

~~KD~~ / R²
 E-A = - - - -
 - (R²) /

2. Pl. reschäfte
with Contents Pg
Post + Ken
Acknowledgement etc.

IDRC Office, 11 Jor Bagh, New Delhi.

<u>TABLE OF CONTENTS</u>						<u>Page</u>
1. Acknowledgements	...	...	...	...	...	2-3
2. Summary, Conclusions, Recommendations.	...	...	...	...	...	4-23
3. Overview of nutrition needs, policies and interventions.	24	31				
in the respective countries.	...	...	...	...	...
4. Critical appraisal of IDMC nutrition-related projects..						
Household Grain Processing (India) 3-P-80-0210.	...					
Travel Note One	...	...	...	...	...	52-53
Food Processing Centres (Thailand) 3-P-81-0058	...					
Travel Note Two (a)	...	...	...	...	...	54-55
Travel Note Two (b)	...	...	...	...	...	56-47
Food Processing Equipment (Thailand) 3-P-80-0138	...					
Travel Note Two (c)	...	...	...	...	...	57-58
Legume Processing (Thailand) 3-P-82-0082	...					
Travel Note Two (d)	...	...	...	...	...	59-60
Legume Utilisation (Phillipines) 3-P-81-0065..	...					
Travel Note Three (a)	...	...	...	...	...	61-62
Travel Note Three (b)	...	...	...	...	...	63-64
5. Specific projects of interest...	...	...	...	...	...	65-66
6. Appendices :	...	...	...	...	...	...
One	...	...	...	...	...	67-68
Two	...	...	...	...	...	69-70
Three	...	...	...	...	...	71-75

2

1. ACKNOWLEDGEMENT

Our heartfelt and abundant thanks go to Dr. Richard H. Young of the New Delhi, IDRC Office, for providing us with an excellent and explicit ^Working Brief. We also thank him for fixing all the appointments for us well in advance in all the three countries visited. This helped us tremendously in meeting all the scientists and government officials we had to. We also would like to thank Ms. Susheela Nayar of the IDRC Office for so ably putting together a huge number of relevant xeroxed copies of various project summaries, reports, papers and travel reports for us to study before we undertook our field visits.

Our thanks also go ^{to} Shri Vijay Pande, Director, IDRC- New Delhi Office and to all the others in the New Delhi IDRC Office for their warmth, friendliness and smiling assistance. We would be failing in our duty if we did not acknowledge the tremendous amount of time given to us so very willingly by all the principal and/or associate investigators of the various IDRC-projects. We also acknowledge the time and reports made available to us by the various government officials we met.

Both of us are indebted to IDRC for reposing confidence in us to do a fair and just job of evaluating the five research projects assigned to us as per the brief and criteria set by IDRC. We are aware that there might be some limitations to our evaluation. These briefly are: time, non-familiarity with the culture of the country, the fact that the evaluation was being done after two or even three phases of the projects had been

completed, and the possibility that we may not have had the time to do full justice to the large amount of reading material given to us.

The experience however, has been a rich and rewarding one from our side.

Max Rutman

Tara Gopaldas

~~Max Rutman~~

4.

2. SUMMARY, CONCLUSIONS, RECOMMENDATIONS

Summary

1. Over the past decade the Post-Production Systems Group of IDRC has supported a number of nutrition related projects in Asia. These projects have generally involved the development of supplementary foods for infant or young child feeding and the production of legume/cereal processing at the village level. IDRC is concerned that these projects have not been as successful or as well oriented as was envisaged when they were initially developed.
2. Consequently, two consultants were hired by IDRC from May 7, 1985 - June 6, 1985 to jointly undertake a nutrition programme review of five research projects in India, Thailand and the Phillipines; as under :
 - (a) Household Grain Processing (India) 3-P-80-0210
 - (b) Food Processing Centres (Thailand) 3-P-81-0058
 - (c) Food Processing Equipment (Thailand) 3-P-80-0158
 - (d) Legume Processing (Thailand) 3-P-82-0082
 - (e) Legume utilization (Phillipines) 3-P-81-0063
3. The specific objectives of the consultancy were as follows :
 - (a) To evaluate the achievements and impact of IDRC supported nutrition/supplementary foods projects in the Asian region, within the context of the nutritional needs of the weaning age child (6-30 mts of age) and current national policies/programmes to overcome these deficiencies ; and

- (b) To recommend future policy for IDRC support for nutrition intervention programmes and identify existing opportunities for research support, particularly regarding weaning food processing and marketing.
4. The methodology in brief followed by the consultants to fulfill the objectives listed at pt.3 were as under:
- (a) Briefing at the IDRC South Asia Regional Office by Dr.A.H. Young, and review of background materials.
 - (b) On-site evaluation of the five research projects.
 - (c) Discussion with recognized authorities on nutrition programmes in Thailand and Phillipines.
5. Each of the five projects was evaluated under the following heads :
- (a) Completion of objectives as laid down in Phase I, Phase II and Phase III of the said research projects.
 - (b) Utilization of appropriate research methodology to accomplish the research objectives.
 - (c) Potential impact of the project.
 - (d) To what extent were the projects' results being implemented on a national or regional scale.
 - (e) Impact as measured in terms of the national government's awareness/approval of the research findings, acceptability of the product by the target population, biological impact, income generation, any other spin-offs.
6. Household Grain Processing (India) 3-P-80-0210 (Phase I & II)
- (a) The project was assigned to Dr.P. Pushpamma, Dean, Faculty of Home Science, Andhra Pradesh Agricultural University. The major effort in phase I was to conduct an extensive

Specimen should be
checked for the
first time.

survey of food processing and consumption among 2000 farm families in representative regions of Andhra Pradesh. Results indicated widespread use of sorghums, millets and pigeon peas. Village families traditionally de-hulled millets and sorghums by an energy-sapping hand-pounding method. Extraction rates ranged from 54-84 %. A wet treatment of whole grains prior to hand-pounding resulted in a product with unstable shelf life which was unsuitable as a cereal base for infant/weaning foods. Further hand-pounding resulted in substantial losses in vitamins of the B-complex, P, Ca and some Fe. Even prior to phase I, the College of Home Science had conducted several feeding trials among 'below fives' at the ICRISAT creche. Several types of sorghum based foods ie gruels, breads, biscuits etc were formulated to meet the child's protein and calorie requirements. These formulations were well accepted and human growth trials over a one year period demonstrated superior growth of creche fed-children vs non-fed control counterparts.

(b) In phase II, a RML Roll-over dehuller (10"x12") was used to compare de-hulling characteristics of sorghum, millet and pigeon peas vs the traditional hand-pounding method. The social, economic and technical viability of the mechanical dehuller was assessed and found to be quite satisfactory. The flour produced from the dry-dehulled sorghum and pigeon peas was incorporated into traditional dishes and bakery products. The products made from dehulled sorghum flour were organoleptically superior to those made from flour from whole sorghum grains. An attempt was made to set up a village level bakery unit but it faced marketing problems.

(c) The principal investigator was keen to obtain an extension of one year's time and financial resources to complete (i) Human growth trials on children 6-36 mts of age with ready-to-eat mixes made from

dehulled sorghum flour using the PRL dehuller, black-gram and pigeon pea vs the traditional milk and rice weaning diet of the region. (ii) To complete shelf-life studies on these weaning mixes.

(d) Excellent as the project is, yet the emphasis in phase II was on executing the operational and related objectives of the mechanical dehuller. The project objectives in phase I did not include collecting information on weaning and feeding practices of the target population (6-36 mts). Rice rather than sorghum emerges as the weaning cereal of choice in the region. The project has not addressed the very real problem of dietary bulk for the weaning child.

(e) This project was ranked by us as the best out of the five evaluated for fulfilment of objectives using a rigorous and appropriate research methodology. Both the phases have generated a number of research publications in national and international scientific journals. The government of Andhra Pradesh has shown interest in expanding the installation of the PRL dehuller. The dehulled sorghum-based recipes, especially, the bakery products have potential of being used as nutrition supplements in the Integrated Child Development Services Programme operating in the region. Dr. Pushpamma and her group are a highly regarded research group in Andhra Pradesh and India.

7. Food Processing Centres (Thailand) 3-P-81-0058 (Phase I & II).

a) Since, 1978, IDRC has supported phase 1 (3-P-78-0078). The project is headed by Dr. Arre Valyasevi and Dr. Dhanamitta Sakron internationally known pediatricians and their several associates at the Institute of Nutrition, Mahidol University.

however
it is not
target to the
microcommunity
of the family.

the objective
was

The overall objective of phase I was to develop a system for producing infant food in the laboratory as well as at the village level. Seven acceptable formulae for infant/weaning foods from glutinous rice, mung bean, sesame and groundnut has been developed using a simple roasting process. The RTE ingredients are ground in an electric or manual Ce-Co-Co-grinder in village level food processing centres (FPCs). The need for producing such a weaning or supplementary food was indicated by numerous dietary surveys and nutritional status studies conducted by this group prior to 1978, which established that approximately 50 % of Thai 'below fives' suffered mostly from 1° PEM; the rest suffered from 2° or 3° PEM. They also established that the food energy deficit was about a third and protein deficit about 10 % of recommended daily allowances (RDA). The RTEs were produced at the FPCs set up at four test villages in NE Thailand which is the nutritionally most deprived region of Thailand. The feeding trials of 'below fives' for 12-18 ^{mts} ~~mts~~ revealed that malnourished children, especially, in 2° and 3° PEM demonstrated significant improvements in their growth status. In this study 3° PEM was wiped out and 2° PEM was reduced from 16% to 6%.

- b) In phase II, the overall objective was to develop an economically and socially feasible system for processing and marketing infant weaning food from a centralized FPC to a whole sub-district (10 villages) and to measure the impact of such a venture on the improved nutritional status of the target child population. (6 - 60 ^{mts} ~~mts~~). It was in Phase II that the weaknesses in the entire project especially ~~(Phase II)~~, started to show up.

- this was just the problem!*
- c) The basic problem is that a cereal: legume: oilseed RTE weaning food has been developed which is against the dietary culture of the Thais. Phase I just plunged into the formulation of supplementary foods using rice, mung, groundnut or sesame without ever relating it to current availability of local food commodities; and weaning and young child feeding practices. This is surprising as baseline surveys on cropping patterns and family eating patterns were conducted in the field-test area in NE Thailand during phase I. Which indicated that mungbeans are not available all the year round; sesame not at all. Progress reports and our discussions clearly indicated that the weaning food preference was for glutinous rice and fermented fish. (*Only on those places we visited*)
- d) With respect to completion of objectives, we feel there was a basic and major defect in phase I itself, that did not include a specific objective on elucidating the weaning food practices in Thailand and the test area (NE Thailand) prior to RTE development.
- e) In summary, the factors operating against the Mahidol RTE were: poverty and inability to purchase on a regular basis, very poor demand for the RTE, inadequate rice to feed the family and perpetual 'rice-indebtedness', poor level of education, high degree of resistance to change, lack of understanding on part of target-child-families on the amount to be fed to the target child everyday, poor responsibility on part of the field workers of FPCs, absolute lack of attention to children (0-6 yrs) during harvesting seasons, unimaginative product without the right taste

or flavour, extremely poor targetting of the product with 90 % of the children who consumed the RTE not being either in the 2^o or 3^o of malnutrition!

f) Results of Phase I indicated that the RTE (100 g packet) was bought for the target child on an average of once a month instead of once a day. It had medicinal connotations. It was used to garnish the family meal. The taste was bland. It took 15 minutes ~~to cook~~.

g) With respect to Research Methodology, the research group was very competent in areas such as biochemistry, clinical, pediatrics and toxicology. They, however, showed some unfamiliarity when it came to food science, food technology, field operational research and process evaluation (Phase II in particular called for economic feasibility ~~and~~ marketing research methodology which the group was totally unfamiliar with). Phase II was particularly weak with respect to data collection and recording of data, selection of parameters and methods, tabulation statistical analyses, and last but not least in the interpretation ~~of~~ data.

h) It is national policy to wipe out the severe grades of PEM (2^o and 3^o) by 1987 and the milder 1^o PEM in a short duration of time. The approach of developing and producing a weaning RTE for wide-scale distribution was therefore, sound. Unfortunately neither the 'product' nor 'marketing strategies' used were appropriate. Current government policy dictates that the village community must participate in the FPCs regardless of their being economically viable or not.

i) This has resulted in an expenditure to-date of 30,000 villages x 3000 B seed money or 90 million B being spent on setting up village FPCs. The government has no feed back on the functioning of the FPCs.

