

12. PRESET STATUS OF ANIMAL RESEARCH IN JAPAN

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It is my pleasure as well as great honour to have an opportunity of presenting about what's going on in animal research in Japan.

The people's demand for animal products is increasing remarkably making animal industry increase steadily year after year. To meet this demand of the time, Ministry of Agriculture and Forestry's appropriation for researches in this field has reached 3 million dollars as shown in Table 1 and Table 2, making research activities lively

Table 1. Expenditures* to the institution for animal industry research under the Ministry of Agriculture and Forestry due to the year

(Unit : 1,000 dollars)

| Fiscal year | Consumables and travelling | Equipments and machineries | Buildings and facilities | Total | Number of researchers | Expenditure per person |
|-------------|----------------------------|----------------------------|--------------------------|-------|-----------------------|------------------------|
| 1965 | 1,068 | 361 | 458 | 1,887 | 388 | 5.6 |
| 1966 | 1,261 | 358 | 427 | 2,046 | 398 | 5.1 |
| 1967 | 1,219 | 535 | 355 | 2,109 | 407 | 5.2 |
| 1968 | 1,085 | 643 | 1,114 | 2,842 | 416 | 6.8 |
| 1969 | 1,237 | 949 | 856 | 3,042 | 459 | 6.6 |
| 1970 | 1,414 | 1,039 | 537 | 2,990 | 477 | 6.3 |
| 1071 | 1,479 | 1,159 | 652 | 3,290 | 487 | 6.8 |

* Salaries and wages are omitted

Table 2. Percentage of expenditures to the institutions of various categories of research under the Ministry of Agriculture and Forestry in 1971 of fiscal year

| Category | Percent |
|---------------------------|---------|
| Agriculture | 19.1 |
| Animal industry | 17.8 |
| Horticulture | 8.2 |
| Tea culture | 1.2 |
| Sericulture | 7.3 |
| Utilization & processing | 5.9 |
| Farm management & economy | 2.1 |
| Forestry | 10.3 |
| Fisheries | 16.0 |
| Others | 12.1 |

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and vigorously. In the research fields that are promoting animal industry, animal husbandry research, grassland and forage crops researches and veterinary research are naturally focused.

According to the purpose of the Symposium, I wish to limit my description in animal husbandry research in narrow sense, and explain its present status in this country.

First, I want to touch on the research organization. Under the jurisdiction of Ministry of Agriculture and Forestry, there is the Research Council, an unique organization endowed with authority. Among the research organizations, as central research institutes, there are National Institute of Animal Industry, National Grassland Research Institute and National Institute of Animal Health.

Table 3. Organization of Animal Husbandry Research in the Ministry of Agriculture and Forestry

| Name of institution | Name of division | Number of laboratories | Number of research personnel |
|--|---|----------------------------|------------------------------|
| Aggiculture, Forestry and Fisheries Research Council Secretariat | | | |
| National Institute of Animal Industry | 1. Animal Genetics Division 2. Animal Reproduction Division 3. Animal Physiology Division 4. Animal Feeding and Management Division 5. Animal Nutrition Division 6. Animal Products Division | 5 4 5 3 7 5 | 113 |
| National Grassland Research Institute | 1. Animal Science Division | 6 | 24 |
| Hokkaido National Agricultural Experiment Station | 1. Livestock Division 2. Upland Farming Division | 4 1 | 19 |
| Tohoku National Agricultural Experiment Station | 1. Livestock Division 2. Farm Mechanization Division | 3 1 | 16 |
| Chugoku National Agricultural Experiment Station | 1. Livestock Division | 4 | 18 |
| Kyushu National Agricultural Experiment Station | 1. Livestock Division 2. Upland Farming Division | 3 1 | 18 |
| Central Agricultural Experiment Station | 1. Upland Farming Division | 1 | 3 |
| Total | | 53 | 211 |
| National Instute Animal Health | | 41 | 155 |
| National Grassland Research Institute and its related field | | 48 | 186 |

Table 3 and Figure 1 show the organization of animal husbandry research. Around National Institute of Animal Industry as the center, there are Livestock divisions of Hokkaido National Agricultural Experiment Station, Tohoku National Agricultural Experiment Station, Chugoku National Agricultural Experiment Station and Kyushu National Agricultural Experiment Station, together with Animal Science Division of National Grassland Research Institute and Laboratories of Livestock Farming of Central Agricultural Experiment Station, Hokkaido National Agricultural Experiment Station, Kyushu National Agricultural Experiment Station and Tohoku National Agricultural Experiment Station. Total number of research personnel is 211.

