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OCM- FEBRUARY 3-6, 1970 - BELLAGIO,Italy
Villa Serbelloni, Accelerating Agric'l.
Modernization in Developing Nations

Enclosure to WB memo of Nov. 19/70

ANNEX 1

ACCELERATING AGRICULTURAL MODERNIZATION IN DEVELOPING NATIONS

A Summary of Findings and Suggestions of
Agriculturists from Development Assistance Agencies
Villa Serbelloni, Bellagio, Italy
February 3-6, 1970*

THE CURRENT SITUATION

In the past couple of years the agricultural sector of many developing countries has exhibited a new vitality, especially in cereal production. Contrary to the situation of a few years ago, this vitality has reached to farms usually considered traditional, even subsistence, in their production patterns. The increased output has made a substantial contribution to national economic growth, to the material well-being of peoples, and to total development.

It is likely that the altered technologies from which this so-called green revolution has sprung will continue to play a significant role in expanding food output in many countries in the next few years. Continued research on the adaptation of new varieties of wheat and rice (and the practices that must accompany their use) to local environments and to major pests and pathogens will permit a wider diffusion of production benefits among farmers and better protection of existing yields on the farms of present adopters. Indeed in some countries there is an imminent or intermediate term prospect that production will exceed domestic demand causing low farm product prices as well as strains on national and international marketing systems and older patterns of trade. The new farm technologies and their potential high productivity may create or aggravate regional disparities in per capita incomes. Also, they may reveal in stark terms some of the issues of equity surrounding national patterns of income and wealth distribution, and may contribute to further rural under-employment or unemployment, exacerbating urban migrations of rural peoples or rural social and political unrest. These are real problems which cannot be ignored and which should be urgently addressed.

In the longer term, however, the seemingly inexorable growth of world populations creates needs that will overshadow the short-run difficulties accompanying the new technologies. Present growth rates of population in Asia alone will add over 30 percent to its close to one billion people (excluding Mainland China) in the next ten years. To feed

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* Conference sponsored by the Rockefeller Foundation as a follow-up to an earlier Agricultural Development Conference at the same location, April 22-25, 1969. See proceedings of 1969 conference as published by the Rockefeller Foundation.

these new mouths and to ensure the necessary agricultural contribution to economic growth of nations requires a very much broader foundation than is now available. More modern farm technology and a larger pool of manpower trained and skilled in the science and technology of farm production methods are required. These long run problems set the backdrop for the conference. Specific concern centered on feeding more people to a better nutritional standard, of providing assurance that agriculture continues to play a strongly contributive role in national economic development by growing apace with the economy and by offering gainful employment to large numbers of people irrespective of their command over personal land or capital resources.

A year ago, prospects of local wheat and rice surpluses in areas which were formerly food deficit were viewed as a possible problem. This is an important matter. But now the concerns are more generally: (a) whether over the decade of the 70's a rate of increase of 3 or 4 percent in grain output can be sustained in nations such as India and (b) whether in the developing nations available diets can in fact be improved in the face of unrelenting population increases.

The impact of existing improved wheat and rice production technologies necessarily will be limited to areas with reasonably assured water (or drainage) for crop growth. Vast land areas suited to other crops or other systems of farming as yet remain untouched by modern technologies and will remain so unless present research endeavors are intensified and strengthened. The experience of the past few years has indicated that traditional farmers will modernize their agriculture as rapidly as their personal resources and inherent propensity to caution will permit when:

1. markedly superior production technologies are available in comprehensive packages that have been adapted, tested and demonstrated as applicable for local use; and

2. favorable input to product price relationships prevail and can be expected to be maintained for two or three production seasons so that the risks of innovation are reduced and the costs associated with learning new techniques can be re-couped; and

3. efforts are coordinated successfully to provide the needed inputs at the time and place required and to assure product markets close to the farmer; and

4. an atmosphere of commitment to rural development and the initiative for its implementation are forthcoming from government.

In the case of small or tenant farmers, provisions of credit or security of tenure may be necessary to overcome resource shortages or to redress the disincentives of sharecropping.

The problem seems not to be the farmer. The focus of attention must be on the productive sureness of the proferred technological package, on the incentives in its profitability, on the infrastructure of market and other rural services available to the cultivator to support his decision for progress, and on the national ethos for development.

ANALYSIS

Recognizing the necessary role that research-generated, superior technology must play in agricultural advance, an illustrative (and very impressionistic) inventory of research needs was attempted (Table 1). This tabulation of enterprises and functions by geographic areas is neither complete nor verified. It does indicate, however, judgments of relative need. Note the almost consistent three star rating (greatest need) for sorghums, grain legumes, tropical root crops, tropical livestock systems and water management. Note also the need to broaden the present relatively strong position of wheat and rice under controlled irrigation to embrace production technologies suited to harsher agricultural environments so that many more cultivators may participate in the harvest of development.

Before evolving specific suggestions in the research, training and program areas, some general guidelines were developed. While only partially spelled out here, they reflect the group's experience:

1. On-farm trials should be an integral component of national research undertakings. Extension or action types of rural production programs should be preceded by on-farm field verification trials to be certain that locally adapted, superior packages of technology are available, understood and profitable.

2. The national research-field verification trial system can often, if it takes care to do so. generate improved production packages which are suitable for small holdings as well as for larger farm units.