Very
Good
abstract
with the
village

Nor do they seem to be interested in finding out.

too much!!

- j) An excellent economic feasibility study on 'Village Food Production and Processing Outreach Program' by Dr. Dow's group has suggested that the food supplement should be given away free to children in 2^o and 3^o PEM; while those in 1^o or N could pay 2 B per 100 g packet. Our calculation of such a give away to approximately 0.4 million weaning age infants/toddlers (6-24 mts of age) alone at 2 B per day per child for 300 days per year would come to 240 million B per annum or nearly three times what the Thai government has spent to date on setting up FPCs in 30,000 villages (see pt i).
- k) The same report (pt j) also indicates that larger scale facilities at the provincial level (for 73 provinces) may result in much better inventory control, quality control and economies of scale of production. This is particularly so, as Dow's analysis clearly shows that farmers can neither purchase more rice to contribute to the FPCs or even barter rice for the RTE. Production and offtake in phase II, was only 27 % of the target population's requirement. At a variable cost of 3.52 B (all costs), the whole marketability at the village level was a losing proposition.
- l) The same report (pt j) indicates that there is urgent need to develop instantly reconstituted weaning foods for the harvesting seasons (Oct-Jan) and June/ July when maternal attention is at the lowest ebb.
- m) Impact in terms of approval and adoption by the government has been a grand success story. Replication of the Nong-Hai model, however, does not appear to have been successful. The product in its present form is unacceptable to the target population. One can no way relate

Mahidol Univ. should act as project leader for the weaning for the September.

the claimed reduction in severe grades of malnutrition by government officials to the FPCs setup in 30,000 villages to date.

n) Phase III could consider a research project that looks at the whole 'weaning food system'. Such a study should address the acute problem of dietary bulk in the weaning age population.

8. Food Processing Equipment (Thailand) 3-P-80-0138 (Phase I) and meeting with staff of the Institute of Food Research and Product Development (IFRPD), Kasetsart University

- a) The project was assigned to the Department of Food Technology, Chulalongkorn^{Korn} University under Dr. Chaitye Thunpithayakul and Dr. Patcharee Chittaporn's direction. The major objective of this research project was to remedy the grinding and toasting problems encountered in the electrically or hand-operated Ce-co-co grinder by fabricating suitable food processing equipment (toaster and grinder) to be installed at the FPCs. The intention was that closer inter-action should be maintained between the Mahidol group, the Chulalongkorn group and the Khon-Kaen group (see Legume Processing, Thailand, 3-P-82-0062).
- b) The objectives regarding the fabrication of the toaster and grinder were fulfilled professionally and competently. It was unfortunate that the units became too large, due to poor demand and offtake for the supplementary food at the FPC level.
- c) The progress reports and travel reports indicate that a rigorous testing-out methodology was employed.
- d) Implementation and monitoring, however, was weak. The group was not

keen on moving out to the test villages where the operational feasibility of the newly fabricated machinery was to be tested out. In fact due to the poor demand for the SF, and the fact that the fabricated units were found to be too large for an FPC operation, it was never installed at the village FPC level. Since implementation never took place, neither did monitoring.

- e) The equipment could still be used at the sub-district or provincial level, or for producing SF for the refugee camps, or for slum children conglomerations.
- f) Dr. Patcharee has been able to successfully extrude the rice : mung : sesame mixture. The product reconstitutes immediately on addition of boiling water. However, the extrusion process is much more expensive, takes much longer and can only be done in a much larger scale than a village-level FPC.

9. Institute of Food Research and Product Development (IFRPD),
Kasetsart University

- a) IFRPD has well equipped labs, pilot plant, animal house and food science laboratories.
- b) The Institute has done pioneering work on the development of Kaset protein, baby food formulations, snack foods and a mung protein concentrate.
- c) A textured fermented fish protein has already been developed by the Institute, which could form the basis of an acceptable 'weaning food'.
- d) The Institute is more market and market-research oriented and is keen to work for IDRC.

NO

10. Legume Processing (Thailand), 3-P-82-0082 (Phases I, II & III)

- a) The three phases of the project were assigned to Dr. Tipvanna Ngarmsak, Dean, The Faculty of Technology, Khon Kaen University, Thailand. This was the first Food Science research project funded by IDRC in Khon Kaen University. It was a part of the Food Legume Processing Network Project in Asia. The overall goal was to promote the cultivation and consumption of cowpeas in the dry pulse form in Central Thailand (Khon Kaen) where cowpeas are traditionally consumed only during season as a fresh vegetable. In phase I the major activities were to determine the food eating habits in the villages of that region. Linear Programming was used to arrive at a least cost 7 - Day-Menu. Nutrition Education and the popularization of main and snack dishes containing cow-peas was possibly the most intensive activity dominating all three phases. The overall objective of Phase II was to determine the feasibility of cowpea dehulling and milling and its impact on cowpea production/consumption/using the PRL dehuller. The major thrust in Phase III was extension education in the use of cowpea recipes to farmers and small food vendors. Since the cowpea crop has been riddled by insect disease for the last 2 years, cowpea production has virtually come to a stop.
- b) The project adopted the 'family approach' to improve existing dietaries and nutritional status. Hence, there was absolutely no focus on developing a 'weaning food' for the 6-30 mt old infant/toddler.
- c) It is very difficult to evaluate fulfilment of objectives, as the reason for undertaking this net-work study on Legume Processing is highly questionable in a culture where regular legume eating

at the house hold level is minimal. As stated at pt (b) there were absolutely no weaning food objectives. The objectives in Phase II & III became redundant and at best of academic interest, as the farmer showed no interest in cow-pea cultivation right through the three phases of the project. What emerges is an amazing tenacity to formulate objectives for a product that had no market.

- d) In Research Methodology, there is a glaring and notable lack of quantitative measures to fulfill objectives in every phase of the project. On the other hand, Dr. Tivvanna's bent for Extension Education emerges. The project has ended up with a heavy emphasis on Extension with a minimal component of Food Science which it was originally meant to be.
- e) The potential impact of the project are the lessons learnt in Extension. Since Thailand (pt see Section 3 on 'overview of nutritional needs (Thailand pt. 6), which indicated that Thailand can greatly benefit by situation-practical nutrition-health-education. Perhaps the Khon Kaen, experience could be utilized towards this end.
- f) Implementation and monitoring at the regional level at the present time is nil as cow-pea is affected by insect disease and has been rejected by the farmer of the region.
- g) Impact of the 3 phases of the project likewise is nil.

11 Legume Utilization (Phillipines) .. 3-P-81-0063 (Phase I, II, III)

- a) This project was assigned to Dr. Josefa.S.Eusebio, Dean, Human Nutrition and Food, Institute of Human Ecology, University of the

Philippines at Los Banos. This institution was also a collaborative centre in the Legume Processing and Utilization net-work in Asia. The objectives in each of the three phases were very similar to the Khon-Kaen Legume Processing project. As in Thailand legumes are neither cultivated on a wide scale nor are they consumed on a regular basis. The project attempted to popularize the utilization of dry un-dehulled and dehulled mung bean, cowpea, rice bean and pigeon pea at the household level. The PRL dehuller was tested for its efficiency of dehulling these pulses at the village level and acceptability of dehulled pulses was evaluated. The major effort as in Khon-Kaen was on four nutrition-education/extension approaches to promote production and consumption of these pulses. In one of the approaches that included supplementary feeding and nutrition-education, Nutri-pak consisting of rice, mung, bean, milk and oil to yield 472 Kcal and 12.3 g protein per ration per child was produced at the barangay or village level. This was the single 'weaning food' activity in the project. Growth trials on 'under-fives' for six months resulted in the enhanced growth of the Nutri-pak fed ^{versus} non-fed counterparts. It was claimed that this beneficial growth benefit persisted for ^a 9 mts further study period in the fed group, even after Nutri-pak was withdrawn, due to the mothers feeding more legume-based diets to their 'below fives'.

- b) As in the Khon-Kaen project, there was persistence in adhering to objectives in the three phases which were no longer valid. Even though a great deal of effort has been expended in the three phases, the efforts were not (i) relevant to the reality of the situation (ii) the stated objectives in Phase II & III were not fulfilled

in 51
clear
or not
diff.

using an acceptable or rigorous research methodology.

- c) There was a notable lack of the use of quantitative methods to fulfill objectives. Statements made in reports are not supported by supportive data.
- d) Since legume production and consumption remain low and erratic, the project cannot be stated to have any potential impact. The only pulse used fairly widely and regularly appears to be mung bean. The extension methods used appear to have increased the production and utilization of mung bean in the test villages. The extension methods could be applied elsewhere.

IX CONCLUSIONS AND RECOMMENDATIONS

1. General Conclusions and Recommendations for IDRC planning and policy :

- a) The three countries in which 5 IDRC-funded projects were evaluated namely India, Thailand and Philippines vary widely in size, regions, economy, form of government, the magnitude and intensity of their major nutritional problems and last but not least the technical expertise available to conduct relevant IDRC-funded studies. It may be useful for IDRC to keep this in mind when planning net-work studies in different countries of the S.E. region.
- b) It may be better and more cost-effective for IDRC to tap experts from S.E. region as coordinating or technical consultants to research projects, especially net-work projects, rather than bring in experts from a highly developed economy who may sometimes experiment with highly sophisticated methods not necessarily the

why
not follow
countries

don't agree

*Not necessary:
some time*

most appropriate to fulfil objectives.

- c) It was observed that Principal Investigators (PIs) who were required to test out the FRL de-huller as a part of the Food Processing or Legume Processing Projects felt that the project did not give them sufficient freedom to address the real nutritional problems of their particular areas^a. They had the option of 'take it or leave it'. They took it and later faced the problem of the product in question, namely legume promotion, not being right.
- d) It is rather surprising that Phase II of research projects in 4 out of 5 were sanctioned by IDRC, when there was some dissatisfaction expressed by IDRC technical staff themselves about Phase I.
- e) Some projects have run as long as eight years. In Thailand and Phillipines, it is rather difficult for PIs to sustain interest in the project if the projects last that long. It would be better for more tightly structured projects running from 3-5 years to be considered. It may also be necessary to set 6-monthly task schedules and hold inter-country meetings among PIs to take stock of work completed and to take mid-term corrections, if deemed necessary.
- f) IDRC may consider the system of a quick peer group review before sanctioning a project and again at sequential stages of completion of projects.
- g) The observations made by Richard Young in his various Travel Reports are endorsed by the two consultants. These are in brief as follows :-
- Scattered or minimal background information on

agro-economic food production, food distribution systems, food acquisition, intra-familial distribution etc. No attempt by 4 out of 5 study groups to review relevant literature before embarking on product formulation and product development, very much a case of 'cart before the horse'.

- A notable lack in ^{all projects} the majority of treating the whole study as a system. Each study group has concentrated only in its area of expertise and by and large has not included professionals from other disciplines like marketing ^{or} market-research.
- The projects by and large have not coordinated with allied and interdependent areas such as agriculture, health, education, or rural development.
- The studies are community or location specific and are not large enough for generalization to even a region within a country.
- The simple fact that it is much more cost-effective and manageable to combat a single nutrient deficiency such as iron deficiency, Vitamin A deficiency or goitre, rather than ~~whole~~ food deficits in the community as a whole and in vulnerable groups in particular, has not been considered by donor or recipient agency adequately.

h) Since the primary mandate was to evaluate the success of the projects in terms of 'weaning food', all 5 projects without

exception had not identified the most crucial weaning age as 6-30 mts of age, and had generally tailored their Supplementary Food for an older age group.

- i) IDRC will have to accept that funding research projects to University departments will have the limitation that their outreach will be limited. Once the research study is completed and results are found to be satisfactory, Phase II should be an expanded phase with an implementing agency, with the University being retained as consultant to the implementing agency. ~~Inbuilt~~ monitoring and evaluation yardsticks will need to be considered for Phase II at the project proposal stage of Phase II.
- j) Those countries that are unfamiliar with research methodology, especially, as related to applied food science and nutrition research projects, would greatly benefit from a training workshop on 'Research Methodology and Research Management in Problem Solving or Intervention Research in Food Sciences and Human Nutrition'. Such a training workshop would include guidelines on writing a comprehensive research proposal. This means problem identification through search of literature, setting overall goal, specific objectives, outlining the experimental design, sampling frame, variables to be studied, parameters to evaluate variables, criteria, methods, data handling and processing methods and appropriate statistical applications. The case study approach with relevant field trips should also form a part of the package.
- k) None of the projects have made an attempt at process evaluation.