To state in detail of the functions of each of these organs, National Institute of Animal Industry covers basic researches such as genetics, physiology and nutrition

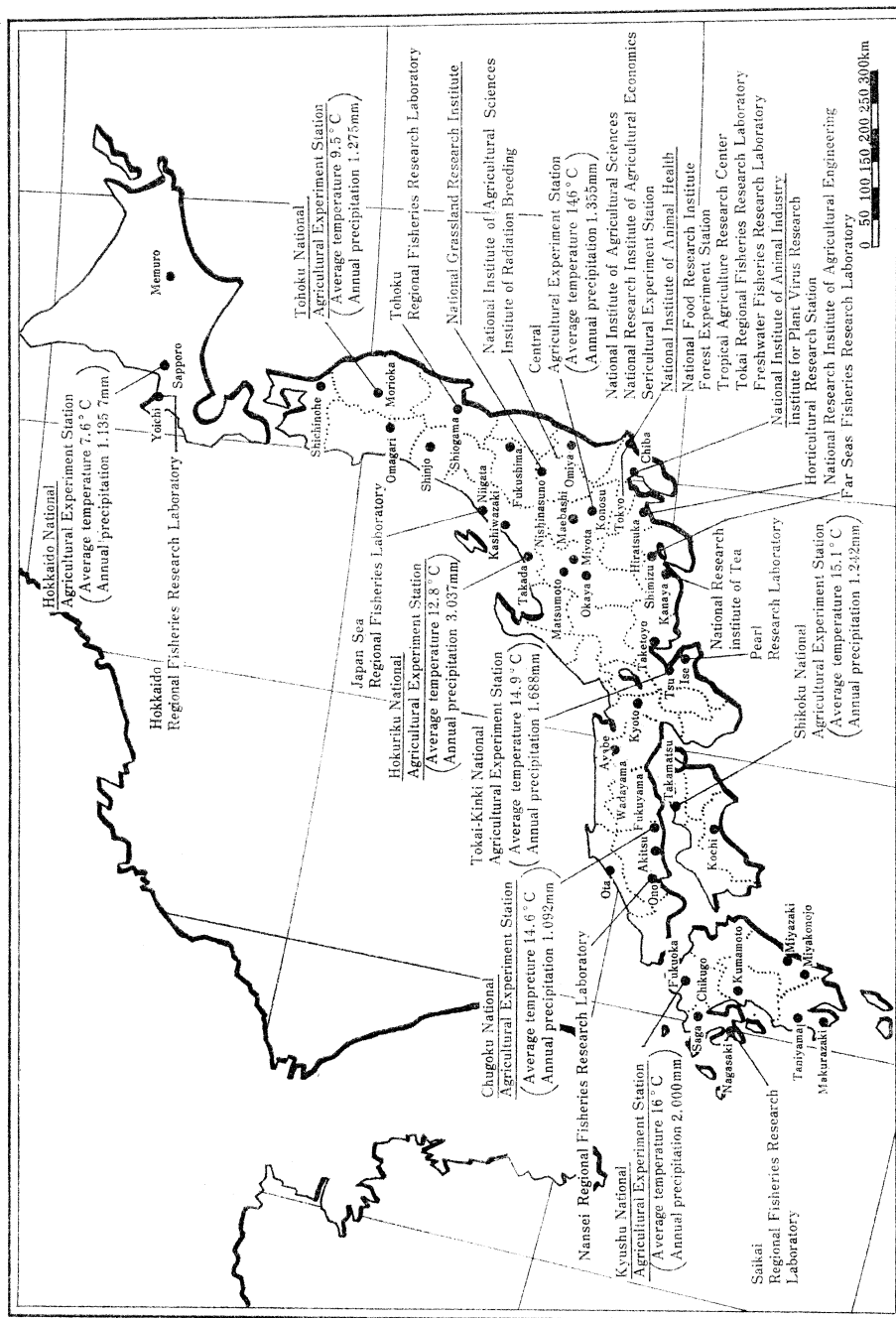


Fig. 1. Location of an annual average temperature and annual precipitation at the research and experiment stations of the Ministry of Agriculture and Forestry

of animal and poultry and also research and development of technology on feeds, processing of animal products, and animal waste disposal. Furthermore, the development of animal husbandry techniques are performed.