3. Understanding and involvement of policy makers are essential if an economic and political environment conducive to change is to be created. Involvement of state, regional and central planning bodies may be of critical importance.

4. Several types of institutional arrangements for technical-vocational and college level agricultural training, research and advisory services can work satisfactorily (e.g., Japanese, Taiwanese, U.S., Canadian, French, British, and other models). Identification and performance of essential functions rather than the institutional model itself are the important issues. Included here is a realistic projection of trained manpower needs by categories; plans to bring needed manpower on stream; training institutions which are production oriented with provision for useful internship type of experience or its equivalent.

5. Regional research (as contrasted to national or international) centers or programs logically have a role to play. For a variety of reasons, especially the difficulty of creating and maintaining multidisciplinary institutions, they have thus far achieved only modest success on the whole. Indeed, many of the essential regional functions might be better performed by a national institution which has an open policy of rendering regional services. Regionally-oriented institutions can work well where:

   a) the users demand the institutions or programs and are willing to participate in their financing;

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   f) the management and staff pursue a cohesive mission-oriented research doctrine with consistency and continuity.

6. International Centers of the IRRI-CIMMYT-CIAT-IITA type should be fully supported so long as their performance merits it. In addition, the potential contribution of possible new centers should be carefully assessed (see Suggestions below). International centers were viewed as institutional innovations designed to speed national development and to serve as tools to assist the building of stronger, harder-hitting national research programs and national problem-solving capabilities.

7. Information retrieval and dissemination in agricultural research and development experience among nations is haphazard at best. Reliance is placed upon obsolete communication technology. This frequently precludes the use of that which is already known or somewhere available and slows the pace of technological development (see Suggestions below).

8. While technological research on production and marketing properly seeks to increase agricultural productivity, the target of more rapid national output growth need not necessarily be in conflict with the larger goals of social justice. Strategies should be such as to minimize trade-offs between growth, which is essential, and the limited spread of the benefits of growth. Because widespread participation of the population in development is sought, greater depth in policy and development management analysis is needed.

SUGGESTIONS

Considering the current situation, the analysis made above, the rough approximations made in Table I, and the record of deliberations of the April 1969 Bellagio Conference, the following suggestions are advanced:

I. Fund Existing International Centers

1) Secure current and forward operational budgets of the four existing international research and training centers -- IRRI, CIMMYT, CIAT, IITA.

2) Explicitly encourage these centers to extend their work to the problems of people who live and likely will continue to live in less advantaged situations -- small farms, poor land, high risk.

Means: As finance for expanded research beyond the capacity of the Foundations is clearly required an organization for funding is desirable. It is suggested that tentative proposals by the IBRD involving a consortium or consultative group or groups be examined and resolved, keeping in mind the need: 1) to encourage multilateral and bilateral donors to participate in the necessary funding and 2) to make decisions arising out of other suggestions in this paper.

II. Determine Potential Usefulness of New "Center-type" Thrusts

Establish two- to three-man task forces to determine the feasibility and potential usefulness of new international centers or of alternative devices to accelerate research and training on the following (priorities depending upon feasibility studies):

a) water management as related to crop production;

b) food legumes (grains, oilseeds and pulses);

c) starchy root crops;

d) livestock systems in Southeast Asia;

e) upland crops in Asia -- sorghums, grain legumes, corn (maize), millet, barley, and appropriate cropping systems;

f) farming systems suitable to the semi-arid areas of West Asia and Africa;

g) policy, management and analysis of socio-economic and development strategy problems.

Means: 1) Present to the April 1970 Conference at Bellagio such analyses as are available to be used for illustrative purposes, e.g., water management;

2) Invite the Foundations and other appropriate bodies to establish one or more task forces to work in consultation with possible donors;

3) Establish funding sources for task force work and proceed with an analysis of funding opportunities for one or more new thrusts of the type listed.

III. Give Economic and Social Problems Special Attention

Identify key problems for study in the economic and social disciplines and determine suitable centers for work on these on a project basis.

Means: 1) A task force analysis should be considered consistent with the measures suggested in II;

2) Request the Foundations and other groups to report on preliminary thinking.

IV. Involve Key Scientists in Structural Workshops

Arrange well prepared workshops which bring together key groups of persons, and especially those working in isolated situations who are actively researching particular crop, animal or functional problems to:

a) assess the present status of research;

b) identify key limiting factors;

c) identify internship training opportunities;

d) facilitate international cooperative work and the exchange of information and research materials.

Means:

1) One institution such as FAO or the UNDP plan, fund and conduct a trial workshop as a learning pilot experience. This could begin with an examination of the "Rice Outlook for the 70's" as a source of procedural ideas. The trial workshop should be carefully evaluated. If the findings are favorable, a program of, say, two per year might be launched.

2) Fund (from some source or sources) a national research center or academy of science to undertake one or a series of such workshops.

3) Combine 1) and 2) or request present international centers to organize and conduct such workshops even though the subject matter is not necessarily the specialty of the center. Arrange funding.

V. Support Informational and Related Services for Researchers

1) Review the status of efforts intended to improve agricultural research information management systems.

2) Review the steps necessary to strengthening research support services by building better and more embracive information and statistical files of research and development experience, by encouraging the establishment of germ plasm banks, by continuing and further developing agro-meteorological and other programs which will lead to a better understanding of the ecological environment for agriculture.

