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Agriculture - Econ. aspects - Taiwan

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FEB 14 1961

PROCEEDINGS OF
AGRICULTURAL ECONOMICS SEMINAR

Taiwan, SEPTEMBER 16-20, 1958

Taipei,

HELD AT THE COLLEGE OF AGRICULTURE
NATIONAL TAIWAN UNIVERSITY

TAIPEI, TAIWAN, CHINA

MARCH 1959

CURRENT SITUATION, PROBLEMS AND FUTURE OUTLOOK OF TAIWAN'S AGRICULTURE

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I. Basic Agricultural Statistics of Taiwan

In the beginning, I would like to cite a few basic figures which may convey to you a general idea of agricultural conditions in Taiwan. Taiwan today has a total population close to 10 million, about 50% of which consists of farm population. The island has a total land area of 36,000 square kilometers, of which about 25%, the equivalent of 876,000 ha., is under cultivation, with an additional 55% in forest. Approximately 550,000 ha. of the cultivated land are under irrigation. There are currently in Taiwan around 750,000 farm families, averaging 6-7 persons per family, whereas average farm size is 1.20 hectares.

Principal crops of Taiwan consist of rice, sugarcane, sweet potato, pineapple, banana, and tea. Livestock population is made up mainly of cattle and hogs.

Annual production of rice approximates 1,800,000 M.T. which not only suffices for local consumption but also leaves an annual surplus of some 150,000-250,000 M.T. for export. Sugar output per year now approaches 900,000 M.T., of which about 100,000 M.T. are provided for domestic consumption, making around 700,000-800,000 M.T. available for export. The number of hogs is estimated to be well above three million heads.

Farm income presently accounts for about 30% of the net national income. Agricultural products comprise more than 90 per cent of all exports by value. Among the export commodities, sugar ranks first in importance, followed by rice, tea, pineapple, banana, and citronella oil.

Chemical fertilizer makes up the bulk of imports of material for agricultural production, with pesticides occupying the secondary position. Taiwan annually requires about 600,000 M.T. of chemical fertilizer. Of this amount, over 200,000 M.T. are met by domestic production, the balance to be made up by imports. Other agricultural commodities imported are cotton, wheat and soybean which provide the raw material for textile, flour, and edible oil processing industries respectively.

II. Main Characteristics of Taiwan's Agriculture

1. Small farm size, large family, and high intensity of land use: The limitation on possible expansion of cultivated land area and the continuous growth of population have presented two serious problems. One involves the steady decline in the average size of farms, while the other is related to an increasing demand for food supplies; both indicating a strong need for intensive use of available farm land. The effort to boost crop yield from per unit area calls for a larger input of fertilizer and labor and the practice of multiple cropping and intercropping systems.

2. High rate of commercialization of farm products: The bulk of rice crop produced is generally retained by farmers in Taiwan to provide food for their own families and to barter for fertilizer, with the result that the rate of commercialization of rice production is about 39 per cent. By contrast, crops such as sugarcane, pineapple, banana, etc. are raised almost entirely for sale by the farmers. Generally speaking, the rate of commercialization of farm production tends to remain at a low level in countries where small farmers predominate. But this is not so in Taiwan.

2. Bartering rice for fertilizer: Since Taiwan's Restoration, the Provincial Government of Taiwan has devoted great attention to the procurement of fertilizer, as it is well aware that fertilizer is one of the most essential factors in increased crop production. Practically all the fertilizer requirement of farmers in Taiwan is supplied from government sources by bartering for rice from farmers. The exchange ratio varies with different kinds of fertilizer. For ammonium sulphate, the most popular fertilizer among the farmers, the exchange ratio is 1 kg. of paddy for 1 kg. of fertilizer. This system has two advantages; firstly, to assure a steady supply of fertilizer to the farmers for crops application, and secondly, the rice thus collected makes it possible for the government to maintain a comparatively stable rice price, adjust the supply to the consumers, and ration rice to armed personnel and public servants of all levels.

4. Provision of price support for certain kinds of crops: Already in effect are the so-called "guaranteed prices" for sugarcane, jute, pineapple, and tobacco. The operation of the price support system enables the growers to figure out beforehand the possible returns that may be expected from raising these crops so that they can make plan accordingly. This system has an added advantage of ensuring the related processing industries of a steady supply of raw material.

5. Strong and active farmers organizations: In every township and village in Taiwan there is set up a voluntarily organized and democratically run farmers association. The number of these associations throughout the island now totals 312. These farm organizations serve local farmers in matters of credit, wholesale purchasing, cooperative marketing, warehousing, and agricultural extension and education. The associations are managed by officers freely elected by their members. In recent years, the farmers associations are actively engaged in agricultural extension and education work under the assistance of JCRR and Provincial Department of Agriculture and Forestry with promising results.