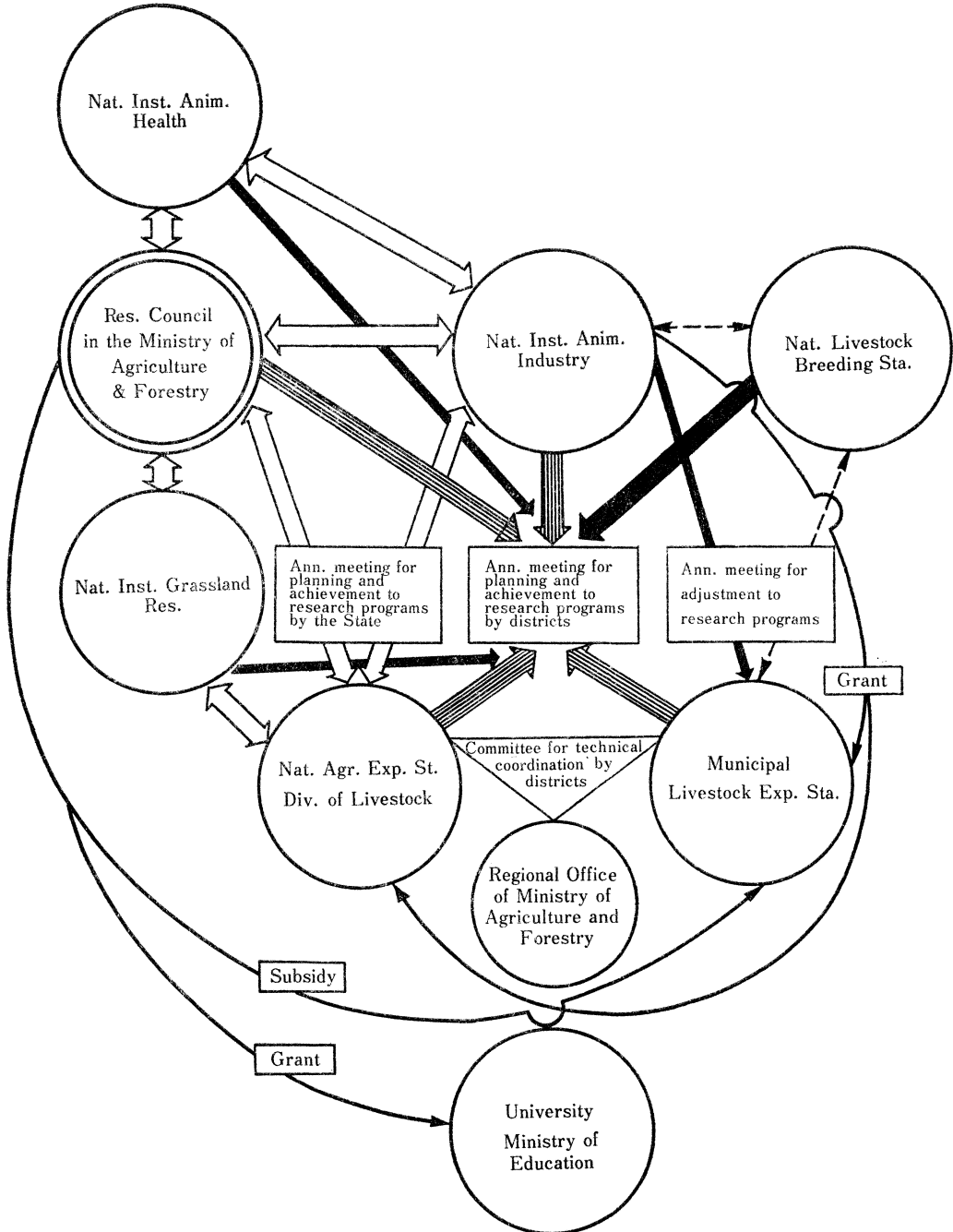


Fig. 2. Diagram of cooperation among research organizations in animal husbandry research

As for the regional agricultural experiment stations, researches for the development of techniques of dairy cattle feeding and management in cold and warm climates, the Livestock Divisions of Hokkaido National Agricultural Experiment Station and Kyushu National Agricultural Experiment Station are working, respectively. The researches for the development of techniques for beef cattle feeding and management, the Livestock Divisions of Chugoku National Agricultural Experiment Station and that of Tohoku National Agricultural Experiment Station are conducting, respectively.