Means: Invite FAO to follow-up and present a report to the April 1970 Bellagio meeting.

VI. Continue to Emphasize Training

1) Continue and expand existing fellowship and other training programs which select and send trainees to international centers and other institutions offering specialized training in agricultural production technology.

2) Sponsor travel-study programs for scientists, policy makers, and others concerned with national and international agricultural development to permit visits to premier research centers and outstanding development programs for direct contact and observation.

Means: Invite international and bilateral agencies concerned to give sympathetic consideration to requests for such training assistance noting the usefulness of FAO experience in this respect.

Legend: 0 Present technical knowledge is generally adequate to support production extension programs where the idiosyncrasies of the farming environment do not demand specially designed or particularly adapted research results.

+ There seems to be a general deficiency in present technical knowledge of how to raise farm output. The number of + marks gives a rough indication of the relative extent of the deficiency, +++ indicating the greatest need for more research, and ++ and + indicating respectively lower levels of need.

? Situation unknown to the authors of the table.

- The subject matter is not relevant to the farming of the geographic region.

* This table must be used with great caution. It was not discussed fully at the Conference and little attempt was made to probe its contentions or verify its pretensions. It was presented to the Conference as a rough "cocktail session" outline of problem areas as seen by Grom, Fournier and Hopper. It reflects impressions, experience and conference suggestions. The authors and many members of the Conference suggested the need for greater subject matter and geographic detail. Greater detail was not included, however, because more "boxes" would have led to more question marks and, perhaps, to even greater errors of judgment. The table was appended to the Conference summary because, for all its limitation, it was found useful as a first approximation exposure of needed agricultural research.

In developing the table, the authors discussed and then specifically excluded consideration of plantation food crops. The exclusion is not a reflection of the unimportance of these crops as food sources in many areas of the world. The decision to exclude them from the table was taken purely on pragmatic grounds of the inadequacy of the authors' own knowledge about them and the need to keep the table within reasonable bounds.

It should be pointed out that the table does not indicate the relative importance of each subject matter item in the agriculture or in the agricultural development opportunities of a given geographic region. It is only a rough ranking of the adequacy of the technical knowledge available upon which to found the acceleration of agricultural modernization.

Table I. An Impressionistic View of the Need or Adequacy of Present Technical Knowledge for Accelerating Farm Production of Food Crops and Livestock, and for Improving Farm Productions Systems*

1. CROP-ORIENTED TECHNOLOGY - CEREALS

Crop	Monsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & Mountain Areas	Comments
Rice									
Irrigated Controlled	0	0	0	+	–	0	0	–	
Deepwater	++	++	–	–	?	–	–	–	
Swamp	–	–	–	–	++	?	–	–	
Upland	+	+	–	++	+	+++	–	–	
Wheat									
Irrigated	–	0	+	+++	–	–	?	–	Q in East Africa
Rainfed Spring	–	+++	+++	–	0	–	+++	–	
Rainfed Water	–	–	+++	–	–	–	–	+++	
Barley									
Rainfed Spring	–	+++	+++	–	–	–	?	–	
Rainfed Winter	–	–	++	–	–	–	–	?	
Millet									
Pennisetum	–	+++	–	+++	++	?	–	–	
Eleusine	–	++	–	–	++	?	–	–	
Sorghum									
Rainfed Humid	+++	+++	+++	+++	++	?	+	?	
Rainfed Semi-arid	–	+++	+++	+++	++	?	–	?	
Maize									
Irrigated	–	0	++	++	–	?	–	–	
Rainfed Humid	+++	++	++	++	+++	++	++	++	
Rainfed Semi-arid	–	+	–	–	+++	–	–	–	

2. CROP-ORIENTED TECHNOLOGY - OTHER CROPS

Leguminous Oilseeds			(2)						(1) Groundnuts
Groundnuts	+++	+++	+	0	+++	+++	++	–	Irrigated in
Soya	+++			+++	++	+++	?	+++	X-East

CROP-ORIENTED TECHNOLOGY - OTHER CROPS

Crop	Moonsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & High Mountain	Comments
ain Legumes									(1) Maybe unimportant because of adequate animal protein
emperate	-	+++	+++	+++	-	-	?(1)	++	
ropical	+++	+++		+++	+++	+++	+	+	
opical Root Tubers	++	+	-	-	+++	+++	-	-	
antains	++	+	-	-	+++	+++	-	-	
ish Potatoes	-	++	0	-	-	-	?	+++	
uits and Vegetables									See Annex
LIVESTOCK-ORIENTED TECHNOLOGY									
ropical Bovines									
Breeding research using present fodders	+	++	++	+++	+++	++	0	?	
Fodder research using present breeds	+++	+++	+++	+++	+++	+++	+++	?	
ntensive animal management altering both fodders and breeds	+++	+++	+++(1)	+++	+++	+++	+++	?	(1) Mainly under irrigation
astoral animal management systems	-	+++	+++	+++	-	-	++	?	
ivestock processing and marketing	+++	+++	++	+++	+++	+++	+	?	
igs and poultry									See Annex
. FARM PRODUCTION SYSTEMS TECHNOLOGY									
ifficult Environments									
. Low Rainfall Areas	+	+++	+++(1)	+++	-	-	-	-	1. and 2. can be tackled together in several countries of Near East & North Africa
. High Mountain Areas	-	+	+++	-	++	-	-	+++	
. Shifting Cultivation Areas	+++	+++	-	-	+++	+++	-	-	