6. Close relationship between agricultural production and farm products processing industries: Examples of such relationship are many, such as sugarcane farming and sugar industry, pineapple farming and canning, tea culture and tea processing industry, jute cultivation and jute bag industry, etc. It must be mentioned here that farm products processing plays an important role in Taiwan's industry.

7. Government's sponsored farm requisites supply and distribution programs: These programs are operated for the purpose of maintaining an ample supply and stabilizing the prices of some of the commodities vitally needed for farm production. Among the programs currently in operation are the fertilizer and feed distribution program operated by the Provincial Food Bureau, and the pesticide and farm implement distribution programs jointly operated by the Food Bureau and the Provincial Department of Agriculture and Forestry.

8. Well-developed irrigation: The provision of water supplies for irrigation is of

vital importance to Taiwan's agriculture. As mentioned earlier in this report, over half a million hectares out of the total arable land in Taiwan are under irrigation. Regional hydraulic associations are organized to operate and maintain the irrigation canals and other properties within their respective districts and to manage the distribution of water and collection of water fee from the beneficiaries. A considerably large number of hydraulic projects have been undertaken in the last few years through the financing in the form of grants or loans extended by JCRR and the government.

9. Enthusiastic support given by government & public agencies to the agricultural development plan: The first 4-year agricultural development plan was developed and put into execution starting 1953. This was followed by the 2nd 4-year plan covering the period 1957-1960. These plans have had the whole-hearted support of the central and provincial governments and public organizations down to the farmers. The Ministry of Economic Affairs and the Economic Stabilization Board represent Central Government organizations in formulating and designing the plans, while the Provincial Department of Agriculture and Forestry, Provincial Food Bureau, and Taiwan Sugar Corporation on the provincial level are charged with the plan execution through local governments of different levels. JCRR extends assistance in almost every field and aspect of the plan.

10. Highly developed skill in agricultural production: Since the key to Taiwan's economic development lies in increased production of food supplies and farm products for export, intensive efforts have been taken through agricultural extension to encourage and educate the farmers in the use of improved cultural techniques. Thanks to these efforts, farmers in Taiwan are now rather skilled in selecting crop varieties, fertilization, pest control, crop irrigation, and crop management.

III. Some Specific Agricultural Programs Worth Mentioning

The spectacular advancement of Taiwan's agriculture in recent years must be accredited to the unremitting efforts on the part of government organizations concerned, JCRR, and the farmers themselves. However, over the years there are a few outstanding programs or projects that deserve special mentioning. These are:

1. Land reform: The program which has been internationally acknowledged as a highly successful attempt to achieve land reform by peaceful means, was carried out in three successive stages over a period of 5 years. The first stage was launched in 1949 with the enforcement of the 37.5% farm rent limitation, which means that the amount of farm rent was brought down from previous rate of 50% to 37.5% of the total annual yield of the main crop. The second stage featured the sale of over 60,000 ha. of public land to some 100,000 tenant farmers. The price of public land purchased by farmers was paid in ten yearly instalments at 2.5 times the value of main crop yield. The third and concluding stage involving the implementation of land to the tiller program was introduced in 1953. Under this program, a total of 150,000 ha. was compulsorily purchased by the government and then resold to 240,000 families of tenant farmers, by the same price scale applied in the sale of public land. Compensation to the landlords was paid 70% with land bonds in kind and 30% in government enterprise stocks. This indirectly had the effect of channeling the landlords' investment from agricultural into industrial enterprises.

2. Shihmen reservoir construction project: This represents a multi-purpose project designed and planned to fully exploit the potentialities of water resources. Construction work on the reservoir was begun in July 1956 and scheduled for completion in 1961. According to the plan, the project will serve the multiple purposes of irrigation, flood control, power generation, and supply water for urban use. When completed, the project is expected to bring about an increase in double crop fields by 57,260 ha. through provision of improved and augmented irrigation, a power generating capacity of 120,000 kilowatts, and additional supply of water for 340,000 inhabitants and industry. The realization of this project undoubtedly will have a far-reaching effect on Taiwan's economy.

3. Field rat control: Heavy damage to various field crops by rats has been one of the causes of serious agricultural losses in Taiwan for years. To combat this pest, farmers of Taiwan launched a province-wide campaign in September 1957 to exterminate field rats by use of the rat poison "warfarin", under the active assistance by the government and JCRR. With the conclusion of the campaign in March 1958, it is estimated that more than 27 million rats were destroyed. This means an annual saving of the equivalent of 130,000 M.T. of food crop, calculated on the basis of the annual consumption of 5 kgs. of food crop by each rat.