Researches for the development of techniques of feeding and management of swine and poultry are mainly conducted at National Institute of Animal Industry, sometimes in cooperation with municipal experiment stations.

Laboratory of Livestock Farming of National Agricultural Experiment Station is conducting researches for farm management techniques combining forage production and dairy cattle management for the purpose of establishing a feeding and management system fit for each locality.

Each prefecture has at least one Municipal Livestock Experiment Station. Their total number is 89 with total 1167 research personnel. They emphasize upon the development of practical techniques and their extension. The inter-relationship between these and the national research organs is shown in Figure 2. Close cooperation is kept between these two through annual meeting held at National Institute of Animal Industry for joint discussion and joint meeting for regional research project held by National Agricultural Experiment Station.

There are also total 14 National Breeding Stations which handle the improvement of farm animals and poultry, and the development of the techniques of their management in cooperation with National Institute of Animal Industry and Municipal Livestock Experiment Stations.

Next, I want to outline the research organization in the universities belonging to Ministry of Education. Please, see Table 4 and Table 5. Those universities which have either Department of Animal Husbandry, Department of Veterinary Science, or Laboratory of Animal Husbandry are 24, 16, and 16, respectively.

Table 4. The number of universities involved in animal husbandry and veterinary science*

| Category | National | Municipal | Private | Total |
|-------------------------------------|----------|-----------|---------|-------|
| Department of animal husbandry | 19 | 0 | 5 | 24 |
| Department of veterinary science | 10 | 1 | 5 | 16 |
| Only laboratory of animal husbandry | 12 | 1 | 3 | 16 |
| Total | 41 | 2 | 13 | 56 |

* As of March, 1973

Table 5. The number of university graduates involved in animal husbandry and veterinary science*

| Category | Number of personnel |
|-----------------------------|---------------------|
| Field of animal husbandry | 1015 |
| Field of veterinary science | 913 |
| Total | 1928 |

* In 1972

The total number of university graduates in these fields in 1972 was 1928.

Animal research conducted at the universities is rather of basic nature. However, some universities of long history includes those researches bearing upon the local interest.

The main societies in Japan in these fields are shown in Table 6; namely, The Japanese Society of Zootechnical Science with 2061 members. The Japanese Society of Grassland Science with 2694 members, The Japanese Society of Veterinary Science with 872 members, and Japan Poultry Association with 950 members. They issue the journals of their own, respectively.

Table 6. The name of research society and its number of members

| Association | No. of members | Name of journal |
|--|----------------|-----------------------|
| The Japanese Society Zootechnical Science | 2,061 | Jap. J. Zootech. Sci. |
| The Japanese Society of Grassland Science | 872 | J. Jap. Grass. Sci. |
| The Japanese Society of Veterinary Science | 2,694 | Jap. J. Vet. Sci. |
| Japan Poultry Association | 950 | Japan. Poultry Sci. |

Secondly, I wish to present briefly the research projects currently pressed for clarification in terms of the kinds of animals.

Dairy Cattle:

Though eyeing the small size dairy farming of this country, historically, diversified techniques were demanded of the Japanese dairy research to adapt the natural conditions and local environment of great variety, and modifications have been made in the techniques to fit these conditions. The national average of milk yield of lactating cows is now increasingly high, supported by the increase of superior cows by dint of the extensive application of the techniques of artificial insemination. And yet the local difference in milk yield is large because of the poor heat resistance of cattle, low quality of feeds, lack of uniformity in quality of cattle. In recent years, in the process of decreasing in cattle-keeping farms, the dairy farm management is oriented to a larger number of cattle, aiming at higher productivity and rationalization of farming.

Under the limitation of farm land, necessarily demanded are the techniques for higher and extremely intensive productivity.

Against these backgrounds, the major research projects in dairying we have to solve are as follows.

- 1) Producing the dairy cattle of high milk yield fit for intensive management.

It is necessary to secure the dairy cattle which can exert high yielding ability even under the intensive management, and adaptability to local environment. For this purpose recently started is the progeny testing of bulls.

- 2) Establishing the techniques for efficient reproduction

Techniques for putting into practice the artificial conception, and for getting rid of reproductive disturbances are considered especially important. Artificial insemination technique using frozen semen is widely in use.

- 3) Establishing the techniques of rearing dairy heifers on large-scale pasture

It is necessary to approach and solve the problem of rearing dairy heifers on pasture both from the standpoints of the techniques of grassland management and those of grassland hygiene. It is one of the necessities for the successful dairy farming to cut the production cost by entrusting the rearing of dairy heifers to the community farms.