4. FARM PRODUCTION SYSTEMS TECHNOLOGY (continued)

	Monsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & Mountain Areas	Comments
4. Water Resources and Use									
Inventory of Water Resources	++	+++	++	+	+	?	?	-	
Methods of Water Exploitation	+	++	+++	+++	+	?	?	-	
Methods of On-Farm Water Management	+++	+++	+++	+++	++	+	?	-	

5. TECHNOLOGIES TO PREVENT LOSSES

Grain Storage, Drying, Milling & Processing	+++	+++	+	+++	+++	+++	0	++	
Rodent Control (1)	+++	+++	?	?	?	?	?	?	Could this be on a project basis?

6. Subjects of Importance Requiring Attention

1. Fruit & Vegetable Crops: Needs a "systems" approach including production, marketing, and processing. Difficult to define priorities. Probably should be aimed at intensive work related to urban developments.
2. Multiple Cropping: Very important. Should it be a separate institute or part of programs of existing or proposed co-op oriented international stations? (This might also apply to "water use and management.")
3. Tropical Soil Fertility: Cover crops, shifting from shifting cultivation, fallows, etc. - Comments as 2 above.
4. Pigs and Poultry: Could this perhaps be handled by appropriate government services plus incentives to private industry?
5. Mechanization: Probably best studied by wings of existing or proposed institutes rather than a special one.
6. Employment: As 5 above, information being fed into a larger coordinated project contracted to an agency, or a university? Do we need some kind of "Agricultural Policy Institute"?
7. Water Pollution: Of growing concern. Agriculture both a main asset and a main polluter. Perhaps a "developed country" project.
8. Pesticide Pollution: Long-term toxic hazards for DDT, mercury, etc. Essential to find cheap, safe, effective substitutes: As 7 above.
9. Animal Disease Control: Especially those affecting large areas (F&M: Trypanosomiasis). Perhaps a program approach?

ANNEX 2

PROVISIONAL AGENDA FOR AGRICULTURAL RESEARCH MEETING
ON JANUARY 14-15, 1971

1. Adoption of the agenda.

2. Opening statement by the Chairman.

3. "Overview" by FAO representative of major weaknesses in present agricultural production and related research efforts in developing countries.

4. Report on bilaterally-supported research effort in or on behalf of developing countries. (To be compiled by IBRD on the basis of information supplied by bilateral agencies.)

5. Report by representatives of the Ford and Rockefeller Foundations on the four international agricultural research institutes being supported by them. 1/

6. Progress report on feasibility studies now under way as a basis for possible new international agricultural research institutes. 2/

7. Establishment of a possible International Agricultural Research Consultative Group or comparable mechanism, including its terms of reference, composition, organizational structure, financing

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1/ These institutes are CIMMYT (International Maize and Wheat Improvement Centre) in Mexico; IRRI (International Rice Research Institute) in the Philippines; CIAT (International Centre of Tropical Agriculture) in Colombia; and IITA (International Institute of Tropical Agriculture) in Nigeria.

2/ There are five such studies, i.e.,

(a) water management for crop production at the farm level;

(b) upland (i.e., rainfed) crops in S.E. Asia;

(c) food legumes;

(d) livestock diseases and wider problems of animal husbandry in Africa south of Sahara; and

(e) economic policies for rural development.

In addition, the Commonwealth Scientific Industrial Research Organization of Australia is considering work on livestock development in S.E. Asia.

and future procedures. (The Bank/FAO staff paper, dated November 17, 1970, entitled "Possible Objectives, Composition, and Organizational Structure of an International Agricultural Research Consultative Group" will provide a basis for the discussion of this agenda item.)

8. Future action, including date and location of first regular meeting of Consultative Group or other comparable grouping, if decision is reached to create one, date and agenda of the first meeting of Technical Advisory Committee, if agreed upon, and action required from the Secretariat in preparation for these meetings.

9. Other business.

Washington, D.C.
November [illegible], 1970

ANNEX 3

LIST OF GOVERNMENTS AND ORGANIZATIONS INVITED TO AGRICULTURAL RESEARCH MEETING, JANUARY 14-15, 1971

Countries

Australia
Austria
Belgium
Canada
Denmark
France
Germany
Italy
Japan
Netherlands
Norway
Sweden
Switzerland
United Kingdom
United States

Banks

Africa Development Bank
Asia Development Bank
Inter-American Development Bank

Foundations

Ford Foundation
Kellogg Foundation
Rockefeller Foundation

Intergovernmental Organizations

European Development Fund
Development Assistance Committee of OECD

THE FORD FOUNDATION
320 EAST 43RD STREET
NEW YORK, NEW YORK 10017

INTERNATIONAL DIVISION
LATIN AMERICA

March 19, 1970

TO : Agricultural Development Conference Participants

SUBJECT : Revised Summary of Conference Held at Villa Serbelloni, Bellagio, Italy, February 3-6, 1970

Gentlemen:

Thank you for your comments on the draft conference summary forwarded to you under date of February 19, 1970. We have attempted to incorporate your suggestions in the attached revised summary. The revised summary will be distributed to individuals who participate in the forthcoming conference to be held in Bellagio the week of April 6.