Nor have they differentiated between operational and impact parameters.

2. Conclusions and Recommendations on Specific Project/Projects for Future Research :

a) Out of the five IDRC-funded projects evaluated, none had addressed the very real problem of dietary bulk for the target population, which should be considered to be a crucial issue in weaning foods.

this is not the only crucial problem.

lack of options

b) Three out of the five projects had a very strong component of Nutrition Education (N/E) and Extension Education (EE). Although the approaches utilized for dissemination of information are interesting, yet, some deficiencies were noted regarding the transfer of messages at the field level. In the case of Food Processing Centres (Thailand), due to poor off-take of the SF, very intermittent feeding of the SF, and its medicinal connotations, there is a very real danger of the basic concept of quantity and regularity of feeding the weaning child being completely distorted. Further, the visual and written materials produced by the projects (Thailand & Philippines) were quite unrealistic; they need to be much more situation practical.

c) The favoured weaning food is 'Sticky or Plain rice' and 'Fermented Fish' in Thailand and 'Rice & Fish' in the Philippines. Even India with its extensive coast-line and fish eating populations would readily accept a 'Rice & Fish' weaning food. ~~This~~ is an excellent energy-protein combination.

not so.

Research should be directed towards a village-level or intermediate level technology to preserve and use fish in a weaning food.

- d) The problems of the slum infant are special and need to be urgently addressed in all three countries. Low cost dairy milk or milk substitutes, to combat the inroads of expensive commercial Baby Food formulae, need to be developed. In India, 'rice and milk' are traditional weaning and super foods; the problem is availability and cost. In Thailand and Philippines the consumption of cow's or buffalo's milk is uncommon and needs to be heavily promoted for the infant and young toddler group.
- e) There are special requirements in a weaning supplementary food during the peak harvesting seasons in all three countries when maternal attention is at a very low ebb. Bakery products especially biscuits find favour with most rural populations. They are capable of being easily powdered and made into a porridge or gruel form for the infant. More systematic research needs to be done in this area.
- f) Not much attention has been paid to research in taste and/or flavour of weaning foods. Unless the mother-child dyad accepts it, it may not be fed regularly by the mother to the child*. We reiterate our hypothesis that 'fish & rice' taste and flavour combinations would be the most suitable for Thailand, Philippines and coastal India.
- g) There is also a need to tap talent with regard to fabrication and testing of food processing equipment/machinery for use at

small scale, medium-scale and large scale facilities. Such talent is available at some of the institutions/departments of Food Science/Technology in all three countries (CFTRI-India; Kasetsart University-Thailand; Chulalongkorn University-Thailand; Khon Kaen University-Thailand; International Rice Research Institute- Los Banos; University of the Philippines-Los Banos)▼

- h) Supplementary feeding is an expensive proposition and governments of all three countries should be made aware through Economic Feasibility, Cost-Efficiency, Cost-Benefit and Food Policy Research of the hard realities of the costs involved. There is little value in doing a superficial and haphazard job and expect child malnutrition to disappear. Proper targetting of the supplementary food will go a long way in controlling costs and bringing about desired improvement in nutritional status.
- i) Last but not least, a 'marketing approach' is required in the development of suitable weaning foods. Unless research is directed towards 'a weaning foods system', there may be the very real danger of a tremendous amount of research endeavour going into the development and marketing of a 'wrong product'.

* Project Poshak by Tara Gopaldas et al. Volumes 1 & 2. Printed by CARE - India, (1975).

3. OVERVIEW OF NUTRITIONAL NEEDS, POLICIES AND INTERVENTIONS IN THE RESPECTIVE COUNTRIES

I India

1. In 1985, the population of the sub-continent of India stands at approximately 700 million. Using a rough thumb rule the pregnant and lactating woman population would be 70 million (10% of the total population); that of the '0-6 year old group' would be 140 million (20% of the total population); and that of the '0-3 year old group' would be 70 million (10% of the total population). In India, it seems to be a losing battle against sheer numbers whether it be the delivery of basic amenities like food, shelter, clothing, and safe drinking water or extra services such as supplementary nutrition, health or educational services.
2. The glaring nutritional disorders in India are under nutrition, iron-deficiency anemia, vitamin A deficiency, iodine deficiency and deficiency of the vitamins of the B-complex. The most affected are the rural and slum poor. *
3. The most vulnerable population considered for nutritional services are children below six years of age and pregnant or lactating women. As pointed out at pt. 1, this would mean mobilizing services in widely scattered and inaccessible areas, for 210 million people.
4. India has eight nation-wide nutritional or nutrient delivery programmes on the ground. These are the Integrated Child Development Services Programme (ICDS) which currently is covering approximately 20 million children (0-6 years) and 10 million pregnant and lactating women. The second is the Mid-Day-Meal (MDM) or School Lunch Programme which covers approximately 15% of the school age population (140 million). The third, is the Nutritional anemia prophylaxis Programme which is meant to deliver prophylactic iron folic acid tablets free, to all pregnant women (2nd trimester^{onwards}), and all lactating women (upto 6 months of lactation), women who have accepted a terminal method of family limitation, ^{and} anemic children below 12 years of age. This programme is also only able to cover about 15-20% of the target population. The fourth, is the National Vitamin A Prophylaxis Programme where a mega dose of vitamin A i.e. 2,00,000 I.U. vitamin A in ^{his} arachis oil or soft jelly capsule is administered two times in the year to all children 1-6 years of age. In actual~~ly~~/fact the programme is only able

to cover about a fifth of the target population. The fifth programme, is the National Goitre Eradication Programme wherein iodised or iodated salt is sold in the Himalayan and Sub-Himalayan goitrogenic belts of the country. Unfortunately, it is reported that the poorest of the poor cannot afford the iodised salt and/or prefer rock salt. The sixth, is the Special Nutrition Programme (SNP) which again like the ICDS, delivers a nutrition supplement free of cost to the pregnant, lactating women, and children below six. However, this programme is being very quickly absorbed into the more comprehensive ICDS which offers health services and non-formal education in addition to supplementary nutrition. The seventh, is the Food-For-Work (FFW) Programme, that offers partly a food wage and partly a cash wage to the poorest of the poor and landless labour against work executed in irrigation works, road laying, afforestation schemes etc. This is a relatively small programme and is localized to drought prone districts and hardship seasons. The eighth is a small pre-school or 'balwadi' Supplementary Feeding Programme that covers about two million children all over the country.

5. The towering nutrition programme is very definitely the ICDS. It is expected to cover 20 million women and 40 million children by the end of India's Seventh Five Year Plan (1985-1990).
6. The government is trying its best to step up production of iron folic acid tablets ^{and} mega vitamin A doses for delivery to the target groups through the primary health care system. There are bottle-necks of production and storage.
7. In addition, a great deal of research and field trials have been completed for the fortification of common salt with iron. Unfortunately, this additional and sensible approach to combat nutritional anemia has also been beset with manufacturing difficulties.
8. There is a real logistical problem with iodised salt in that the iodizing salt factories are on the coast-line while the goitre/belt is inland and up north ! Generally the salt reaches its destination with much or all of its iodine potency lost.
9. Supplementary nutrition in the ICDS (see point 5) is either in the form of extruded food manufactured in large scale facilities right

down to village-centre operations of a cooked cereal-pulse dish. The government provides 35 p per child per ration to yield roughly 300-400 Kcal and 10-15 g protein/child per day. Feeding is provided for 300 days/year/beneficiary. In other words, the government has to provide a colossal Rs 100x20 million children or ^{Rs} 2000 million to deliver the nutrition supplement in this programme alone. It also delivers a food supplement at 60 p per beneficiary pregnant or lactating woman to yield about 500 Kcal and 20-25 g protein/ration. This would mean another Rs 180 x 10 million women = Rs 1800 million per annum to cover the costs of maternal food supplementation in the ICDS. Although it may be much more manageable and cost-effective to first wipe out the nutrient deficiencies (iron, vitamin A, iodine), yet, the Government of India like those in Thailand and the Phillipines (see later) is committed to the ICDS and its expansion to all 5000 odd Community Development Blocks (each block would cater to about 20,000 target children and 10,000 pregnant (lactating women)).

10. Hence, the IDRC would be assisting in this all-out national effort by researching all aspects of the 'weaning food-system'.
11. IDRC could also assist greatly with operational-research studies using the marketing and market research approaches to improve the manufacture and delivery of iron tablets, vitamin A syrup/capsules and iodised salt. Studies should be taken up with a district as the unit of investigation.
12. The interaction of nutrition and infection (including infestation) is well established. Consequently, in the Indian context, the integrated approach as in the ICDS is called for. Hence, feasible and cost-effective nutrition intervention studies aimed at improving the existing programme especially ^{the} manufacture and the delivery of the nutrition supplement, would be relevant.

II Thailand

1. *The population of Thailand is presently about 50 million.*
2. The major nutritional problems of Thailand are PEM, iron-deficiency anemia, vitamin A deficiency, deficiency of both vitamin B₁ (Beriberi) and vitamin B₂ (riboflavin), goitre and bladder stone disease.
3. In 1982, it was estimated that among children under five, 48% children were normal; PEM 1° was 36%; PEM 2° was 14% ; and PEM 3° was 2%.

Iodine deficiency affected all age groups in northern Thailand; 22% of all primary school children were affected. Iron deficiency is also widespread and 43% female and 29% male are reported to be affected, though the norm for arriving at this prevalence figure is not given. Dietary intake surveys and biochemical tests have shown that only 13% of the children studied had normal serum vitamin A levels. Vitamin B₂ deficiency is also reported to be highly prevalent (51-80%) in school children of the north-east as indicated by urine analysis.

4. PEM in the pregnant and lactating women especially the rural ones is also a problem with 30-50% estimated to be undernourished. Diets are very restricted due to false food beliefs and taboos. Mothers in their immediate post-natal period are put on only a rice and salt diet for 1-3 weeks. This appears to be one of the causes of infantile beri-beri in this population. Another major problem is the seasonality of malnutrition among mothers and infants during the peak agricultural activity seasons. Infants born immediately post harvest were generally found to be ^{of} lower birth weight.
5. Rice is the staple cereal in the Thai diet. Ordinary rice is consumed in the central and southern regions and glutinous rice in the northern and northeastern regions. Relatively small amounts of soups or sauces containing fish, meat or vegetables are eaten along with large amounts of rice. The rural and slum poor show a great liking for fermented fish and strong spices/chilli to make their rice meals more palatable. Regular consumption of legumes is contrary to the Thai dietary culture and attempts to date to popularize legumes and their regular inclusion in the dietary has not met with success (see later). The one legume which is relatively more used and liked is mung bean. Among oilseeds, groundnut is relatively more consumed and liked than sesame.
6. Fortunately, as in India, most rural Thai mothers breastfeed their young ones upto 2 years of age or even beyond that. There is a special problem in the slum areas of big cities, especially, Bangkok, where occurrence and severity of PEM was far more aggravated due to bottle feeding early in the infant's life under unhygienic and improper conditions. There is, therefore, an urgent need to

develop the dairying industry or develop special milk-based-foods to address this grave problem of the deprived urban slum infant.

7. Studies on the protein and energy intakes of preschool children in NE Thailand showed that energy and protein deficits in the 24-35 month old and the 36-47 month old child was about 36% for food energy but only about 10% for protein. Hence, the primary need is for the development of a calorie dense but low-bulk food that is culturally acceptable to bridge the above quoted dietary deficits in the weaning age child (6 months-30 months).
8. Government Nutrition Plan, Policy, and Implementation is clearly to consider PEM in the 'under fives' as their most immediate and stressful nutritional disorder to be totally addressed and eradicated in the next decade. They have unreservedly accepted the 'Mahidol Food Supplement' consisting of rice : mung : sesame and have expanded village-level Food Processing Centres (FPCs) to 37,000 villages out of 56,000 villages in all Thailand (see Travel report 2(a) and 2(b)).
9. They have not addressed their nutritional anemia, goitre, or riboflavin deficiency problems on a national scale as yet.
10. They have not addressed the problem of poor nutritional status in their pregnant or lactating women populations or the special problems of adverse nutritional status of the weaning child during the harvesting seasons.