- 4) Systematizing labor-saving feeding techniques on larger size for milking cows
- Urgently needed is the development of the techniques for feeding methods adapted

to the local characteristics and for labor-saving devices in equipments and managing operations.

5) Bettering the quality of milk and rationalizing the circulation

Increasing the solids-not-fat content in milk, and improvement of keeping quality in the process of circulation are expected among others.

Here is one thing I want to emphasize in dairy research, and that is a unique condition in this country. In the warm south-west region of Japan, summer season sees the difficulty of stabilizing the dairy farming because of the decrease of milk yield, lowering of conception rate, physiological disturbances, and damage in forage production due to high temperature. Since 1950, researches are conducted to cope with the effect of high temperature on Holstein dairy cattle, and the results are pointing to several methods of feeding and management fit for warm region. In this region, it is expected to breed better dairy cattle with heat tolerance.

Beef Cattle:

In the past, improvements were made on Japanese Black breed for dual purpose for draft and beef, and the research results were highly esteemed. But in those years the researches were against the background of farming with only a few cattle. So, naturally no technical research was conducted to enhance the management for beef production. But in the present, it is the demand of the time to produce as much beef at as low price as possible to meet the vigorous demand for beef, utilizing efficiently the feed resources of the land, securing at the same time the income of the farmers keeping beef cattle. Research projects along this line are established as follows.

1) Increasing the meat productivity of beef cattle

Genetic studies are being made to improve further the Japanese Black breed, Japanese Brown breed, Japanese Shorthorn and Japanese Polled which have been improved as beef cattle in recent years. Simultaneously, the survey of beef productivity of the crossbreed between foreign breeds and the Japanese Beef cattle is being carried on.

2) Establishing the intensive large-scale feeding technique for cows for breeding

In Japan, in the target of beef operation, two kinds of management are oriented: a) a large-scale farming holding 80 or more cattle operated by public agencies or co-operatives, and b) the regular farmer keeping average 30 cattle combined with rice or other crops. Thus, it is necessitated to develop the group management technique, reproductive technique and all-year round utilization techniques of forages for these two types of farming.

3) Establishing the technique of intensive young-age fattening for both beef-purpose steers and dairy-purpose steers.

It is considered important to develop the feeding and management procedures for feedlot fattening for 100-150 cattle, with special reference to the control of feedlot diseases.

4) Establishing the circulation technique for beef

Demanded are the establishment of evaluation method of beef fit for the food habit of the Japanese people and the development of quality-keeping.

Swine:

Before 1960, swine husbandry in Japan was a poor homestead operation feeding the pigs with crop residues and human food remnants. The major projects for swine researchers were the improvement and proliferation of Middle-Yorkshires and Berkshires. Suddenly since 1960, supported by the vigorous demand of pork, the pig farm size rapidly extended. The prosperity owes much the improvement of equipment, betterment of the quality of feeds, improvement of the feeding procedures, and the production

of crossbreds using Landrace and other techniques. Further prosperity is in the prospect of swine industry provided the stable supply of pork both of low-price and good quality is ensured. The research projects to support this are as follows.

1) Producing high performance of pigs under a large scale pig farming

For this purpose, it is necessary to keep superior breeding stock of pigs. Since 1970, in line of the national breeding plan, the improvement of swine through selective breeding in a closed herd has been conducted. In this scheme, the most efficient method for evaluating the genetic merits and the method of crossbreeding are being studied. Artificial insemination technique using frozen semen and the synchronization of heat are also studied.

2) Soaring the yearly production of pigs from a sow

Urgently needed is the supply of fattening piglets in large scale. So the joint project involving the techniques in reproduction, nutrition hygiene, housing and equipments has been started aiming at the production of 30 pigs per sow per year.

3) Establishing the large-scale feeding technique for sows and growing pigs

Management procedures of 100 head in sows and 1,000 head in growing pigs are being needed together with mechanization in housing, equipments, feeding and management, as well as further improvement of feed efficiency.

4) Establishing the technique for circulation of pork

Urgently needed is the establishment of the methods of evaluation of the quality of carcass and of the frozen storage.

Poultry:

Poultry farming has been extensively practiced in this country since the olden times, partly because of its practicability regardless of the size of land and management, and partly it had no extreme limitation in the locality of adaptability.