Sincerely,

Lowell Hardin

Lowell S. Hardin

Encl

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Considering the current situation, the analysis made above, the rough approximations made in Table I, and the record of deliberations of the April 1969 Bellagio Conference, the following suggestions are advanced:

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Means: As finance for expanded research beyond the capacity of the Foundations is clearly required an organization for funding is desirable. It is suggested that tentative proposals by the IBRD involving a consortium or consultative group or groups be examined and resolved, keeping in mind the need: 1) to encourage multilateral and bilateral donors to participate in the necessary funding and 2) to make decisions arising out of other suggestions in this paper.

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c) starchy root crops;

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e) upland crops in Asia -- sorghums, grain legumes, corn (maize), millet, barley, and appropriate cropping systems;

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Means: Invite FAO to follow-up and present a report to the April 1970 Bellagio meeting.

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Table 1. An Impressionistic View of the Need or Adequacy of Present Technical Knowledge for Accelerating Farm Production of Food Crops and Livestock, and for Improving Farm Productions Systems*

1. CROP-ORIENTED TECHNOLOGY - CEREALS

Crop	Monsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & Mountain Areas	Comments
Rice									
Irrigated Controlled	0	0	0	+	–	0	0	–	
Deepwater	++	++	–	–	?	–	–	–	
Swamp	–	–	–	–	++	?	–	–	
Upland	+	+	–	++	+	+++	–	–	
Wheat									
Irrigated	–	0	+	+++	–	–	?	–	O in East Africa
Rainfed Spring	–	+++	+++	–	0	–	+++	–	
Rainfed Water	–	–	+++	–	–	–	–	+++	
Barley									
Rainfed Spring	–	+++	+++	–	–	–	?	–	
Rainfed Winter	–	–	++	–	–	–	–	?	
Millet									
Pennisetum	–	+++	–	+++	++	?	–	–	
Eleusine	–	++	–	–	++	?	–	–	
Sorghum									
Rainfed Humid	+++	+++	+++	+++	++	?	+	?	
Rainfed Semi-arid	–	+++	+++	+++	++	?	–	?	
Maize									
Irrigated	–	0	++	++	–	?	–	–	
Rainfed Humid	+++	++	++	++	+++	++	++	++	
Rainfed Semi-arid	–	+	–	–	+++	–	–	–	

2. CROP-ORIENTED TECHNOLOGY - OTHER CROPS

Leguminous Oilseeds			(1)						(1) Groundnuts irrigated in Near East
Groundnuts	+++	+++	+	0	+++	+++	++	–	
Soya	+++	++		+++	+++	+++	?	+++	

2. CROP-ORIENTED TECHNOLOGY - OTHER CROPS

Crop	Moonsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & High Mountain	Comments
Grain Legumes									
Temperate	-	+++	+++	+++	-	-	?(1)	++	(1) Maybe unimportant because of adequate animal protein
Tropical	+++	+++		+++	+++	+++	+	+	
Tropical Root Tubers	++	+	-	-	+++	+++	-	-	
Plantains	++	+	-	-	+++	+++	-	-	
Irish Potatoes	-	++	0	-	-	-	?	+++	
Fruits and Vegetables									See Annex

3. LIVESTOCK-ORIENTED TECHNOLOGY

Tropical Bovines									
Breeding research using present fodders	+	++	++	+++	+++	++	0	?	
Fodder research using present breeds	+++	+++	+++	+++	+++	+++	+++	?	
Intensive animal management altering both fodders and breeds	+++	+++	+++(1)	+++	+++	+++	+++	?	(1) Mainly under irrigation
Pastoral animal management systems	-	+++	+++	+++	-	-	++	?	
Livestock processing and marketing	+++	+++	++	+++	+++	+++	+	?	
Pigs and poultry									See Annex

4. FARM PRODUCTION SYSTEMS TECHNOLOGY

Difficult Environments									
1. Low Rainfall Areas	+	+++	(+++(1)	+++	-	-	-	-	1. and 2. can be tackled together in several countries of Near East & North Africa
2. High Mountain Areas	-	+	(+++	-	++	-	-	+++	
3. Shifting Cultivation Areas	+++	+++	-	-	+++	+++	-	-	

4. FARM PRODUCTION SYSTEMS TECHNOLOGY (continued)

	Monsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & Mountain Areas	Comments
4. Water Resources and Use									
Inventory of Water Resources	++	+++	++	+	+	?	?	-	
Methods of Water Exploitation	+	++	+++	+++	+	?	?	-	
Methods of On-Farm Water Management	+++	+++	+++	+++	++	+	?	-	

5. TECHNOLOGIES TO PREVENT LOSSES

Grain Storage, Drying, Milling & Processing	+++	+++	+	+++	+++	+++	0	++	
Rodent Control (1)	+++	+++	?	?	?	?	?	?	Could this be on a project basis?

