The way in which people get protein determines how much total food must be grown. For example, an economy which depends heavily on animal protein must have an excess of calories from grain to feed the animals. Such an economy has a better chance of minimizing problems of malnutrition since there would be adequate meat and animal protein for all including the vulnerable groups. Where there is no excess of cereals for animal production, the chances of getting good protein nutrition are more difficult to attain. Under those conditions the vulnerable groups such as preschool

infants and pregnant and nursing women are the first to show signs of deficiency in protein supply. (We do not minimize the requirements for vitamins but these are much cheaper and easier to satisfy than the requirements for protein). The problems of the vulnerable groups, as serious as they are, merely reflect a general inadequacy in the food balance. Therefore, efforts to correct this problem must not stop at simply providing foods for the vulnerable groups but must make a basic improvement in the food balance of the country at the lowest cost.

Protein Strategies

Our experience in dealing with these problems generally all over the world would indicate that improvements in the protein situation in any given country can be found amongst the following interventions:

1. A cereal policy. Each country must have a policy of maximizing the food impact of the cereals. This includes, first, having an adequate supply of cereals and, secondly, having an adequate supply of protein foods or additives to maximize the protein impact of the cereals. In Thailand the system primarily consists of rice as the major staple and the major source of calories supplemented by mung bean sprouts and small amounts of animal protein. With the present rate of growth of population at 3.2% per year, the demands on satisfying the

basic requirements for calories will be such as to put a strain on the production of the cereals, primarily rice, at the expense of more expensive foods such as the beans and the animal products. Hence, alternate ways of balancing and maximizing the protein value of the rice must be sought; one of these is the fortification of the rice which is being tested.

2. New sources of protein. An additional way of balancing out the protein in the rice is to find new sources of protein which will satisfy the nutritional needs and be acceptable to the people. One such approach is textured vegetable protein either from mung bean protein or from soy protein. Another possible source of low cost protein might be new fish sources such as from mussels.
3. Institutional Programs. Another approach to eliminating malnutrition is to use institutional programs as a way of controlling food intake so as to supply maximum nutrition at lowest cost. Examples of such approaches are school feeding and day care centers.

Since there is no panacea to the food problem, many approaches will have to be used. The three approaches described above are not mutually exclusive. For every country the lowest cost mix that works will have to be found.

Our Findings

1. Fortification of rice. Cereal protein is the major source of protein in the world, particularly the underdeveloped world; rice protein is the major source of protein in Thailand. But the protein of rice as with other cereals is not as efficient a source as is the protein from animal sources. Therefore, a considerable portion of the protein as normally taken is wasted unless it is supplemented with other sources of protein or with amino acids (protein constituents) in which the rice is deficient. The two amino acids deficient in rice are lysine and threonine; when these are added in very small quantities (.3 of a percent and .1 of a percent respectively) the effective protein in the rice is almost doubled. This can now be done at a cost of less than 10% of the cost of rice and this cost will be reduced as the markets for these amino acids are increased and production efficiency improved. Lysine and threonine are produced by fermentation of cheap carbohydrates or by chemical synthesis. It is not difficult to foresee that a fermentation industry could be developed in Thailand to produce such amino acids as well as to produce other products of fermentation (e.g. penicillin and other drugs) which are needed in the Thai economy. This then is the basis for the fortification program proposed for Thailand.

It was thought that this program should be examined in villages to see whether it is feasible and the contract was given to Harvard University to undertake this. The first part of this contract was to study the feasibility of this test in three villages. The evidence that we saw was that this can be done, that rice granules can be made synthetically which contain the fortification ingredients, and these can be introduced in the village mill by a simple device which feeds in 1% of fortification granules in with the regular rice. These granules are accepted by the population and it is now being regularly introduced in the test villages.