III Phillipines

1. The population of Phillipines in 1980 was approximately 50 million. It was not possible to obtain the breakup of the 'under fives' population relative to the total population. In very approximate terms one could expect to have about 1.5 million infants (3% of total population); and about 4 million toddlers (1-3 years of age) at 8% of the total population; and another 4 million in the 3-6 year age group (8% of the total population). The most needy or vulnerable age group as far as weaning or supplementary feeding is concerned, would constitute roughly 0.75 million in the older infant (7-12 months) and another 2 million in the 1-2 year age group or approximately 2.75 million weaning age children in

the Phillipines.

2. The First National Nutrition Survey of the Phillipines, 1978, National Science Development Board, Food and Nutrition Research Institute, indicated that the nutritional profile of the 'under fives' using the Gomez classification and the Harvard standard were : Normal, 21.4%; 1^oPEM, 45.7%; 2^oPEM, 26.4%; and 3^oPEM, 6.5%. An analysis by Best and Worst regions indicated that 2^o+3^oPEM in the former region was 25.5%, while it was 40.1% in the latter. Unfortunately, we were not able to obtain figures for the nutritional status of the weaning age infant/toddler that we were most interested in.
3. In 1974 a National Nutrition Council was created to coordinate nutrition activities and had active government support. There are eight stated 'Policy directions': (i) Identification of priority or 'at risk' groups; (ii) Prevention, cure and rehabilitation of malnutrition; (iii) Economic sufficiency of the family; (iv) Nutrition education; (v) Food supply; (vi) Population control; (vii) Research and; (viii) Coordination of effort. The Council set up an organizational structure which 'reaches down to the village (Barangay) level with a coverage of more than 70% villages. Currently, there are about 24 government and private agencies participating in the Filipino Nutrition Programme. The main elements of this multi-pronged programme are: Food assistance through the give-away and/or purchase of Nutri-paks (see Travel Report Three); Health Protection and Food Production. The total budget for this programme with bilateral and international assistance is around US \$ 70 million per year.
4. The other three major nutritional disorders (as found in India and Thailand) were nutritional anemia (51% in the whole country and 85% in pregnant women; goitre (4% in the whole country and 60% among children in the endemic regions) and xerophthalmia with a prevalence figure of 24% in the 'under fives'.
5. Other details regarding Nutrition Research Plan and Policy are given in our Travel Report Three (points 1 and 2) and hence not repeated.
6. Geissler and Miller¹ in their excellent comparison of the nutritional problems in Thailand and the Phillipines have shown that

¹ Catherine Geissler and Derek Miller. Nutrition and GNP - A comparison of problems in Thailand and the Phillipines; in Food Policy; pg 191-206, 1982. Publishers Butterworth and Co Ltd.

the two countries with the same GNP, practically the same ~~GNP~~ size, almost identical crude birth rates, crude death rates, infant mortality rates, child mortality (1-4 years) rates and more than 100 percent adequacy in food energy per capita- have fundamental differences in the causality of malnutrition, especially so in the 'under fives'. Their analysis reveal that income was more important than education in the Phillipines as a factor correlating with nutritional status. The cost of food was higher in Phillipines as compared to Thailand. In Thailand the reverse was found to be true : with lower food prices, the scope of education to reduce malnutrition was greater. It was, therefore, paradoxical that the Phillipinos spend vast sums on nutrition education whereas food price policy might be more effective. In Thailand where food prices are low nutrition education programmes are inappropriate (please see our Travel Report 2(a) to 2(d)).

IV. Areas of Commonality and Contrast between India, Thailand and the Phillipines regarding Nutrition Needs, Policies and Interventions

1. Nutrition Needs : There is a commonality in that the glaring nutrition disorders in all the three countries are PEM in the young child population, Catherine Geissler and Derele Miller, Nutrition and GNP- A comparison of problems in Thailand and the Phillipines; in Food Policy, page 191-206, 1982. Publishers Butterworth and Co Ltd, nutritional anemia in the whole population, vitamin A deficiency in pre-school and schoolage populations, and endemic goitre. The point of contrast is that India being a sub-continent with about 14 times the population of either Thailand or Phillipines has enormous difficulties in the implementation of her eight on-going national nutrition programmes to combat the major nutritional disorders listed above.
2. All the three countries have accorded high priority to nutrition programmes and the eradication of undernutrition and some or all the nutrient deficiencies encountered in their respective populations. India and Phillipines have excellent and well articulated Nutrition Plans, Policies and related Nutrition Research on paper. However, due to the sheer numbers Below the poverty line in India and due

to the high cost of food and present political unrest in the Philippines, achievement of nutritional goals are as yet distant in these two countries. Although Thailand does not have such a well articulated Nutrition Plan, Policy or related Operational Research, yet, she is in a much happier position as far as the overall nutrition position is concerned due to relatively low prices of the basic food commodities, which are within the reach of the majority.

3. All three countries have identified the eradication of PEM in the young child population as their pre-eminent nutritional goal.
4. All three countries face an uphill task in addressing and overcoming detrimental practices regarding young child feeding and rearing. The most affected age group is the weaning age child (6 months to 30 months of age). The PEM profile in the 'under fives' is the worst in India, followed by Philippines and then Thailand.
5. All the three countries believe in including supplementary feeding of the vulnerable groups, especially, the 'below fives' as part and parcel of primary health care. Integration of basic health, nutrition-health education and supplementary nutrition as a minimal package of services to the 'under fives' has been accepted by all three countries and such programmes are in full swing. Hence, it would be most useful for IDRC to fund operational research on the 'weaning food system' within the context of the integrated child health and nutrition programme of the said countries
6. While considering the nutritional needs, policies and interventions of the three countries, namely, India, Thailand and Philippines it may be worthwhile to consider the report² of the International Food Policy Research Institute (IFPRI) wherein four policy and programme areas in which nutrition-related policy research should take high priority^{are listed}. These are :
 - agricultural and rural development programme and policies
 - food price policies;
 - food and income transfer programmes and policies; and
 - integrated health and nutrition intervention programmes and policies.

Note², Kennedy E.T. and Pinstrip-Anderson, P. Nutrition-related Policies and Programmes : Past Performances and Research Needs. IFPRI, Washington D.C. (1983).

4. CRITICAL APPRAISAL OF IDRC NUTRITION-RELATED PROJECTS

Travel Report No. : One
 Consultant Travelling: Tara Gopaldas
 Date : May 10-12, 1985
 Place : College of Home Science, Andhra Pradesh
 - Agricultural University, Hyderabad.
 Purpose : To evaluate the Two Phases of the Household Grain Processing (India) Project 3-P-80-0210.
 People met : Dr.Pushpamma, Dean, Home Science APAU
 : Dr.Chittamma Rao, Principal, College of Home Science, Hyderabad.
 : Two research associates

I. Summary :

1. The mandate given in the Working Paper to the two IDRC consultants was :
 To evaluate the impact and achievements of IDRC-supported nutrition/supplementary foods projects in the Asian region, within the context of the nutritional needs of the weaning age child (6-30 mts of age) and current national policies for overcoming deficiencies.
2. The project was ranked as the best among the five evaluated. Dr.Pushpamma was keen to obtain an extension of time and financial resources to complete certain unfinished aspects of Phase II, which were, namely :
 - i) To continue her human trials on children 0-3 years in order to evaluate the growth promoting effect of ready-to-eat-mixes made from de-hulled sorghum flour; black gram; pigeon pea vs the traditional milk and rice weaning diet.
 - ii) To complete shelf-life studies on these weaning mixes. She estimated that approximately a year would be sufficient to complete this pending work.
 The project has been evaluated under the heads suggested by Dr.Richard Young.

I. Completion of objectives :

1. The project has progressed well through its two phases and nearly all objectives in Phase II except for the two pieces of pending research referred to in the Summary, are completed. Dr. Pushpamma stated that she has been interested in sorghum research since her doctoral student days. The interest still persists.
2. The origin of Phase I (1975) was to examine the feasibility of utilizing sorghum - the poor man's staple - as a cereal base for young child feeding. A full day menu for the ICRISAT-Creche children (1-3 years) was devised for 6 days in the week. Working rural mothers left their children for the whole day and collected them late at evening. These 'Creche' children formed the experimental group. Baseline nutritional status surveys were conducted to determine the dietary intake and growth of the experimental group. Age matched children from the same milieu formed the control group. Growth trials over a 6-month period clearly established that the experimental group relished the sorghum-based diets and grew well on them. Their growth was superior to the control group fed the traditional rice + milk diet.
3. However, it was noticed, that the traditional method of dehulling sorghum grain was an extremely laborious, energy consuming and inefficient process. The wet-processing of grain before dehulling in the mortar and pestle often resulted in a grey and unstable product - which was not desirable for a weaning mixture. It is for this reason that Phase II was proposed.
4. In Phase II, a PRL roll-over dehuller was obtained from Canada. The same model was seen by me at Khon Kaen University and at a village in Philippines. The benefits of using such a village-level-appropriate mechanical dehuller vs the traditional hand pounding was evaluated in detail in terms of energy expended per unit of sorghum dehulled, the extraction rates, the nutrient content of grain, stability, shelf-life, acceptance of the new method by the rural community, acceptability trials on various traditional recipes made from sorghum grain and milled powder.

II. Research Methodology :

1. Discussions with Dr. Pushpamma and Dr. Chittamma and a scrutiny of reports and publications satisfied us that this group had used well accepted and appropriate procedures to fulfil objectives, had a firm grasp of research methodology called for and had the capacity to conduct the type of operational and laboratory level food science research with the equipment/instrumentation with them (Phase II).
2. In research methodology it must be mentioned that this was the only group that had formed a research committee with ICRISAT to develop experimental designs and methodologies.

Dr. Chittamma took me to a slum which was being developed with UNICEF assistance. The PRL dehuller and the Winnower (Fabricated by the Agricultural Engineering Department of APAU) were placed in a local mill. Two tribal women had approximately 3 kg of sorghum dehulled and then milled. The Winnower was not used. It was observed that (i) There needs to be a protective screen over the motor, (ii) Tipping of the dehulled grain is cumbersome and there should be a trap underneath to catch the dehulled grain, (iii) A 3 minute dehulling does not uniformly de-hull the grain, (iv) A great deal of bran which appears to be about a third of the entire volume of grain milled is obtained. Unless households have cattle or poultry this by-product is considered a waste of precious grain by the poorest of the poor (Banjara tribal women), (v) The miller had not kept a proper inventory of customers who had come in to get their sorghum dehulled free of cost, (vi) The urban slum population preferred to buy the dehulled and milled flour. The miller stated that the main clientele for the dehulled and milled flour were not the poor but the lower middle and middle class families. A value-added product (de-hulled flour from raw grain) could thus form an economically viable venture for millers themselves. The flour can be used instead of wheat

for village bakery product, which are becoming tremendously popular in both rural and urban areas of the country.

Dr. Pushpamma mentioned that the Government of AP had approached her for the skill training of local women and bakers. The Agro Industries of AP (AP Small Scale Industries Development Corporation) had shown interest in manufacturing and marketing the PRL dehuller and Winnower.

III. Potential impact of the project :

1. The Government of India has a nation-wide Integrated Child Development Services (ICDS) programme. The ICDS is being implemented in 1000 Community Development Blocks of India in 1985. The target population of children covered are approximately 20 million. Supplementary feeding and growth monitoring, basic preventive and curative services, and non-formal education form the three major components of the programme. In supplementary feeding, the emphasis is on each ICDS project or a group of ICDS projects within a district using locally available foods. The government supports both project level, district and state level facilities for producing the food supplement.
2. The bakery products could well be channelled as an appropriate weaning (mashing biscuits with boiling water) or toddler/pre-schooler nutrition supplement in this programme.

IV. Implementation and monitoring :

The Government of Andhra Pradesh (AP) has a close link with the Home Science College which at the present time is training the village-level functionaries of the ICDS in AP. Therefore, RTEs and RTMs formulated by the Pushpamma group are likely to find favour with the State government.