6. Subjects of Importance Requiring Attention

1. Fruit & Vegetable Crops: Needs a "systems" approach including production, marketing, and processing. Difficult to define priorities. Probably should be aimed at intensive work related to urban developments.
2. Multiple Cropping: Very important. Should it be a separate institute or part of programs of existing or proposed co-op oriented international stations? (This might also apply to "water use and management.")
3. Tropical Soil Fertility: Cover crops, shifting from shifting cultivation, fallows, etc. - Comments as 2 above.
4. Pigs and Poultry Could this perhaps be handled by appropriate government services plus incentives to private industry?
5. Mechanization: Probably best studied by wings of existing or proposed institutes rather than a special one.
6. Employment: As 5 above, information being fed into a larger coordinated project contracted to an agency, or a university? Do we need some kind of "Agricultural Policy Institute"?
7. Water Pollution: Of growing concern. Agriculture both a main asset and a main polluter. Perhaps a "developed country" project.
8. Pesticide Pollution: Long-term toxic hazards for DDT, mercury, etc. Essential to find cheap, safe, effective substitutes: As 7 above.
9. Animal Disease Control: Especially those affecting large areas (F&M: Trypanosomiasis). Perhaps a program approach?

Legend:

O — Present technical knowledge is generally adequate to support production extension programs where the idiosyncrasies of the farming environment do not demand specially designed or particularly adapted research results.

\+ — There seems to be a general deficiency in present technical knowledge of how to raise farm output. The number of + marks gives a rough indication of the relative extent of the deficiency, +++ indicating the greatest need for more research, and ++ and + indicating respectively lower levels of need.

? — Situation unknown to the authors of the table.

\- — The subject matter is not relevant to the farming of the geographic region.

* This table must be used with great caution. It was not discussed fully at the Conference and little attempt was made to probe its contentions or verify its pretensions. It was presented to the Conference as a rough "cocktail session" outline of problems areas as seen by Oram, Fournier and Hopper. It reflects impressions, experience and conference suggestions. The authors and many members of the Conference suggested the need for greater subject matter and geographic detail. Greater detail was not included, however, because more "boxes" would have led to more question marks and, perhaps, to even greater errors of judgment. The table was appended to the Conference summary because, for all its limitation, it was found useful as a first approximation exposure of needed agricultural research.

In developing the table, the authors discussed and then specifically excluded consideration of plantation food crops. The exclusion is not a reflection of the unimportance of these crops as food sources in many areas of the world. The decision to exclude them from the table was taken purely on pragmatic grounds of the inadequacy of the authors' own knowledge about them and the need to keep the table within reasonable bounds.

It should be pointed out that the table does not indicate the relative importance of each subject matter item in the agriculture or in the agricultural development opportunities of a given geographic region. It is only a rough ranking of the adequacy of the technical knowledge available upon which to found the acceleration of agricultural modernization.

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Villa Serbelloni, Bellagio (Como), Italy
February 3-6, 1970

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NEW YORK, NEW YORK 10017

INTERNATIONAL DIVISION
LATIN AMERICA

March 19, 1970

TO : Agricultural Development Conference Participants

SUBJECT : Revised Summary of Conference Held at Villa Serbelloni, Bellagio, Italy, February 3-6, 1970

Gentlemen:

Thank you for your comments on the draft conference summary forwarded to you under date of February 19, 1970. We have attempted to incorporate your suggestions in the attached revised summary. The revised summary will be distributed to individuals who participate in the forthcoming conference to be held in Bellagio the week of April 6.

Sincerely,

Lowell Hardin

Lowell S. Hardin

Encl

ACCELERATING AGRICULTURAL MODERNIZATION IN DEVELOPING NATIONS

A Summary of Findings and Suggestions of
Agriculturists from Development Assistance Agencies
Villa Serbelloni, Bellagio, Italy
February 3-6, 1970*

THE CURRENT SITUATION

In the past couple of years the agricultural sector of many developing countries has exhibited a new vitality, especially in cereal production. Contrary to the situation of a few years ago, this vitality has reached to farms usually considered traditional, even subsistence, in their production patterns. The increased output has made a substantial contribution to national economic growth, to the material well-being of peoples, and to total development.

It is likely that the altered technologies from which this so-called green revolution has sprung will continue to play a significant role in expanding food output in many countries in the next few years. Continued research on the adaptation of new varieties of wheat and rice (and the practices that must accompany their use) to local environments and to major pests and pathogens will permit a wider diffusion of production benefits among farmers and better protection of existing yields on the farms of present adopters. Indeed in some countries there is an imminent or intermediate term prospect that production will exceed domestic demand causing low farm product prices as well as strains on national and international marketing systems and older patterns of trade. The new farm technologies and their potential high productivity may create or aggravate regional disparities in per capita incomes. Also, they may reveal in stark terms some of the issues of equity surrounding national patterns of income and wealth distribution, and may contribute to further rural under-employment or unemployment, exacerbating urban migrations of rural peoples or rural social and political unrest. These are real problems which cannot be ignored and which should be urgently addressed.

In the longer term, however, the seemingly inexorable growth of world populations creates needs that will overshadow the short-run difficulties accompanying the new technologies. Present growth rates of population in Asia alone will add over 30 percent to its close to one billion people (excluding Mainland China) in the next ten years. To feed these new mouths and to ensure the necessary

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*Conference sponsored by the Rockefeller Foundation as a follow-up to an earlier Agricultural Development Conference at the same location, April 23-25, 1969. See proceedings of 1969 conference as published by the Rockefeller Foundation.

agricultural contribution to economic growth of nations requires a very much broader foundation than is now available. More modern farm technology and a larger pool of manpower trained and skilled in the science and technology of farm production methods are required. These long run problems set the backdrop for the conference. Specific concern centered on feeding more people to a better nutritional standard, of providing assurance that agriculture continues to play a strongly contributive role in national economic development by growing apace with the economy and by offering gainful employment to large numbers of people irrespective of their command over personal land or capital resources.