There are three villages under test now: in one the fortification granules contain no extra additives, in a second the extra additives are minerals and vitamins with the exception of riboflavin which is yellow, and in the third there is the total additive mixture which includes minerals, vitamins and the amino acids lysine and threonine. It is anticipated that tests will be made on the preschool age children in the villages to determine the effects, if any, that can be observed as a result of such fortification. It is too soon to notice major effects, but tests on the urine of the children in the villages where the vitamins have been added

indicate now an enormous increase in the vitamin excretion which shows that they are indeed receiving the vitamins intended for them.

One problem that has not been solved has been the addition of the vitamin riboflavin which is also deficient in the Thai diet. This vitamin is yellow colored; it was feared that the addition of this in the fortification granules would make them easy to pick out from the rest of the rice. For this reason we are not including riboflavin but are watching the situation carefully to see whether something can be done to take care of this deficiency.

The cooperation which Harvard University is receiving from the villagers and from Dr. Amorn and Mr. Uthai of the Ministry of Health is excellent. It seems that the feasibility has been demonstrated; now the tests can be put on a larger scale to provide statistically significant information on what effects might be anticipated. There was some discussion of measurements on the entire family in addition to the preschool children.

One such measure might be birth weight of children; this could provide some information about the effect of supplementation on the health of pregnant women. Another measure that ought to be introduced is some way of getting at performance of children as affected by intervention in their food supply.

2. Day Care Centers. We saw several day care centers in operation. Some of these were in villages in which the rice was being fortified. Others involved introduction of textured foods in the noon meals; in one village the textured food was a product of Archer-Daniels-Midland made from soy and in another village the food was made by the Food Research Institute of Kasetsart University out of a mixture of mung bean protein and fish protein concentrate. We were very much impressed with the day care centers as an institution which can be used for many purposes and which represents a good economic investment. These centers are a convenience for the mother and allows her to work during the day without fear of the child not receiving good care. It is educational for the children. It is a means of dispensing health education and care. It is means of dispensing good food habits and it is a means of intervention in the food by supplying foods that can be handled in an institutional setting but not in a home setting.

Just the fact that children eat in a social setting seems to prompt the parents to give the children better food than they might ordinarily have gotten and therefore has caused a shifting in the priorities with which the food in the family is divided among the members. It may even have caused the families to spend more of their resources on food and less on other items than they might ordinarily have done.

The day care centers are an excellent example of perfect cooperation between the USAID Mission as represented by Dr. John Kennedy and the Ministry of Health as represented by Dr. Amorn and Mr. Uthai.

3. New Food Technologies. The Institute of Food Research at Kasetsart University in Bangkok is one of the best of its kind anywhere in the world. The head of this institute Mr. Amara is pragmatic, has a good grounding in food science, and has a sincere desire to develop new practical approaches to protein foods. His Institute has developed a textured food from mung bean using a very simple apparatus for achieving texture, biscuits containing 50% full fat soy flour, a method for extracting protein from mussels which may have a way of introducing a new industry into Thailand and a new source of protein, and an evaporated soy milk which is now being made and distributed to schools.
4. Soy Protein. At the present time the production of soybeans is very small in comparison with production of mung bean. (This figure is slightly misleading since only a small proportion of the mung bean is processed into starch. It is this portion of the mung bean which produces the mung bean protein which is made into textured products.) Yet the production of soy is increasing and soy of all legumes is the largest producer of protein per acre. It is possible that soy can make a serious contribution to the protein supply of Thailand. Its growth should be encouraged and so should be the development of food processing

industries based on soy. Archer-Daniels-Midland is interested in the possibility of industrial operations involving soy and so are some other American companies.

5. Other Protein Food Products. Certain ideas being tried elsewhere ^{would} in the world/seem to be applicable to Thailand as well. These include the new 20% protein corn-soy-wheat macaroni now being tried in Brazil and the United States and developed by the General Foods Corporation. Another possibility are the protein drinks based on a soft drink model such as SAMSON and SACI being tested by Coca-Cola in South America and PUMA being tested in Guyana by Monsanto Company.