The amazing boost in the people's demand for eggs and chicken meat in recent years resulted in the enhancement of larger-scale management. Necessarily the labor-saving techniques in management have been introduced or devised using the engineering skill fit to it. Concurrently, the improvement of feeding procedure to negotiate the large-scale production to the biological mechanism has been attempted. Efforts are being made to produce superior utility birds no inferior to the foreign poultry. The research projects for further progress are as follows.

1) Producing high ability chicken fit for large scale poultry farming

The major research projects at present when the large supply of superior utility poultry is required aiming at the improvement of economic characters of groups of birds are: a) producing the superior parents stocks and the clarification of the ability in crossing, b) methodological studies for producing the disease resistant strains, c) establishing the technique for testing the economic ability, etc. For the latter two projects, approaches should be made from the viewpoints of the extension of gene pool and interaction of genetics and environment. Considerable progress is expected from the future international cooperation.

2) Establishing the technique for large-scale feeding of layers and broilers

Researches are being conducted on the more efficient housing and equipment, feeding and management procedures to meet the requirement of large-scale feeding. Above all the planning of the fittest windowless poultry house is in acute demand.

Thus far I have presented the research problems per animals and birds. Now I wish to state some of the issues common to all animal researches. They are as follows.

1) Establishment of the techniques for the control of pollution due to animal wastes

Water pollution and air pollution by bad smell attributable to animal waste is getting increasingly grave as a social issue as urbanization proceeds. So the development

of the more and more efficient techniques of purifying treatment, of converting wastes into fertilizers and its application method as well as odor control is urgently needed.

2) Improving the utilization of feeds and developing the feed resources

Animal industry in Japan depends much of the concentrates, the base of the industry, on foreign imports. In this situation, what we can do and must do is the improvement of the utilization of feeds and the development of feed resources, which would be the contribution of technical researches to the cutting of feed costs. The achievements in the field of animal nutrition and feeds have been crystalized in the established "Japanese Feeding Standards", and furnish the base for the manufacture of formula feeds. The future researches in this field are oriented, upon the basis of nutritional studies, to the development of feed resources, promotion of the utilization of feed by processing, control of deterioration of feed quality, safety of feed, etc.

3) Establishing the systematized hygienic management technique

Diverting from the main theme of this Symposium let me say a few words.

One of the essential factors for the success of a large-scale livestock and poultry industry is the preparedness of hygienic response, in other words, the labor-saving, efficient and systematized control of frequently occurring diseases in groups.

I have presented you the major technical problems we have in our animal research in Japan. They are numerous and diversified. But these problems are not confronting us only. Our effort toward the scientific and technical solution of these problems may be said to be on the line of international technical cooperation in the coming days.

Thirdly, I wish to say a bit concerning the present status of international cooperation in the field of animal research.

Regrettably I have to recognize that the research interchange in the field of animal science with the tropical countries, which would be the basis of our contribution to tropical agriculture, is very poor excepting the animal hygiene section.

Up to date, only there has been some research activity in cooperation by the researchers sent by The Japanese Society for Researches on Native Livestock, The Center for South-Eastern Asian Studies of Kyoto University, OTCA and Tropical Agriculture Research Center. As for publications, there are only JARQ, and SABRAO, respectively issued by Tropical Agriculture Research Center and The Society for the Advancement in Breeding Researches in Asia and Oceania.

I believe, therefore, this Symposium is of great importance as it will stimulate the positive and systematic international cooperation for the progress of tropical agriculture from the side of animal research.

Discussion

B. K. Soni, India: Studies in Latin America and Southern States of U.S.A. have shown that cross breeding by 'Bos Indicus' (Indian cattle live "Gir and Nellore") with beef breeds has improved the economic production of beef. I notice that Japan has not tried this. It may be a very useful method of economic production of beef in the South-west warm region of Japan.

Answer: In general, indigenous beef cattle are well adapted to the climatic condition of all over this country. From the economic point of view, however, it may be useful to introduce 'Bos Indicus' in the warm region of Japan in future.

F. S. Mensalvas, the Philippines: Under the limitation of farm land in Japan, you mentioned about the need of producing the dairy cattle of high milk yield for intensive management. How would you go about producing this kind of dairy animal?

Answer: Dairy improvement of this country was done by importing the superior bull from U.S.A.

In the present, in order to obtain high milk yield of dairy cattle under the

environment of this country, progeny testing for bull and registration for cow has been tried. Genetically selected superior bull is extensively used through frozen semen system.

Concurrently, feeding procedure for dairy cattle under intensive management are studied.