A year ago, prospects of local wheat and rice surpluses in areas which were formerly food deficit were viewed as a possible problem. This is an important matter. But now the concerns are more generally: (a) whether over the decade of the 70's a rate of increase of 3 or 4 percent in grain output can be sustained in nations such as India and (b) whether in the developing nations available diets can in fact be improved in the face of unrelenting population increases.

The impact of existing improved wheat and rice production technologies necessarily will be limited to areas with reasonably assured water (or drainage) for crop growth. Vast land areas suited to other crops or other systems of farming as yet remain untouched by modern technologies and will remain so unless present research endeavors are intensified and strengthened. The experience of the past few years has indicated that traditional farmers will modernize their agriculture as rapidly as their personal resources and inherent propensity to caution will permit when:

1. markedly superior production technologies are available in comprehensive packages that have been adapted, tested and demonstrated as applicable for local use; and

2. favorable input to product price relationships prevail and can be expected to be maintained for two or three production seasons so that the risks of innovation are reduced and the costs associated with learning new techniques can be re-couped; and

3. efforts are coordinated successfully to provide the needed inputs at the time and place required and to assure product markets close to the farmer; and

4. an atmosphere of commitment to rural development and the initiative for its implementation are forthcoming from government.

In the case of small or tenant farmers, provisions of credit or security of tenure may be necessary to overcome resource shortages or to redress the disincentives of sharecropping.

The problem seems not to be the farmer. The focus of attention must be on the productive sureness of the proferred technological package, on the incentives in its profitability, on the infrastructure of market and other rural services available to the cultivator to support his decision for progress, and on the national ethos for development.

ANALYSIS

Recognizing the necessary role that research-generated, superior technology must play in agricultural advance, an illustrative (and very impressionistic) inventory of research needs was attempted (Table I). This tabulation of enterprises and functions by geographic areas is neither complete nor verified. It does indicate, however, judgments of relative need. Note the almost consistent three star rating (greatest need) for sorghums, grain legumes, tropical root crops, tropical livestock systems and water management. Note also the need to broaden the present relatively strong position of wheat and rice under controlled irrigation to embrace production technologies suited to harsher agricultural environments so that many more cultivators may participate in the harvest of development.

Before evolving specific suggestions in the research, training and program areas, some general guidelines were developed. While only partially spelled out here, they reflect the group's experience:

1. On-farm trials should be an integral component of national research undertakings. Extension or action types of rural production programs should be preceded by on-farm field verification trials to be certain that locally adapted, superior packages of technology are available, understood and profitable.

2. The national research-field verification trial system can often, if it takes care to do so, generate improved production packages which are suitable for small holdings as well as for larger farm units.

3. Understanding and involvement of policy makers are essential if an economic and political environment conducive to change is to be created. Involvement of state, regional and central planning bodies may be of critical importance.

4. Several types of institutional arrangements for technical-vocational and college level agricultural training, research and advisory services can work satisfactorily (e.g., Japanese, Taiwanese, U. S., Canadian, French, British, and other models). Identification and performance of essential functions rather than the institutional model itself are the important issues. Included here is a realistic projection of trained manpower needs by categories; plans to bring needed manpower on stream; training institutions which are production oriented with provision for useful internship type of experience or its equivalent.

5. Regional research (as contrasted to national or international) centers or programs logically have a role to play. For a variety of reasons, especially the difficulty of creating and maintaining multidisciplinary institutions, they have thus far achieved only modest success on the whole. Indeed, many of the essential regional functions might be better performed by a national institution which has an open policy of rendering regional services. Regionally-oriented institutions can work well where:

   a) the users demand the institutions or programs and are willing to participate in their financing;

   b) the institutions or programs are genuinely responsive and useful to its user cooperators;

   c) leadership is effective;

   d) personnel of high quality are engaged;

   e) working linkages are effectively forged so that each institution has political influence for development;

   f) the management and staff pursue a cohesive mission-oriented research doctrine with consistency and continuity.

6. International Centers of the IRRI-CIMMYT-CIAT-IITA type should be fully supported so long as their performance merits it. In addition, the potential contribution of possible new centers should be carefully assessed (see Suggestions below). International centers were viewed as institutional innovations designed to speed national development and to serve as tools to assist the building of stronger, harder-hitting national research programs and national problem-solving capabilities.

7. Information retrieval and dissemination in agricultural research and development experience among nations is haphazard at best. Reliance is placed upon obsolete communication technology. This frequently precludes the use of that which is already known or somewhere available and slows the pace of technological development (see Suggestions below).

8. While technological research on production and marketing properly seeks to increase agricultural productivity, the target of more rapid national output growth need not necessarily be in conflict with the larger goals of social justice. Strategies should be such as to minimize trade-offs between growth, which is essential, and the limited spread of the benefits of growth. Because widespread participation of the population in development is sought, greater depth in policy and development management analysis is needed.