V. Impact :

The group is highly regarded in AP and the research findings in other studies are being implemented by the State government. The group intends setting up 'Skill training centres' in the

various agricultural research stations of APAU. In these centres, both local bakers and housewives will be trained in bakery and in the use of sorghum flours in baking and other traditional recipes. Organoleptic tests revealed the acceptability of sorghum based recipes in adult and child populations.

A much earlier study (Phase I) had clearly established the growth promoting effect of dehulled sorghum and dehulled sorghum flour along with blackgram and pigeon pea on the growth of creche children 1-3 years of age.

Travel Report : Two (a)
 Consultant Travelling : Tara Gopaldas and Max Rutman
 Date : May 13-20, 1985
 Place : Institute of Nutrition, Mahidol University,
 Bangkok, Thailand
 Purpose : To evaluate the two phases of the Food
 Processing Centres Project (Thailand -
 3-P-81-0058)
 People met : Dr. Aree Valyasevi, Director, Institute of
 Nutrition
 : Dr. Sakorn Dhanamitta, Deputy Director,
 Institute of Nutrition
 : Dr. Somjai Wichaidit, Associate Professor,
 Institute of Nutrition
 : Dr. Somkiat Kosalwat, Project Field Director
 : Dr. Dow Mongkolsmai, Economist, Thammasat
 University

1. Summary: 1) The basic problem is that a cereal:legume:oilseed RTE weaning food has been developed which is against the dietary culture of the Thais. Phase I just plunged into the formulation of supplementary foods using rice, mung, groundnut or sesame without ever relating it to current weaning and young child feeding practices in the different regions of the country, especially the economically and agriculturally poor N.E. region where the supplementary food preference in all ^{few} formulations were to be field tested. The clear weaning food preference in all our discussions emerged as fermented fish and glutinous rice.

2) The Royal Thai Government has unilaterally decided that village communities must participate in the village Food Production Centres (FPCs) regardless of their being economically viable or not. The results of the two phases of the IDRC project have resulted in a paradoxical situation of a 'wrong product' in a 'wrong setting' but for a 'right reason'. (eradication of the more severe grades of PEM).

only in
 places we
 visited.

It is truly extraordinary that the Government without any feedback on the success or otherwise of the FPCs has gone headlong into expanding its subsidy to 30,000 villages! It hopes to cover 37,000 by the end of 1986. The figures for the villages were supplied to us by Government officials.

3. Dr. Dow's report stands out for its clarity in presentation, for its honesty of being able to see the situation for what it is, for underscoring the reasons for the test-marketing operation being a failure, and for constructively listing some ways of promoting the product and increasing sales. In summary, the factors operating against the supplementary food (SF) and the nutritional goal ^{we're} poverty and inability to purchase on a regular basis, very poor demand for the product, inadequate rice to feed the family and perpetual 'rice indebtedness', poor level of education, high degree of resistance to change, lack of understanding on part of families regarding the amount to be fed to the ^{try} weaning child every day, poor responsibility on part of the workers, absolute lack of attention to children (0-6 years) during harvesting seasons, unimaginative product without the right taste or flavour, extremely poor targetting of the product with 90% of the children who consumed the SF not being either in 2° or 3° of malnutrition!

She has proposed four alternative options of free give away of the SF or subsidy by the Government. In practical terms, it would be difficult to differentiate between 2° and 3° for food supplementation as 2° child very often slips in 3° ^{to an} episode of illness, overnight. Hence, her fourth proposition for a free giveaway of SF to all children in 2° and 3° and charging 2B per packet of SF for children in the 1° or N° appears to be the most attractive. However, such exercises have to be operationalized and evaluated using proper data collection and evaluative methods.

4. The Government has first to be persuaded to modify its policy of a FPC for every village to a FPC facility per province. This would

lead to economies of scale of production and for better inventory control, quality control and even better distribution of product in villages in the province. Dow's 4th proposition (see point 3) could be tested out in this setting. Fortunately, Dr. Aree, a key person to influence the Thai Government concurs that a more centralized operation would be more feasible.

5. Phase III could consider a research project that looks at a 'whole weaning^{food} system'. This would require a more market research oriented approach that would look at weaning and young child feeding practices ~~study~~ in the different regions of the country, the availability of all-the-year-round produce i.e. rice, legumes, oilseeds, fish, milk, fruits and vegetables, the formulation of appropriate supplementary high nutrient-low-cost and low dietary bulk food product types for the 7-12 mt, 13-18 mt, 19-30 mt age groups, shelf life studies, product testing and finally market testing exercises.

6. There is urgent need to develop instantly re-constituted weaning foods for the harvesting seasons (October-January) and June, July when maternal attention is at the lowest ebb. Since parents spend a fair amount (284 + 340B/year^{family}) on sweets for their children - the development of bakery products (biscuits) could be tried.

11 Completion of Objectives:

As in our evaluation of the IDRC-funded Indian project, the achievements of the Thai IDRC-funded project, 3-P-81-0078 and 3-P-81-0078 were evaluated in relation to the completion of the 'weaning-food' objectives.

1. We feel there was a basic and major defect in Phase I itself, that did not commence with a study on weaning food practices in Thailand and a thorough market-research survey, as listed by the group at point 4.
2. Several minio reports on Phase I and II and two xerox copies of articles appearing in the Food and Nutrition Bulletin

(1982) were made available to us. Work done in Phase I has also been reported in the 'Human Nutrition - Better Nutrition Better Life' 1984 (proceedings of the 4th Asian Congress of Nutrition, Bangkok, 1983), wherein the group appears to have noted the importance of conducting pre-project surveys on (a) major nutritional diseases, (b) causes thereof, (c) food habits ^{and} acceptable foods for child feeding, (d) family resources i.e. food availability, income and purchasing power etc. (e) potential scope of community participation in product development, etc.

actually The point we wish to make is that although awareness was there, these essential pre-product formulation/development surveys succeeded product formulation. Hence, whatever post-mortem information was collected became rather useless, and the group was left holding a 'product' that had 'no market'.

3. We were also rather disconcerted at the minimal amount of hard data available to support statements made in the several mimeos/scientific papers. There was much adherence to the concept of 'models'.
4. It was stated that the formulations of the seven supplementary food mixes were based on the Thai standard for Infant Foods (Ministry of Public Health, 1979). We obtained a copy of the Codex Alimentarius ^{tarins} specifications from Dr. Theera (see later) and found that SF did not have rigid specifications but Infant Foods did. The SF formulations of Aree's group did not adhere to all the specifications ^{by} of Infant Foods, namely, the ~~in~~ addition of vitamin/mineral pre-mix etc. Hence, it ended up having neither the advantages of either types of formulations.
5. The first weaning food a Thai baby seems to receive is small amounts of pre-mashed and force-fed glutinous rice (sometimes from its fourth day of life). From a year-onwards rice and fermented fish are the most favoured foods. It, therefore, appeared to us that Aree's group may be 'barking

not necessary for other regions.

thaiminase

up the wrong tree'. Much more work needs to be done on having a low-cost 'fermented fish' technology, wherein the ^{thaiminase} thiaminase is destroyed and the product can be used

as a weaning food even for an older infant (7 mts).

Similarly, there was a need to focus on ways and means to reduce the dietary bulk of the staple glutinous rice for infant-stomachs.

6. It appeared to us to be much more sensible to develop a high protein SF of mung alone; or mung/soya; mung/sesame; mung/groundnut; or fish concentrate alone; to be added to the glutinous rice (which the child gets anyway), rather than dilute his meal with yet more glutinous rice. Presently, ~~it is~~ ^{it} forms 70% by weight of the RTE. We also found that the village level roasting of the rice was a long ^{and} tedious operation resulting in an unevenly roasted and unattractive product.
7. Dr. Aree and Dr. Sakorn themselves pointed out that the plight of the urban infant in Bangkok was much worse than that of its rural counterpart, as the urban slum mother initiated bottle feeding with heavily diluted and infected sources of water leading to severe diarrhoeal episodes and severe malnutrition in these unfortunate ^{or} deprived urban infants. Consequently, there is also great need to promote dairying and cheap sources of animal milk for the urban pockets. At the moment dairying is ridden with politics with an expatriate nation having the monopoly of the 'milk business'. It is not true to state that Thai children are not fed buffalo or cow's milk as a Food Habits Survey in Khoh Kaen (Tipvanna et al) clearly revealed that one-third of the families interviewed gave such animal milk through ^{cut} the day to their young ones (quantity, however, not specified). It has been shown time and again (Indian experience) that the quickest way to put money into the farmer's pocket is through 'Milk Cooperatives'.

is the right
or wrong
product
is up to
the Thais
not
to us

8. A scrutiny of the Progress Report (Phase II, 1982-83) on 'Village Food Production and Processing Outreach Program' reveals that Annex^{ure} I was the most interesting as it was the only report that had some statistics and data ~~on~~ ^{as} under:

Annexure

- That on an average a family bought a SF packet (100 g) only once in a month. For example in August 1982, 788 packets were produced and there were 672 target children.

- That although acceptability is reported to be 90% in the infant group and 52% in the older child, there^{are} ~~is~~ no detail given as to how the acceptability trials were conducted, how much was offered, in what form, what was the duration of testing etc. without which the percentages have no meaning.

- On an average a Thai rural household had a per capita availability of cash income of about 2.7B/day (our calculation from average income of 7000B/year and 7 members in a household). How then, can one expect a mother^{to} ~~to~~ expend 2B every day on a SF alone?

- The five most popular items of diet per household per year, in Nong Klang (fishing village) was: fish (220 ± 197 kg); rice (140 ± 112 kg); vegetables (100 ± 157 kg); eggs (77 ± 139 kg) and meat (40 ± 71 kg). It is also stated that 91% preserved fish (39 ± 82 kg/Household/year) by fermentation or drying. This clearly points to the need of developing an appropriate 'village-level-technology' for fish preservation.

deleterious

- There are some very deleterious practices of feeding only rice, fish and salt to lactating mothers which requires research investigation. Nursing mothers went on to this diet even during late lactation whenever their child suffered from diarrhoea or fell sick. It was important to note that the majority of children of mothers who did not have these irrational beliefs/practices were healthy.

very few.

- As stated later, statistics quoted show that there are very few Thai children in 3° (0.8%) and in 2° (7.7%) of PEM. Most of the malnourished, fortunately, are in 1° (about 40%). Therefore, one can easily wipe ^{out} 3° and 2° malnutrition, and take steps to protect the mildly malnourished.

This approach is ok as long as food gap is not pronounced

- The other nutritional problems of the country, namely goitre in the N.E., ariboflavinosis, nutritional anemia and Vitamin A deficiency have not been addressed by either the Thai Government or the research groups in the country. It is but simple logic that suggests that it is much simpler to wipe out a nutrient deficiency than a food gap deficit. There is need for designing studies on enrichment and fortification of foods of major consumption and/or direct nutrient supplementation.

III. Research Methodology

1. It was noted that Dr. Aree's group was very strong in research methodology pertaining to biochemistry, toxicology and clinical medicine. However, the research methodology as applied to Phase II was weak (Village Food Production and Processing Outreach Program). In Phase I, which was primarily a laboratory-scale project, the group showed some mastery and grip over the formulation of the RTE, proximate and chemical analysis and in calculation of the Amino-Acid Score of the RTE formulations, and in the conduct of tolerance and acceptability trials. Even here, experimentation using the animal model to assess growth and protein quality is missing. Hard data is not to be found for tolerance or acceptability trials. Nor are there any for shelf-life studies (moisture, rancidity, viable plate count etc.)

before product

no need

2. It is in Phase II, that the Research Methodology is really weak. The group appears to be quite unfamiliar with the concepts of marketing, market research, ^{food technology} nutrition intervention research or process evaluation.
3. There is a general weakness in Phase II to set specific objectives, to define suitable parameters or yardsticks for measurement, to decide which methods would be the most appropriate for the parameters set, to collect and record information systematically, to tabulate data, and last but not least - to interpret the data.

IV. Potential impact of the project

1. In as much as it is ^{the} primary nutritional objective of the government to wipe out the more severe grades of PEM, and in as much ^{as} that a much larger quantum of food (food energy and protein) is required by the most vulnerable 6-30 mts age group, the concept of SF was sound. However, from our foregoing observations, it is seen that neither the 'product' or its 'marketing' were correct.
2. In spite of this, the FPCs have been started in no less than 30,000 Thai villages with a government seed-money subsidy of 3000 B per village. The government is prepared to buy back the RTEs from the village FPCs, thereby assuring the rural community of both income, employment and a market. Although sound in concept, in actual practice, ^{this} ~~nothing~~ is not happening. The 'product' has been rejected by the community it was meant for.