4. Livestock disease control: Hog raising assumes great importance in Taiwan's farm economy as it has been the principal sideline pursued by local farmers. Prevention of hog cholera and other livestock diseases therefore is of paramount importance and has been given the utmost attention. A province-wide program for control of hog cholera has been carried on since 1954. The program provides for inter-region hog quarantine and inspection, mass vaccination with lapinized hog cholera vaccine, meat inspection in slaughter houses, controlled vaccination of weaning pigs, condemnation and burning of cholera-infected hogs. As a result of all these efforts, hog cholera is practically stamped out at present in Taiwan.

5. Crops improvement: The most notable achievement in this respect in recent years has been the propagation and extension of the sugarcane variety NCO310. Introduced from South Africa, this variety, by virtue of its many desirable qualities, has been responsible for an estimated increase of 20% of sugarcane yield per unit area. Its contribution to local sugar industry can be seen from the fact that despite a steady decline in sugarcane acreage over the past few years, the industry has been able to maintain the annual total sugar output at the level of around 900,000 M.T. The widespread adoption of sugarcane ratooning has had the effect of shortening the sugarcane growing period by almost one third, thus contributing, in no small measure, to more efficient land utilization. In rice production, the strengthening of rice breeding program and expansion of acreage planted to the higher yielding "ponlai" rice also result in continuous bigger output.

6. Aerial inventory of forest resources: Under a cooperative project between JCRR and government organizations, an up-to-date inventory of Taiwan's forests by aerial photography was started in 1954 and completed in 1956. From this inventory, we have come to know that Taiwan has a total of about 1,790,000 ha. of forested land and about 1,600,000 ha. of non-forested land, the latter including 425,000 ha. of cutover forest land in urgent need of reforestation, and an additional 580,000 ha. which must be restocked or replaced by high value tree species. Our forestry program for the forthcoming years therefore will lay stress on gradual replacement of the low value hardwood forest species with high value conifers, and building of forest roads to facilitate and speed up the harvest of virgin forests and reforestation.

7. *Fisherries development:* Fisheries products have been an important source of protein food for people in Taiwan. Under the circumstance where the prospects for any substantial increase in cultivable land are not bright, a solution to the local food problem apparently lies in the development of fisheries. The efforts in this direction in recent years have been concerned mostly with expansion of deep sea fishery, building of fishing vessels, construction and improvement of fishing harbors, anchorages, and shore facilities, and training of fishermen. These efforts have contributed to a significant rise in fish landings which now total more than 200,000 M.T. per year. We are now beginning to consider the steps to be taken to develop export markets for local fisheries products.

IV. Essential Spirits Behind Taiwan's Agricultural Development Program

1. The agricultural development program being carried out in Taiwan is depended upon the spirit of self-help on the part of the farmers. All development projects must necessarily take their origin in local initiative and desire for progress. With assurance of such local support, the government can then start planning and systematically push forward various agricultural development works.

2. Another important factor in the implementation of agricultural development program is the spontaneous and voluntary participation of the farmers. If it were not for the active participation of the farmers, all agricultural operations would not have been so smoothly and effectively carried out as they have been thus far in Taiwan.

3. The third kind of spirit characterizing the agricultural development program of Taiwan is the mutual understanding and close relationship between the government and the people. The policies and operational plans set forth in the development program must take account of the need of the people and reflect their aspirations and demands. The people, on their part, may bring forth suggestions and opinions to the government through local farmers organizations, the government also take pains to explain from time to time to the people the policies and main ideas behind various reconstruction and development projects.

4. The fourth main spirit underlying all agricultural development projects is expressed in the hope that all local government or organizations will eventually take over the responsibility for sponsoring and executing all long term reconstruction projects, so that they may be carried on without interruptions, and become a permanent part of the rural community activities.

Reflecting the four essential spirits described above, all projects set forth in the agricultural development program of Taiwan are originated in farmers' needs and geared to the national policy of seeking the advancement of agricultural production on the one hand and continual improvement of farmers' standard of living on the other.

V. Some Vital Problems of Taiwan's Agriculture

It may be noted from the above summary report that Taiwan's agriculture has taken some big strides forward. But there is no denying that there are a number of serious problems encountered for which solutions are still to be found. Among

these the three outlined below stand out as the most urgent and all-important:

1. The rapid growth of local population and limited arable land available cast a gloomy shadow over the future prospects of Taiwan's agriculture. Expansion of cultivable land is now almost at a standstill, while local population is growing continuously at an annual rate of 3.5%, thereby exerting an increasingly heavy pressure on available food supply. Taiwan's agriculture therefore is faced with the serious problem of how to get the limited land area under cultivation to produce more in order to cope with the food requirement of a fast growing population. The answer to this problem seems to lie in constantly seeking for improvement of land utilization through development of water resources, reclamation of new land, readjustment of crop pattern, introduction of better cultural techniques, continuously pushing up the yield per unit area, etc., and means for regulating the growing rate of local population.