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Upland	+	+	–	++	+	+++	–	–	
Wheat									
Irrigated	–	0	+	+++	–	–	?	–	O in East
Rainfed Spring	–	+++	+++	–	0	–	+++	–	Africa
Rainfed Water	–	–	+++	–	–	–	–	+++	
Barley									
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Millet									
Pennisetum	–	+++	–	+++	++	?	–	–	
Eleusine	–	++	–	–	++	?	–	–	
Sorghum									
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2. CROP-ORIENTED TECHNOLOGY - OTHER CROPS

Leguminous Oilseeds			(1)						(1) Groundnuts
Groundnuts	+++	+++	+	0	+++	+++	++	–	irrigated in
Soya	+++	++		+++	+++	+++	?	+++	Near East

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3. LIVESTOCK-ORIENTED TECHNOLOGY

Tropical Bovines									
Breeding research using present fodders	+	++	++	+++	+++	++	0	?	
Fodder research using present breeds	+++	+++	+++	+++	+++	+++	+++	?	
Intensive animal management altering both fodders and breeds	+++	+++	+++(1)	+++	+++	+++	+++	?	(1) Mainly under irrigation
Pastoral animal management systems	-	+++	+++	+++	-	-	++	?	
Livestock processing and marketing	+++	+++	++	+++	+++	+++	+	?	
Pigs and poultry									See Annex

4. FARM PRODUCTION SYSTEMS TECHNOLOGY

Difficult Environments									
1. Low Rainfall Areas	+	+++	(+++(1)	+++	-	-	-	-	1. and 2. can be tackled together in several countries of Near East & North Africa
2. High Mountain Areas	-	+	(+++	-	++	-	-	+++	
3. Shifting Cultivation Areas	+++	+++	-	-	+++	+++	-	-	

4. FARM PRODUCTION SYSTEMS TECHNOLOGY (continued)

	Monsoon Asia	South Asia	Near East N. Africa	Sudanian Africa	Tropical Africa	Tropical Latin America	Temperate Latin America	Andean & Mountain Areas	Comments
4. Water Resources and Use									
Inventory of Water Resources	++	+++	++	+	+	?	?	-	
Methods of Water Exploitation	+	++	+++	+++	+	?	?	-	
Methods of On-Farm Water Management	+++	+++	+++	+++	++	+	?	-	

5. TECHNOLOGIES TO PREVENT LOSSES

Grain Storage, Drying, Milling & Processing	+++	+++	+	+++	+++	+++	0	++	
Rodent Control (1)	+++	+++	?	?	?	?	?	?	Could this be on a project basis?

6. Subjects of Importance Requiring Attention

1. Fruit & Vegetable Crops: Needs a "systems" approach including production, marketing, and processing. Difficult to define priorities. Probably should be aimed at intensive work related to urban developments.
2. Multiple Cropping: Very important. Should it be a separate institute or part of programs of existing or proposed co-op oriented international stations? (This might also apply to "water use and management.")
3. Tropical Soil Fertility: Cover crops, shifting from shifting cultivation, fallows, etc. - Comments as 2 above.
4. Pigs and Poultry Could this perhaps be handled by appropriate government services plus incentives to private industry?
5. Mechanization: Probably best studied by wings of existing or proposed institutes rather than a special one.
6. Employment: As 5 above, information being fed into a larger coordinated project contracted to an agency, or a university? Do we need some kind of "Agricultural Policy Institute"?
7. Water Pollution: Of growing concern. Agriculture both a main asset and a main polluter. Perhaps a "developed country" project.
8. Pesticide Pollution: Long-term toxic hazards for DDT, mercury, etc. Essential to find cheap, safe, effective substitutes: As 7 above.
9. Animal Disease Control: Especially those affecting large areas (F&M: Trypanosomiasis). Perhaps a program approach?

egend:

O Present technical knowledge is generally adequate to support production extension programs where the idiosyncrasies of the farming environment do not demand specially designed or particularly adapted research results.

\+ There seems to be a general deficiency in present technical knowledge of how to raise farm output. The number of + marks gives a rough indication of the relative extent of the deficiency, +++ indicating the greatest need for more research, and ++ and + indicating respectively lower levels of need.

? Situation unknown to the authors of the table.

\- The subject matter is not relevant to the farming of the geographic region.

This table must be used with great caution. It was not discussed fully at the Conference and little attempt was made to probe its contentions or verify its pretensions. It was presented to the Conference as a rough "cocktail session" outline of problems areas as seen by Oram, Fournier and Hopper. It reflects impressions, experience and conference suggestions. The authors and many members of the Conference suggested the need for greater subject matter and geographic detail. Greater detail was not included, however, because more "boxes" would have led to more question marks and, perhaps, to even greater errors of judgment. The table was appended to the Conference summary because, for all its limitation, it was found useful as a first approximation exposure of needed agricultural research.

In developing the table, the authors discussed and then specifically excluded consideration of plantation food crops. The exclusion is not a reflection of the unimportance of these crops as food sources in many areas of the world. The decision to exclude them from the table was taken purely on pragmatic grounds of the inadequacy of the authors' own knowledge about them and the need to keep the table within reasonable bounds.

It should be pointed out that the table does not indicate the relative importance of each subject matter item in the agriculture or in the agricultural development opportunities of a given geographic region. It is only a rough ranking of the adequacy of the technical knowledge available upon which to found the acceleration of agricultural modernization.

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