V. Implementation and monitoring:

There has been overwhelming and unquestioning response from the Thai Government to the SF and RTEs, (please see above). Unfortunately, the government does not appear to think it necessary to have any feed back on the huge sums of seed money (3000B X 30,000 villages =

90,000,000B) they have distributed upto now. The nutritional status (wt for age) is being measured by village level health workers. Approximately a million children have been so measured and it was claimed by a Health Ministry official that due to the FPCs, child malnutrition had practically been wiped out in 1985!

VI. Impact:

- In terms of approval and adoption by the government it has been a success story.
- In terms of replication, it was being continued in a very haphazard manner in the original Nong-Hai village where the first FPC was started. There was no FPC activity in the Non-Klang village we were taken to.
- The product in its present form does not seem to be acceptable to the target group.
- In the expanded government model, there is no way one can relate the FPC (even if it exists) to its impact on nutritional status of the target population. This type of evaluation has not been done.
- In terms of spin-off the FPCs may have guaranteed some jobs and income in the villages.

VII. Conclusion: In spite of a rather negative evaluation by us, we would still recommend that IDRC work with Dr. Arre's group as they are highly regarded and are also technically the best in Thailand. Possibly, they need more orientation to large-scale nutrition intervention research and the research methodology it involves.

VIII. Future directions for research suggested to Dr. Arre's group:

- a) Study the entire weaning system by region before developing weaning foods for the regions.

*Excellent relationship with village, New anthropologist might change
performance of Institute
IDRC was much more concerned of technology
than health projects performance*

- monitoring results*
- b) Particularly study the weaning practices during periods of peak agricultural activity.
 - c) Reformulate the existing RTE (reduction of dietary bulk, instantizing it, flavour, color, texture, packaging, possibilities of fortification with vitamin-mineral pre-mix) for production at a larger facility level (Province).
 - d) Development of suitable product types and strategies for the reformulated RTEs in the different major regions of the country.
 - e) Development of a fluid milk type or low-cost milk-based foods for infants in the urban areas.
 - f) Development of an appropriate 'fermented fish technology' which would have wide application as a weaning food.

g) Develop a *monitoring* system for the village. has no meaning for this culture, should be studied first.

I. Summary

- a) The Government Nutrition Plan, Policy and Implementation is clearly to consider PEM in the 'underfives' as their most stressful nutritional disorder. By expanding the FPCs to 37,000 villages by 1986 (end of their 5th Plant Period) they hope to completely eliminate the moderate and severe forms of PEM very shortly.
- b) They are wedded to the concept of 'peoples participation' in the FPCs.
- c) They have not tackled their goitre and nutritional anemia problems on a national scale as yet.
- d) There are disadvantages in setting up larger FPS as these larger facilities would come under F&D administration and labour laws. Registration, licencing and strict adherence to food specifications would be required.
- e) Cereal-based supplementary foods for infants and children (1-3 yrs) do not have any rigid specifications. Commercially manufactured Baby Foods would.

Travel Report : Two (b)
 Consultants Travelling : Tara Gopaldas and Max Rutman
 Date : 16th May - 20th May, 1985
 Place : Some government agencies and departments in Bangkok, Thailand
 Purpose : To obtain an insight into current and future national planning and policy in nutrition in Thailand
 People Met : i) Dr. Theera Satasak, Director, Technical Division, The Food Control Division, The Food & Drug Administration Ministry of Public Health, Bangkok
 ii) Dr. Puanjong Tantiwongse, Head Division of Nutrition, Department of Health, Ministry of Public Health, Bangkok
 iii) Dr. Chaowalit, Chief of Deficiency Disease Control, Division of Nutrition, Bangkok
 iv) Mrs Suparp Suanpan, Chief of Laboratory Section, Division of Nutrition, Bangkok
 v) Dr. Sukanya Roongtanapirom, Acting Chief of Health Promotion Division of Ubon Provincial Hospital, Ubon

vi) *Mr. Chatchan Boonyarat, President of the Food Processing Association.*

II. Points made by Dr. Satasuk:

- a) The disadvantages of large scale processing are that;
- a licence will be required to produce the infant or supplementary food.
 - the processed supplementary food will have to conform to the specifications laid down for specially controlled food.
 - the large-scale processing facility has to be Registered.
 - if larger FPCs were put up at the provincial level (73 provinces), they would come under the FD administration and labour laws.

- b) The eradication of malnutrition is proceeding in the right direction. By the end of Thailand's 5th Plan Period i.e. 1987, it is hoped that the moderate and severe forms of malnutrition would be wiped out. Hence, the FPC approach is the right one.
- c) The improvement in the health and nutritional status of the lactating woman needs to be addressed.
- d) He gave us a photo copy of the relevant portions of the Codex Alimentarius (please see Annexure 2). The Codex does not have rigid standards for Processed Cereal - Based Foods for infants and children (1-3 years). All that it specifies is that protein of fairly good quality should form 15% of the RTE on a dry weight basis. The sodium content should not exceed 100 mg/100 g of the product sold. There is no mention of level of linolenic acid to be incorporated. However, commercially produced Baby Foods do have rigid specifications. Such foods should not only contain not less than 200 mg linolenic acid per 100 kcal weaning food, but are required to contain minimum specified levels of fat and water soluble vitamins, macro minerals etc. (please see copy of specifications attached at Annexure 2).
- e) There are no specific standards for fermented fish or fish meal.
- f) Fish sauce is universally consumed. It contains about 9 g protein/l fish sauce.

III. Points made by the officials at the Nutrition Division, Department of Health, Ministry of Public Health

- a) The major nutritional diseases of Thailand are PEM in the underfives, Iodine deficiency in all age groups of the North, and iron deficiency anemia, particularly in the female population.

- b) The strategy to deliver Primary Health Care to the masses is through - peoples participation, inter-sectoral collaboration and appropriate technology.
- c) They solidly support the SF propagated by Arre's group even though it has a shelf-life of only one month. The SF (100 g packets) are given away free at the present time to children in 2° and 3° PEM. The general population can purchase a 100 g packet for 2B. The money so collected goes into a 'Village Nutrition Fund'. They were unable to comment on who manages the Village Nutrition Fund and how the FPCs were doing. They claimed that in 1984, 2° PEM was 5.9% and 3° PEM only 0.8%. These statistics were quoted on the 3-monthly weighings of approximately 1 million 'under-fives' all over the nation by village health workers. So FPCs ~~are great~~. Were considered to be highly ~~successful~~.
- d) They admitted that iodated salt cost 3-4 times that of ordinary salts. But no appropriate technology had been developed to reduce the price and make it more readily available to the affected population.
- e) Research was on-going (Dr. Arre's group) to fortify fish sauce with iron salts. The outcome of these studies was not known to them.

IV. Points made by Dr. Sukanya at The Provincial Hospital, Ubon

- a) Her impression also was that there was a decrease in the moderate and severe forms of malnutrition.
- b) Nutrition-health-education in the hospital and in the extension work emphasises breast feeding for infants atleast upto 3 ^{mts} of age and the introduction of the Mahidol RTE at 4 ^{mts} ~~mo~~ onwards. Quantitative models of diets for the pregnant/lactating woman and the young child are shown to the mothers.

Travel Report : Two (c)
 Consultant's Travelling : Tara Gopaldas and Max Rutman
 Dates of Visit : 17/5/1985
 Place : i) Department of Food Technology,
 Chulalongkorn University, Bangkok,
 Thailand
 ii) Institute of Food Research and Product
 Development, Kasetsart University
 People Met : ^{MR CHAT CHAI BOONYARAT}
 The President of the Thai Food
 Processors Association
 : Dr. Patcharee Chittaporn, Co-Project
 Leader at Chulalongkorn University
 : Dr. Bulan, Director of the IFRPD,
 Kasetsart University.
 Purpose : To evaluate Food Processing Equipment
 (Thailand 3-P-80-0135)

I. Summary

- a) The Chaityute group at the Food Technology Dept., Chulalongkorn are technically sound and are innovative in fabricating food processing equipment. It is a great pity that the government will not consider as yet, larger FPCs at the provincial level, where the Grinder and Toaster fabricated by this group could be efficiently used.
- b) Dr. Patcharee has successfully extruded the Mahidol RTEs. The RTEs can be instantly reconstituted.
- c) The IFRPD at Kasetsart has potential and should be followed up by IDRC technical staff.
- d) Attempts should also be made to meet Dr. Mali, an internationally known expert on fish fermentation technology.

II. Completion of objectives: The major objective of this project was to remedy the grinding and toasting problems encountered with the Cecoco manual grinder used at the FPCs. Although we were unable to meet Dr. Chaityute, both the consultants were impressed with the professional job that the Chaityute group had done on the fabrication of appropriate equipment to overcome the problems listed earlier. Except for the fact that

the ^{out}throughput far exceeds the current demands of an average FPC; and the fact that the grinder was electrically motored (some villages do not have electricity), we felt that both ^{pieces} ~~pieces~~ of equipment were highly innovative. The objectives set were met.

III. Research Methodology: A rigorous methodology as applicable to research projects in Food Technology has been followed.

IV. Potential impact of project:

The equipment (Grinder and Toaster) can certainly be used if larger-scale FPCs are set up at the provincial level. It may be far more technically and economically sound to do so.

V. Implementation and monitoring: This part of the project was

weak. We got the distinct impression that Chaiyute's group is competent and innovative in the laboratory or at the ~~pilot machine shop~~ ~~plant~~ level. Their interaction (senior staff) with field staff at the FPC at Nong Hai and Bang Dang has been inadequate. Although Dr. Patcharee did mention that they would like to continue to work with Dr. Arre's group, yet, meetings with Arre's group were not a common feature. The very purpose of the project i.e. implementation of the Food Processing Equipment (Grinder and Toaster) never took place. Since it was never set up at the village level, the question of its monitoring never arose! The equipment is too large for a village-level FPC, and needs electricity!

VI. Future possibilities for the grinder and toaster equipment:

It could be used for feeding of 'underfives' in the refugee camps, or for feeding 'underfive' slum children around Chulalongkorn University.

VII. Dr. Patcharee has worked on the extrusion of the Mahidol food formulations. This has resulted in an instantly re-constitutible RTE. However, scale of operation has to be very large, and the time taken for the operation is much longer than the roasting process currently followed at the FPCs. In this connection the Kasetsart University's Institute of Food Research and Product Development does have a very small extruder. Dr. Patcharee did not know of this. Perhaps she and Dr. Bulan's group should be given a joint project on evolving and testing out appropriate village-level extruders.

VIII. Recommendation to IDRC: The group is a competent one and IDRC should continue to use them.

Meeting with Dr. Bulan, Director of IFRPD, Kasetsart University

1. Dr. Bulan struck us as an extremely dynamic woman with a great willingness to undertake projects for IDRC.
2. The Institute has well equipped labs, pilot plant and an animal house for toxicological testing of non-traditional products.
3. Although the staff is not as highly ^{qualified} ~~educated~~ (far less Phds. at staff level) as that at Chulalongkorn, yet, they seem to be more 'market oriented' in their thinking.
4. The booklet given to us clearly indicates that the Institute has done pioneering work in the development of
 - i) Kaset protein (based on mung, fish protein and soya milk residues).
 - ii) Baby food formulations based on precooked rice flour, full-fat soy flour and fish protein concentrate.
 - iii) Various cookies, snacks, soy products and soya-milk for school lunch programs.
 - iv) And a mung protein concentrate.

5. What is most noteworthy is the fact that protein food prototypes i.e. textured fermented fish, textured mung protein (kaset meat), soya milk, and textured vegetable soy protein were field tested in typical rural families in North and North Eastern Thailand. The child subjects ranged from 1-7 years in age. The field trials lasted 18 months (1969-70). The cohort study included experimental and matched control groups. The 'fed-group' demonstrated significantly superior growth (height) vs the non-fed counterparts. The textured Fermented Fish prototype was the most preferred among all types fed. These field trials appear to have been conducted under much more controlled conditions than those of Mahidol University (Phase I and II).
6. The organization chart indicates that the Institute has full fledged departments of Administration, Demonstration and Education, Research, Quality Control, Product Development and a Pilot Plant. The sort of 'Weaning Food Systems Approach' that we are considering may work better in this set-up, where all the required disciplines for a 'systems-approach' are under one roof, so to speak. The Product Development Department professes to have a section on Marketing and Market Research, but this has to be further investigated by IDRC technical staff.
7. Recommendation: We strongly recommend that IDRC consider this Institute for further IDRC-funded projects.