Recommendations

1. Fortification

The feasibility of this approach has been established. The basis exists for expanding this study to full field trials of four to five years duration to test out this concept and measure the effects of fortification on the population and the costs of so doing. This information will be needed to enable the Thai Government to decide how much of a role fortification can play in its own economy. These trials should be accompanied by discussions held at least annually between experts from the United States, Mission personnel in Bangkok, and Thai personnel to review the progress and discuss the implications in the Thai context. We found that an extremely useful byproduct of this visit was that

we were able to establish very good rapport with the Thai personnel and understand the problems which they face as they try to improve nutrition in their country.

2. Day Care Centers

These seem to be very effective institutions and should be expanded as rapidly as funds and availability of proper supervisory personnel allows such expansion. We were impressed with the caliber of both the Mission personnel and the Thai authorities who are involved in setting these up.

3. The Food Research Institute

Because this institute has done such good work and is far superior to any others that we have seen, the potential for it doing much better with adequate support, housing and equipment, is all the greater. Investment in the future of this institute ought to pay great dividends. We do not necessarily imply a major increase in the size of the institute; it may even be that its strength lies in the fact that it is a relatively small institution. We are interested more in it having adequate food processing facilities, adequate training facilities, and the kind of status within Thailand and within the international community which it deserves.

4. Private Sector

American private sector should be encouraged to join with counterparts in Thailand to develop new protein food industries. Archer-Daniels-Midland has already been given a grant and could possibly be interested to go ^{on} with an investment. So could other companies.

One major way of helping them might be to provide a floor of sales from institutional purchases to help them develop the market and give them a chance to build up production and attain needed production economies to make this a viable business.

On our part we agreed to contact several of these companies in the United States and encourage them to take a hard look at the opportunities in Thailand.

Other Matters

Several additional matters are worthy of note, and these will be discussed further with Harvard University.

1. Completeness of Supplement

Since measurement of increase in stature is to be the most important criterion of effectiveness of supplementation, it is imperative that optimal quantities of all factors which affect growth should be present. For this reason, it is suggested that consideration be given to the inclusion of riboflavin, calcium and vitamin B₁₂. In experimental animals the main effect of a mild deficiency of any of these substances is a retardation of growth. It would also be desirable to investigate the possibility of a deficiency of two trace elements -- chromium and zinc. Since there is a likelihood that the greater part of these metals may be removed from the rice grain by milling, their addition to the rice pill might be warranted.

Actually it would be an interesting and possibly important research project to determine the nutritional status of the population studied with respect to these two food essentials. Samples of hair could be easily collected and sent to the States for determination of zinc content. This appears to be a fairly reliable measure of zinc sufficiency. To show chromium deficiency, glucose tolerance tests should be carried out before and after a period of chromium treatment.

2. Effect of Day Care Centers

From the content of the lunches seen in one of the Day Care Centers visited, it would seem possible that the lunches may have been greatly improved with respect to high quality protein because these lunches now may come under the scrutiny of others. While this may be desirable from the point of review of benefitting the children as mentioned earlier, it could alter the outcome of the experiment. Since there will be villages without Day Care Centers which receive the complete supplement, this aspect of the project would appear to be sufficiently well controlled -- but it will have to be watched closely.

3. Comparison of One Village with Another

Because of the possibility of intervention of epidemics of infectious disease, crop failures, etc., this is a dangerous procedure. However, since the expanded plan calls for 5 villages in each treatment, the danger here is greatly reduced. This also will need to be monitored closely.

Comment

It is all well to look at the possibilities for improving nutrition in Thailand and be optimistic because of the competence of the people there and the many things that are under test or being started. But one must not forget that all this can be wiped out if there isn't first success in reducing the rate of growth of population perhaps to zero population growth and concomitant socio-economic development to reduce the level of poverty in the country. Unless progress in these two areas can be made, we see no long term benefits from either improved nutrition or medical care. Under such conditions where real progress in population control and in improving economic status are not attained, nutrition and public health efforts take on an ad hoc character.