Agricultural sciences and the world food supply

An international symposium
organized by the Agricultural University,
Wageningen, the Netherlands,
on the occasion of its golden jubilee

March, 4-6, 1968

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Participation: No membership fee. Participants are requested to complete the attached application form. This form should reach International Agricultural Centre, P.O. Box 88, Wageningen, the Netherlands, as soon as possible but not later than February 1, 1968.

The Symposium Bureau is located in the "Aula" (the central hall of the Agricultural University), Generaal Foulkesweg 1a, Wageningen, tel. 3400.

Registration:
Saturday, March 2 from 14.00-18.00,
Sunday, March 3 from 14.00-20.00,
and during the Symposium.

The opening of the Symposium will be on Monday, March 4 at 14.45.

All lectures will be held in the Aula of the Agricultural University. There will be sufficient time for discussion.

The official working language of the Symposium will be English.

Lunches will be served at the cost of Hfl. 4.00 at the students' club "Ceres", Generaal Foulkesweg 1b. In the Aula beverages will be served at the price of Hfl. 0.50. Tickets may be obtained for lunches and beverages during registration.

Excursion: An excursion on Sunday, March 3 is to be arranged for foreign participants.

Proceedings: The lectures will be published in full after the Symposium. Participants can obtain one copy at the subscription price.

Monday, March 4, 1968

14.45 Welcome address by the President.
Opening of the Symposium by the Honorary President, S. L. MANSHOLT, Vice-President of the Commission of the European Economic Community (Brussels, Belgium).

15.00 E. DE VRIES (Chalkhill, U.S.A.):
World population, food demand and the agricultural sciences during the last 50 years.

21.00 Reception by the Minister of Agriculture and Fisheries.

Tuesday, March 5, 1968

9.30 C. T. DE WIT (Wageningen, the Netherlands):
Plant production.

12.30 Break for lunch.

14.00 H. P. DONALD (Edinburgh, Great Britain):
Research and development in animal production.

20.00 Musical evening.

Wednesday, March 6, 1968

9.30 H. A. B. PARPIA (Mysore, India):
Conservation and technological production.

12.30 Break for lunch.

14.00 P. LAMARTINE YATES (Geneva, Switzerland):
The future of farming and food.

16.30 Closing of the Symposium by the President.

WORLD POPULATION, FOOD DEMAND AND THE AGRICULTURAL SCIENCES DURING THE LAST 50 YEARS

E. DE VRIES

Professor of International Development, Graduate School of Public and International Affairs, University of Pittsburgh

The period 1918-1968 is characterized by the continued growing of one-world-society. World population rose at an accelerating rate causing a commensurate increase in demand for food. For an increasing number of products, the industrialized countries became net-exporters, causing a paradoxical situation in world development.
The agricultural sciences were repeatedly and seriously challenged by these developments. Agricultural prices would be very high at present, unless agricultural science and techniques had provided an underlying basis for surplus conditions.
The *contributions to increased production* at the production-input side have been: 1) immediate impact on yields, mainly through genetics; 2) reduction of losses in transport and storage; 3) expansion of area under cultivation by heavy earth moving machinery; 4) indirectly by chemical substitutes for important inputs.
The result is a *reduction in cost of production.* Mechanization offered another improvement (combustion motor and rubbertire).
The impact of the social (and political) sciences also has been great, notably through studies and measures on: 1) farm-management and support prices on domestic markets; 2) stabilisation of prices on world markets; 3) land tenure and land use; 4) incentives for higher production.
Agricultural policies are feasible and can be effective, on a national as well as a continental or world scale.
Plants, animals and humans, working for agricultural production, *can be manipulated.* Research has shown the basic rational motivations and reaction of the farmers, as well as the need for maintaining an ecological equilibrium.
A *variety of sciences* has influenced these processes. A widening of the field of relevant sciences with the adjective "agricultural" or "rural" is apparent. These agricultural sciences have shown great

internal development. In 1918 they still were largely Europe-oriented. At present they have a worldwide connotation and have become *comparative* and *integrated*. The scope of immediate transfer of findings has been limited, but the scope of applicability has been greatly widened through appropriate checkings.

In the order of *basic, comparative* (or environmental) *and integrated* these internal developments have been accepted. *Agricultural Science,* as an integrated scientific approach to the problems of agricultural production and producers, processing and consumption, as well as governmental and inter-governmental action, perhaps has suffered. The concept of a synthesis still is there, as is shown by the rapid growth of interrelated branches of activity, research, application of research and teaching. The agricultural metropolis of Wageningen itself is a good example.

There is a need for a concerted action for synthesis in the next decades, as a scientific counteraction towards diversification and specification. Tremendous tasks are ahead of us: the factory-production of food; the implications of the biological breakthrough in our knowledge of the process of life; the effect of various chemical substances on human, plant and animal life; the problems of the tropical, the desert and the arctic environment; the nutritional problems of the developing countries. However, the combined effect of agricultural sciences opens an unprecedented vista for more and better production. Without agricultural science we all now would be starving, or pay 40 % of our income on food.