Meeting with the President of the Thai Food Processor's Association

1. One of the consultants (MR) met with the President

who was of the opinion that Thailand had a booming economy, was ready for many modern innovations in food processing and technology and was moving very fast into the 21st century.

2. MR also tried very hard to meet with Dr. Mali who is internationally known for her work on fermented fish. Unfortunately Dr. Mali was very busy and could not give him an appointment.

Travel Report : 2 (d)

Consultant : Tara Gopaldas

Dates of Visit : Faculty of Technology
Khon Kaen University
Thailand

Purpose : To evaluate the Legume Processing
(Thailand, Phases I, II & III (3-P-82-0082)
1978 to 1984.

People met : Mr. Supachai Ngarmsak, Animal Scientist
Mr. Kusum Nantachal, Food Technologist

I. Summary

1. The project has several weaknesses in conceptualization, in research methodology, in a surprising lack of quantitative data, and in an over concentration of extension and communication methodology to the neglect of the application of parameters, criteria and methods normally expected to have been used in the three phases of a research project of this kind.
2. We do not think propagating ^clow-pea production at any cost was wise. No farmer will cultivate a crop unless he is sure of the economics of ~~so~~ doing^{As}. The whole project in short was a "non-starter".
3. The weaning objectives are minimal. Infact the project was never meant to be a Weaning Food Project.

II. Completion of objectives:

1. The project which is in its third phase is a co-operative research project in Food Legume Processing and Utilization Network in Asia. It is very difficult to evaluate whether the objectives of the three phases have been completed as the very reason for undertaking this network study on Legume Processing is highly questionable in a culture where it clearly has not even obtained a toe-hold, let alone a foot-hold in all these years.

The blame, I feel, is with the ^{funder} founder who thrust this project on both Thailand and Phillipines where regular legume eating is minimal at the household level. Hence, looking for 'fulfillment of weaning-food object' is really not fair to the project; it was never meant to be one.

1. Phase I : The major effort in Phase I was to conduct 'A survey on eating habits in ten villages in Khon Kaen Province in Northeastern Thailand'. It is difficult to concieve of a survey that does not inclux some quantitative measures. Although, the survey methodology is appropriate for the general objectives set, yet, it greatly suffers from not having quantitative data on dietary intakes in the different demographic groups (infants, toddler, pre-schooler, adolescent, adult male, adult female, geriatric age group, and the pregnant and lactating women group).. (On a qualitative level, a good deal of interesting information has been documented which requires more wide-spread dissemination of survey results in Thailand itself).

In ^{sum} ~~some~~, one cannot conclude that the major aim of Phase I was achieved.

2. In Phase I, Linear Programming was used to arrive at ^{the} least cost of a 7-day-menu. The cost of this menu was around 40 B per person per week or about 6 B per day when only half this amount of money was available in the average rural family. This again is a case of using unnecessary statistical methods to solve a common-sense problem.

- 57
3. The types of food eaten by 1-5 year old children is interesting (see page 66 of the above quoted report at pt 2). The report states that 65% of the households that had 'underfives' children, fed them exactly the same diet as the rest of the household. The remaining 35%, however, gave additional or a different type of diet to their 'under fives'. It would have been worthwhile at that point of time to see if the nutritinal status of the two groups (age for age) differed in any way. Unfortunately the investigators have not presented data separately for the infant (< 12 mts), toddler (12-35 mts) and preschooler (36-72 mts). This would have atleast shed some light on infant and young child feeding practices in Central Thailand.
 4. The report states that the 35% 'underfives' who ate differently from the rest in the household, drank milk during the whole day (though frequency and amount are not reported). It is further stated that fish was the main meat eaten by children at every meal. This in itself suggests that weaning foods based on fish would be the most acceptable.
 5. The most regularly consumed food items by the households were glutinous rice, fish, green papaya, groundnut, leaf of the young lead tree and string bean. A fairly varied and nutritious cyclic menu can be devised for 'underfives' from these 6 dietary items alone.
 6. Another major effort in Phase I was the determination of the most appropriate method to introduce ^{cow} low-pea into the dietaries of the farm families. As an experiment in Nutrition Education and Communication the methodology is very interesting. Infact, it formed the material for the doctoral dessertation of Dr. Tipvanna.
 7. All three Phases nd about in such instances of just not facing upto the situation. The situation being: farmers were reluctant to grow low ^{cow} peas; there never had been a ready supply in all the 8 years of the project ground-nut was for more widely grown and consumed, and to cap it all there has been no ^{sowing} ^{cow} saving of low pea for the last 2 years due to a severe insect disease affecting the ^{low} low pea crop. Under these circumstances, it is really difficult to understand how Phase II was planned or approved by IDRC ?

Phase II & III

1. Despite the low production of ^{low}low-pea, the Tipvanna group persisted in their efforts to obtain an acceptable ^{flour}flour from de-hulled low-peas using the PRL de-huller. The major success was in popularizing low-peas flour based recipes among food vendors.
2. We would like to cut short our comments on Phase II and III as what really emerges is an amazing tenacity to persist and carry on with objectives in Phase II and III despite having a 'dying' or 'dead product' on their hands.

III. Research Methodology: There is a glaring and notable lack of quantitative measures to fulfil objectives at every phase. On the other hand, Dr. Tipvanna's bent for extension and communications clearly emerges. The project has ended up in being primarily an Extension effort and not a study in Food Science or Technology .

IV. Potential impact of the project: Minimal. The lessons learnt in extension could be applied elsewhere.

V. Implementation and monitoring: At the present time - nil.

VI. Impact: Nil

VII. Conclusion recommendation to IDRC:

1. If IDRC is interested in ^{groups}groups having a strong base in food science and food technology, this faculty is weak.
2. A technician in the Faculty has fabricated a solar drier, and a ^{tray}tray drier which look promising for dehydration of fish, vegetables, fruit etc. However, IDRC technical staff should further investigate.

Travel Report No : Three (a)

Consultants Travelling : Tara Gopaldas and Max Rutman

Date : 21-25 May, 1985

People & Places visited :

1. Dr. Pacita Zara, Executive Director, The Phillipine Council for Health, Research and Development, National Science and Technology Authority, Manila.
2. Dr. P. Guzman, Deputy Director, The Food and Nutrition Research Institute, Manila.
3. Dr. Fedel Mundo's associate, Dr. Fe Garcia Institute of Community and Family, Manila
4. (i) Dr. M. S. Swaminathan, Director-General
(ii) Dr. Carangal - Farming Systems
(iii) Dr. C. Perez - Cereal Chemistry
(iv) Dr. Jeon Yong Woon - Agricultural Engg.
International Rice Research Institute,
Manila, Los Banos, Phillipines.
5. Dr. Ricardo Redel Rosario, Associate Proffesor, Dept. of Food Science and Technology, University of Phillipines, Los Banos.

Purpose : To obtain an overview of nutrition research, plan and policy in the Phillipines

1. Summary

1. Phillipines has an excellent plan for nutrition action, but due to the extremely sensitive and ^{charged} ~~changed~~ political situation, no nutrition programme has had much impact. This points to the fact that political and nutritional stability go hand in hand.

NO 2

where is the strength 60

2. The Food and Nutrition Research Institute in Manila, is definitely the strongest research organization visited by us. IDRC should work with FNRI.
3. The Institute of Community and Family can be a field data collector under the supervision of FNRS in any future proposed IDRC funded project to these two institutions.
4. Dr. ^{Jeon}Woon's agricultural produce drier at IRRI is a gem of innovation utilizing extremely cheap sources of energy.
5. Dr. Rosario's low-cost mung-bean parcher cum de-huller is also very innovative and IDRC could follow-up on this.

A great number of people - policy makers, planners, nutritional scientists, food scientists and agricultural engineering scientists were met apart from the personnel of the IDRC funded project at the College of Human Ecology. Our meetings with the former are discussed first.

1. Meeting with Dr. Zara: The Philippine Council of Health, Research and Development is a nodal agency which plans and farms out the entire spectrum of Health Research to be conducted for the Philippines over the next five years (1985-1989). The major nutritional problems of the Philippines as in the rest of South-East Asia was - PEM in the under-fives, iron deficiency, Vitamin A deficiency, and Goitre. Under the major head of Malnutrition, several areas covering local growth norms, nutritional assessment, deficiency diseases, nutritional [&] food processing/technology, food quality, bio-availability, toxicity, disease interrelationships, delivery systems, policy research, surveillance, nutrition education, food economics and behavior^{studies}; ~~studies~~ are all listed. Infact, Philippines is very nutrition and nutrition programme conscious. Dr. Zara felt that the need of the hour was to find out how the various nutrition delivery systems were functioning. She felt that there was a weakness in not having a speedy feed back system on the success or otherwise of the various nutrition programmes in the field.
2. Meeting with Dr. P. Guzman: The Food and Nutrition Research Institute is a lead agency for food and nutrition research under the Philippines Food and Nutrition Program. Dr. Guzman is directly in charge of the nation-wide nutritional and dietary assessment surveys of different demographic groups in different regions of the Philippines. In the area of Weaning Foods, the

Institute is currently formulating rice:mung formulations in proportions of 70:30 (W/W) - very similar to the method and approach adopted by Dr. ^{Arre's} group. The protein quality of this processed rice:mung feed RTE has been tested out in the rat model. The RTE was found to have growth promoting effects. Human field trials are planned. As in Thailand, Slum Manila has severe malnutrition problems in the infant ^{population} due to extensive bottle feeding. Upto now there is no nutrition programme to address this problem.

Dr. Guzman mentioned that their new thinking was directed towards: Nutrition Intervention and Policy Research Programmes; Food Composition and Quality Research Programmes; and Nutrition Communication and Education Research Programmes. Two extremely interesting projects mentioned were (i) Assessment of the Nutritional Situation of an Urban Region in a state of Economic Flux; and (ii) Technology in Service of the people: A Pilot Project in Nutrition Technology Transfer. In this project, mothers and small food vendors were taught low cost recipes and basic food sanitation. The method of making RTE for young child feeding from rice and mung is also taught.

It is a rat oriented group.

3. Meeting with Dr. Fe del Mundo's associate Dr. Fe D. Garcia:

We found this group extremely field oriented and dynamic although they could not be termed to be a strong research group. The Institute had received two projects on the 'Role of ^UHeplots (Birth Attendants) in primary health care in the Phillipines' from IDRC in the past. It was suggested to them that they could perhaps approach IDRC for a follow-on service-oriented project on 'The Utilization of ^UHeplots in the propagation of weaning foods in the community'. They could perhaps do the field data collection under the supervision of FNRI.

NO

4. Meeting with Scientists at IRRI: Apart from meeting Dr. M.S. Swaminathan, four other scientists at IRRI were met. Dr. Carangal is the head of the Farming Systems. He mentioned that IDRC had funded several projects to his division. Dr. Perez mentioned that most of the research was directed towards determining the nutrient composition ^{or} value of genetically different varieties of rice. One of us (TG) was interested in knowing the method of germination of paddy (a preliminary step to malting). The most interesting and innovative scientist was Dr. ^{Jeon}Woon from Korea who had fabricated an excellent 8-ton capacity multi-purpose vortex dryer which works on extremely cheap sources of energy (wind power ^{and} rice husk to fire the heating unit). He mentioned that immediate post-harvest moisture in cereals, pulses and various types of agricultural produce was the chief culprit in causing rapid spoilage. His multi purpose dryer can

dry food produce from perishables such as meat and fruit to cereals all-n 3-
the-year . This has made it very popular with the Philipino farmer who does not
want to invest his money in a dryer which he can use only part of the year.
Dr. ^{Jeon} ~~Weon~~ has fabricated a 2-ton capacity dryer which may be ideal for fish
drying. Its estimated cost is about US\$ 150.