2. Taiwan's agricultural development is further handicapped by the instability of farm products export trade and the limited internal market. Over 90% of Taiwan's foreign exchange revenue derives from the export of agricultural commodities. Take sugar production as an example, the 1957 sugar output of Taiwan amounted to 920,000 M.T., of which only 20% was for domestic consumption and the remaining 80% was delivered to markets abroad. The problem arises over the fact that Taiwan's sugar export is subject to the quota restriction imposed by the International Sugar Agreement, and moreover, in the last couple of years, it has been harassed by violent fluctuations in world sugar market price. Other principal export farm commodities such as canned pineapple, tea, banana, and citronella oil too, have experienced similar ups and downs of world market demand and prices. This situation naturally plays havoc with our efforts to place local agricultural production on a stabilized basis.

3. A growing demand for consumer goods has rendered capital accumulation and formation in rural area extremely difficult, thereby hampering the progress of agricultural development. Although the rapid and spectacular rise in Taiwan's agricultural output in recent years has brought bigger income to the farmers, there is also noted a trend toward bigger spending on consumer goods or a higher standard of living, permitting only limited capital to accumulate for agricultural reinvestment.

VI. Future Outlook

Taiwan's agriculture is depended upon not only to produce enough food to meet the requirement of local population, but also to supply our growing industry with necessary raw materials. It is obvious that Taiwan's agriculture cannot satisfactorily fulfill this important function without attaining a higher level of production than at present. The following lines of action have been suggested to help achieve that end.

1. *Regulation of population growth rate:* The over-rapid growth rate of local population has imposed an enormous strain on available resources. The fundamental obstacle to agricultural development to be hurdled therefore is the population problem. Means must be sought and adopted to slow down the natural rate of population growth and keep the total population at an optimum level.

2. *Development of fisheries and forestry:* With the prospects for any substantial

gain in cultivable area appear rather dim in future, it is only logical that we must look into the possibilities of agricultural resource development in the mountain regions and waters off Taiwan. As forest land occupies about 55% of the total land area of Taiwan, forestry offers enormous opportunities for future development. The efforts in this respect will pay dividends in the form of increased output of lumber partly for meeting domestic demand and partly for export, and increased employment. Development of fisheries will bring an increase in protein food supply for local inhabitants.

3. *Expansion of rural sidelines:* To afford more opportunities for employment and provide the farmers with sources of additional income, serious effort must be taken to encourage diversification in farming. Farm sidelines such as hog raising and handicraft industry must be given every assistance to expand and flourish so as to provide more jobs for a growing farm population.

4. *Holding the level of consumption at the current level and adoption of positive measures to promote savings and capital formation:* Farmers should be encouraged to spend only part of their increased income on daily consumption and direct a definite and substantial portion to farm investment. For capital accumulation and capital formation on the farm can furnish the basis for bigger production and higher productivity. The furtherance of Taiwan's agricultural production depends upon the availability of farm reinvestment which must come principally from private sources.

5. *The rate of agricultural development in Taiwan should be accelerated:* If the population of Taiwan continues to increase as at present, and the development of agriculture is not accelerated, rice production will likely fall below domestic needs in another five years. Moreover, at the current rate of agricultural development, in twelve to fifteen years the foreign exchange balance from the export of agricultural products over imports will have diminished to practically nil, and the economy of Taiwan will be in serious trouble.

Our preliminary study indicates that an accelerated rate of agricultural development in Taiwan necessitates vigorous efforts in many directions, particularly in the following aspects: (a) Fertilizer usage should be substantially increased, so that there would not only be more for rice and sugarcane but also an adequate supply for other crops; (b) The current level of pesticide usage should be materially raised; (c) Agricultural research and extension work should be strengthened; (d) Development of water should be accelerated to make water available for irrigation; (e) Potential usable tidal land should be reclaimed and developed for agricultural production.

Assuming that all the above suggested lines of operations can and will be vigorously pursued, despite the many difficulties encountered, the outlook for Taiwan's agriculture will still be hopeful. There will continuously be a surplus of rice for export after meeting domestic demand. Exports of sugar and other agricultural commodities may be maintained at the current level or even increased. On the other hand, the expansion of local cotton, wheat and oil crops may make it possible to reduce the import requirements of these items. The favorable foreign exchange balance resulting from bigger exports of agricultural products over imports may have hope of further growing instead of diminishing, with immense help to the development of industry and economy of Taiwan.