The benefits resulting from agricultural improvement and application of science justify government support from tax money for these purposes, far beyond the interests of the farmer's groups. The unique nature-man symbiosis, which characterises agricultural science, should motivate scientists of great diversity to think together and stick together in order to act responsibly in a rapidly changing world.

PLANT PRODUCTION

C. T. DE WIT
Institute for Biological and Chemical Research of Field Crops and Herbage, Wageningen

The theory on soil fertility developed by Von Wulffen in the beginning of the 19th century is discussed as an illustrative example of system synthesis in agriculture. Subsequently the revolutionary progress of the knowledge in this field is considered with special emphasis on the present state of affairs. The art of water management developed also in a science, but progress here is mainly due to an increased technological capability.

The history is reviewed of estimating yields of crops, grown under conditions where climate rather than water and mineral supply is limiting. Estimates of potential photosynthesis rates, maximum growth rates and maximum yields are compared with experimental results. Husbandry problems under those conditions are discussed, possible impacts of new technologies evaluated and the contribution of various disciplines to the increase of yields is considered.

Present trends in plant breeding and plant physiology are surveyed and examples are given to show that an integrated approach is necessary to make major advances. Since a few years computers are so large and fast that system synthesis according to the principles of Wulffen may be again attempted, but now at a much more sophisticated level.

Eight out of ten farmers in the world manage to obtain yields which are at best comparable with the yields in Western Europe 150 years ago. Artificial fertilizers have to provide the leverage for the integrated effort necessary to improve this deplorable situation, this even more so than water. Well managed, 20 percent of the arable land or 1.5 percent of the global surface could provide at least the caloric needs of ten times the present human population.

RESEARCH AND DEVELOPMENT IN ANIMAL PRODUCTION

H. P. DONALD
Director Animal Breeding Research Organisation, Edinburgh

1. Past and present agricultural practices show that throughout history animal production has been a function of five variables. These are (a) genetic adaptation, (b) environment, (c) markets, (d) capital, and (e) human nature and institutions. Changes in any of them are likely to produce repercussions in the others.
2. Current research in animal production is reviewed against this background.
3. The absorption of technical advances is usually very slow. Exceptions prove that this is not a necessity and suggest that much remains to be learnt about the behaviour patterns of large and small farmers, advisory officers, and research workers.
4. Industrial innovation is highly correlated with capital investment. Basic biological research, however, tends not to be mission-oriented in an agricultural sense. The developmental stages of innovations in animal production in which opportunities for improvements are recognised and taken are relatively free of risk but often neglected.
5. In various ways (econometrics, systems analysis) efforts are being made to understand how the components of agricultural production interact. For animal production, there would appear to be a case for developing more objective methods of determining (a) the total investment in research and development, (b) its distribution among competing topics, and (c) the point of diminishing returns from specific techniques, such as herd-testing or performance testing.

CONSERVATION AND TECHNOLOGICAL PRODUCTION

H. A. B. PARPIA
Director Central Food Technological Research Institute, Mysore

Knowledge of food preservation as a traditional art, based on experience, has been known to man for centuries, but the contribution of modern science based technology in augmenting the food supplies, both quantitatively and qualitatively, to meet the rapidly rising requirements of the world population is being recognised increasingly over the last few decades. Today Food Technology is recognised as the vast inter-disciplinary science of techniques applied in a systematic manner to foods for preventing losses through preservation, processing, packaging, storage and distribution. It begins in the field after the crop or animal is raised and ends with its consumption.

Effective application of technology to storage, processing and preservation can raise the availability of food for human consumption to an extent where many deficit countries can become selfsufficient. Through utilisation of non-conventional resources for production of high protein foods, the nutritional standards can be raised substantially. To achieve these objectives, safe, economical and efficient technology has to continue its development and play effective part at each stage of food handling and processing from production to consumption. Food Technology can not only help in overall economic progress through development of new industries, but also raise the income of the agriculturist through bringing him better return for his produce.

The paper discusses some of the important stages at which technology can make real impact on the solution of the food problem.

THE FUTURE OF FARMING AND FOOD

P. LAMARTINE YATES
FAO Regional Representative for Europe, Geneva

Fifty years hence we can expect that food will be produced in many new ways and that farms will be just one of the sources of supply. Some food will be "manufactured" by micro-organisms, some will be synthesized in laboratories; some will be derived from hitherto inedible vegetable and mineral products.

Farmers will have to adopt up-to-date business methods in order to remain competitive and will have to farm on a large scale to obtain acceptable incomes. The progressive ones will have no difficulty so rapid will have been the advances in plant and animal breeding, in precise control of the supply of water and nutrients to growing crops and grass, in the feeding of animals, in automated farm equipment, in weather forecasting, in computer services for farm management.

The developing countries will have sufficient "pockets" of modernized agriculture to make most of them self-sufficient in essential foods. Moreover, it will be feasible to irrigate the great deserts with desalinated water pumped from the oceans and such investment will be justifiable if world population has become very large.

The people of the developing countries will still be poor in relation to those in (to-day's) industrialized countries. Economists will still be arguing away themselves how to accelerate the rates of growth of developing economies, while agricultural scientists will continue to make astonishing and exciting discoveries.