5. Meeting with Dr. Ricardo R. del Rosario, Dept. of Food Science and Technology
University of Phillipies, Los Banos

Dr. Ricardo has fabricated a cheap and effective parching machine for mung bean.
The method adopted by him is to soak mung bean in water for 6 h. (maximum
hydration). The product was heated quickly in a jet of steam ^{and} ~~of~~ instantly parched
in sand heated upto 350°C. He showed us the equipment which he had
~~fabricated for about 10,000 pesos. According to him one need not de-bull the~~
~~mung bean~~ parching operation not only fully cooks the legume but also
~~removes the hull~~ which just fall off. Hence, his equipment is a two-in-one
~~machine~~ the legume as well as fully processing it. IDRC technical
staff could follow up on this piece of equipment which appears to have promise.

6. Phillipines has an abundance of highly trained technical and scientific
personnel. However, due to the current insurgency and critical political
situation, there is widespread poverty and consequently no nutrition program
is working.

Travel Report No : Three (b)

Consultants Travelling : Tara Gopaldas and Max Ruitman

Date : 21-25 May, 1985

Place : Institute of Human Ecology, University of the Philippines, at Los Banos, Laguna, Phillipines.

Purpose : To evaluate Phase I, II & III of the Legume Utilization at Home and Community Levels (3 P-81-0063 from 1981 - 1984).

People met : Dr. Corazon Barba, Associate Professor, College of Human Ecology.
Mrs. Ruby He Chanova. (Dr. Josefa Eusebio, Dean was out-of-the-country)

I. Summary

1. The execution of this project revealed several weaknesses in its conceptualization, research methodology and execution.

2. We do not recommend that IDRC continue to work with this research group.

+ recommend Dr Corazon Barba.

II. Completion of Objectives: The problems besetting this project are very much the same as those we had outlined for Khon-Kaen University (Phases I, II & III (3-P-82-0082)).

1. The terminal report of Phase III (1984) and the Project Summary project (1981) clearly indicate that legumes are neither widely cultivated nor consumed on a regular basis in Phillipines as is the case in Thailand. *We were unable to obtain any hard data or information on legume production consumption or utilization.* The Eusebio's group appears to have accepted the net work project on Legume Utilization by IDRC, on the basis of their earlier studies which indicated that ⁱⁿ the Batangas province of rural households claimed to plant legumes. (~~Dietary consumption of dried legumes~~) Dietary consumption of dried legumes, however, was minimal. At this point it may have been prudent on their part to have confined Phase I to thoroughly assessing the demand in quantitative terms for dried legumes ^{in the study} in their region at least. This does not appear to have been done.

2. It is reported that a controlled hospital trial was undertaken in 19 wherein severely malnourished preschool age children fed a rice-mung bean or a rice ^fowpea diet exhibited the same growth and recovery patterns, thereby indicating the comparative value of the rice-legume diet. Here again, no well documented data or publication was made available to us.
3. The basic problem is that a great deal of effort has been put in ⁱⁿto Phase I, II & III, but the efforts have not been (i) relevant to the reality of the situation (ii) nor have the stated objectives in Phase II & III been fulfilled using a rigorous and acceptable research methodology (see later [✓] under Research methodology).
4. A slide show of Phase III was viewed by us. We found no hard data presented at all, on the basis of which we could come to any conclusion. The major effort had been directed towards recipe formulation incorporating small amounts of legume additionally to traditional dishes containing por^k or meat. The concept that the vegetable protein must repl or substitute the animal protein appears to have been missed in the ~~formulation of legume flour among home-makers~~ effort of popularizing legume and legume flour among home-makers and small food-vendors. Just as in Khon-Kaen, it is a question of the wrong product being promoted against all odds, and without much success.

III. Research methodology

This group above all others showed a reluctance to use ^{quantitative} qualitative measures at any stage or Phase to fulfill objectives. Some growth anthropometry has been attempted on children fed and not-fed legume based diets by their mothers over a 6-month trial period. It is very difficult to explain or accept the data which ascribes significantly better growth in the legume fed group where there is no supporting data to ^{compare} ~~comparative~~ dietary and nutrient intakes in the two groups. Even in the case of acceptability trials for legume-based dishes there is no indication of the methodology followed. ^{It is} ~~It is~~ ^{ufficient} ~~ufficient~~ to say that scientific [✓] ~~going~~ in the methodology used is missing.

IV. Potential impact of project: Nil

V. Implementation and monitoring: Mung legume is being used in the nation-wide supplementary food for undernourished 'under-fives' called Nutripak. However, it is not all clear as to why Eusebio's group suddenly shifted from the objectives listed in Phase III of the IDRC-project, to the production of Nutripaks ?

VI. Impact:

- Since the cultivation of ^Clow-pea and ^{can}pigeon pea are extremely erratic in the region, there is no question of replicability of the project.
- The extension methods used appear to have been ^vsuccessful and have been effective in increasing the production, utilization and consumption of mung bean in the experimental villages. The extension efforts were not successful in regard to ^Clowpea or pigeon pea .
- Although nutritional impact of legume-fed children has been reported, this is not supported by sufficient data, to be accepted.

SANTIAGO, Sept. 30 1985

Dear Richard

I am sending you my comments to the very good report written by Tara. As you might remember we came to the same conclusions in most of the areas, but of course we did not agree in some of them. This lack of agreement is healthy, it shows that in this field things are not neceseraly black or white, and you will get both colors...

After several months, visiting different places, cultures, and projects, were the memory fade away details and the backbone conclusion settles, I would summarize the following.

a) IDRC push of appreciate technology might be the right one, but unfortunately the same mistake as in old days with FPC (Fish Protein Concentrate) happened, lack of market survey, and or antropologic studies, prior to the push.

b) There was a lack of flexibility in the project, both for IDRC as well as project leaders. Years could have been saved.

c) To be realy succesful Tai project on weaning foods should be linked as one single project. I recomend strong support as well as a tight monitoring.

d) Philipines also requires at least one strong project on weaning foods. I also recomend to support 2 or more groups.

e) Regarding Indias Project. It seems important to evaluate continously this project and support the correction. Because the final objective of a weaning food project is not only a publication it is mainly a working system, no matter how small.

f) Regarding future projects. I could list a few which are useful to all projects:

- a. Monitoring village conditions, as well as interventions.
- b. Marketing studies on weaning practices and weaning foods, for different regions.
- c. Study of functional properties of weaning foods components, to get better acceptable weaning foods.
- d. Study of existing appropriate technologies (for example fermented fish); in order to screen the most approach and adapt those who need it.

It was a pleasure to work for you as well as with Tara.

Best regards, and sorry for the delays, and my english

A handwritten signature in black ink, appearing to read 'Max Rutman', with a stylized, cursive script.

Max Rutman

C O M M E N T S

2. SUMMARY

2.1 HOUSEHOLD GRAIN PROCESSING (INDIA)

Pages 5, 6, 7

Although the classical research methodology of this project was well planned and executed, far better than any other research group we visited; nevertheless, somehow, the main objective was completely lost:

a) The project is not able to answer why the transfer of technology does not work: is it because the price of processed sorghum is higher than rice (as we were told), is it because the "time saving" factor is not appreciated by the mother?

b) It is even harder to get an answer of this project when we examine from the: "weaning food" perspective. However, the project originally was not meant for that purpose, therefore it would not be fair to asses it on that basis. Nevertheless, the fact that infants were actually fed for nutrition trials would strongly suggest that the researcher were targeting the processed foods to the children below five. Unfortunately, the way this project is targeted, it will never accomplish this purpose.

This project lacks a thorough analysis of objectives, a system approach, and deeper knowledge of marketing of the technology as well as the products. It would be very useful to have a good background information on family microeconomics.

The previous statement is not meant to criticize specially this project, it is to open our own eyes to what happens to most research project in applied nutrition; and Hyderabad project, unfortunately is no exception. It is specially important to realize it, in spite of their "good methodology" and "scientific approach". It was easy to see how things didn't work in Philippines or Thailand projects, it was much more difficult to see it in India.

We should be optimistic however, because of the excellent people involved in the research, which might tune their work and target it to better fulfill their main objective.

2.2 FOOD PROCESSING CENTERS

Page 9

Glutinous rice and fermented fish seems to be promising approach, but it might work for those areas where fish is available, not for the rest. Actually every region should be analysed for the right weaning food selection.

I think point 7e) summaries very well the whole situation.

Page 10 point q)

It should also stated that the research group had a good understanding with the villagers.

Page 13 point d)

I have a different view. They are not linked at all to market research. They have a better understanding of technology than Mahidol group, and are more practical than Chulalong group. They have very large pilot plants, however few products developed reach the market. I do think if they would get more support on marketing they might start to have succes stories.

I do recomend to support this group

CONCLUSIONS AND RECOMENDATIONS

Page 17

I don't think that always experts coming from developing economies are the only ones needed for the region; highly sophisticated methods sometimes are unnecessary, but sometimes are necessary, the good consultant will help to select which one is the best.

Page 19 ---) 23

I would change the order of these points from the most general to the most specific.

TRAVEL REPORTS

1. MAHIDOL UNIVERSITY

1.1 ON MAHIDOL POSSIBILITIES

I agree with most Tara's statements (they were discussed previously), however to be fair they are not the only ones that went for the "right reason" with a "wrong product" in a "wrong setting". In my view, all five groups fell into the same trap. What makes Mahidol group specially vulnerable to our critic is the fact that it is a well-respected group and part of a UN University network. Therefore, much more was expected from them; at least a minimum attempt of a methodology, and even that was not found!

For the future however, if Mahidol gets the right people and good advice, it is the place to coordinate the developing of a weaning food system. The main reasons are:

- a) They are a well-respected nutrition group by all the rest of research Thai groups. So they can do joint research.
- b) They have been very successful implementing their project on a National level.
- c) They do have now an economist as well as an anthropologist which might improve the project.

d) They have a very good relationship with villager to do field work.

e) After our visit they got aware of their problems and willing to solve them.

1.2 I'm also very enthusiastic about fermented fish as well as milk analogs, or milk; but I would not like to recomend the utilization without market or food habits research. Actualy our visit in part of Thailand (Nong Hai) showed that there was a strong feeling against buffalo milk . (India's culture is quiet different from Thai's) (Pag 43, 46).

1.3 The food gap approach means goverments expenses far higher than todays expenditures. It would be interesting to have an economic analysis of this situation, before we state that huge expenses are spended by the government on the weaning foods. May be too little is spended (page 44).

TRAVEL REPORT (b)

Page 49 (Some "facts" that could be added)

a) According to the ministry the coverage of FPC has been the following:

	1982	1983	1984	1985 (projected)
N°	4000	8000	19000	31000

b) AID provided a Grantt to the Ministry of Health Nutrition surveillance based on the existing FPC.

TRAVEL REPORT (c)

Page 50

People met: Mr Chatchai Boonyarat

President of the Thai Food Processor Association

Page 52

Point 3. IFRPD is not well connected to the industry and very weak in marketing.

Page 53

Meeting with Mr.Chatchai

According to Mr.Chatchai, there is no good food research institute which can provide assistance to the industry. That is the reason why they are thinking on starting a new research facility for the private sector.

Regarding processed weaning, specially for the urban areas, he thinks it could be done, even without subsidies if the right product is produced and marketed. He was very interested in milk analogs.

All trial with soybean milk type products have been a failure according to Mr. Chatchai.

TRAVEL REPORT: THREE (a)

Food Nutrition Research Institute

This Institute spends most of its time to do food analysis and nutritional classical survey: dietary intake plus anthropometry. They are still very weak on the design, implementation and evaluation of nutrition interventions. The fact of being interested in doing nutrition intervention research projects is not backed by qualified personnel.

This group could do some good work jointly with Dr Fe del Mundo Associates.

Dr. Fe del Mundo

This group seems to be excellent for pilot test nutrition interventions. Today they are involved in primary health care. I suggest a grant jointly with FNRI or Dr Corazon Barbas research group, or a consultant. This is the only group we met where the main objective is not lost by methodology. I strongly support them, as long as they get a strong counterpart on methodology.

TRAVEL REPORT: TREE (b)

Regarding Dr. Josephe Eusebio project. I agree with Tara's conclusion. It is a very poor project, and shows that IDRC should stop supporting her. However, I was very impressed by Dr. Corazon Barba of the same department. She is well trained, seem to grasp how project should be designed. Today she is involved on a Nestle Foundation project jointly with the University of North Carolina. This project is on infant feeding study (nutrition economics and demographic cnsquences". IDRC should explore the possibility of supporting her.