

V

P203H	6
A41Y	
F2	

PROJECT FINDING SURVEY REPORT
ON
AGRICULTURE, FORESTRY
AND
LIVESTOCK INDUSTRY

AUGUST, 1977

JAPAN INTERNATIONAL COOPERATION AGENCY

J.I.C.A.

104
80
AFT

CR(7)
77

FOREWORD

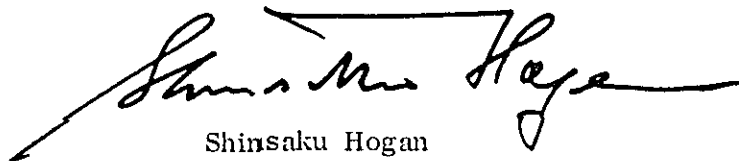
The Japan International Cooperation Agency (JICA), responding to the request of the Government of Burma, dispatched survey teams to conduct the study on technical cooperation and the ways of its implementation in the fields of upland crop cultivation, livestock industry and forestry for 20 days from November 29th through December 19th, 1976. The surveys were conducted in the vicinity of Mandalay and Shan Plateau for upland crop cultivation, in the environs of Rangoon and Myingyan area for livestock industry and in the periphery of Bassein for forestry as the objective areas of the field survey.

It was acknowledged once again that agriculture, livestock and forestry industries play an important role in the national economy of Burma, particularly after the observation of the actual situation on the spot.

This Report is the summary of the outcome from the primary survey on the technical cooperation for the development of agriculture, livestock and forestry industries.

I should like to take this opportunity to express my deepest gratitude to the cooperation extended by the Government personnel concerned during the period of surveys.

August 1977



Shinsaku Hogan
The President
Japan International Cooperation Agency

JICA LIBRARY



1016178[4]

国際協力事業団		
受入 月日	'87. 4. 13	104
登録 No.	08432	80
		AFT

-OR-
77

CONTENTS

I.	INTRODUCTION	1
II.	SURVEY ON AGRICULTURE	3
	1. Itinerary of the survey, constituent of the survey team	3
	2. Summary of outcome of the survey	6
	3. Direction for technical cooperation	7
III.	SURVEY ON FORESTRY	11
	1. Itinerary of the survey, constituent of the survey team	11
	2. Summary of outcome of the survey	13
	3. Direction for technical cooperation	14
IV.	SURVEY ON LIVESTOCK INDUSTRY	17
	1. Itinerary of the survey, constituent of the survey team	17
	2. Summary of outcome of the survey	20
	3. Direction for technical cooperation	28

I. INTRODUCTION

On the occasion of this survey report, we would like to express our hearty gratitude for the cooperation and assistance extended by the Government of Burma for the acceptance of the three survey teams dispatched recently by the Government of Japan, for the arrangement of meeting with competent agencies of the Government of Burma and related organizations, and for the field survey and other works.

Even though the stay of our survey teams in Burma was comparatively short, the impression on the out-line of the current problems and situation being encountered by agriculture and forestry in Burma, has been obtained through the acquisition of the general information concerned from the Government agencies and the public corporations relating to agriculture and forestry, and also through field observation and survey tours.

It is very highly regarded that Burma has made devoted efforts to promote development of agriculture and forestry and at the same time, it is considered confidently that the Government of Japan is to do their utmost sparing no cooperation for the national policies of Burma to seek the introduction of techniques, funds (capitals), equipment and materials according to needs from various countries concerned and thus to promote development of the country.

The mutual economic cooperations between Burma and Japan has been made according to the *Economic Cooperation Agreement* and other gratuitous and onerous contracts of financial cooperation mainly for enterprizes in the field of industry and mining, and there have been so far few cooperative projects in the field of agriculture and forestry.

Since Japan joined the Colombo Plan in 1954, however, the technical cooperation projects have been expanded in various Asian countries. Among those projects, a large share of about one third were cooperative projects in the field of agriculture.

This is because the accumulated experiences on the part of small scale barely subsistent farmers in Japan, as one of the countries in the same Asia, in the phases of agricultural techniques and farm management of mainly paddy crop cultivation are prospected highly valuable to contribute a great deal to the development of agriculture in many Asian countries.

In Burma, also, agriculture has a large share of and an importance in the national economy and at the same time Burma was one of the major rice export countries. Thus, the development of agriculture in Burma is also to play a major role in the stabilization and development of Asia as a whole.

It is considered highly significant to have an opportunity to discuss the possibilities of the technical cooperation projects in the field of agriculture.

The objective fields of the Survey Teams were agricultural, including upland crop cultivation, livestock husbandry and forestry. In Burma, all of these fields are under the jurisdiction of a Public Corporation which is one of the national organizations. And technical extension and training works for farmers and other producers are being performed mainly by this corporation.

Because the technical cooperation projects by Japan are also on the grant basis for the whole amount, out of the Government budget, the adequate cooperation of Japan in strengthening technically and managerially the projects of the Burmese Government organizations can be confidently considered.

On this occasion, because of various hazards and risks for the development of a nation-wide project at the initial stage with the object of a single commodity, it is considered appropriate to compute the development plan of agriculture principally for upland crop in a suitable area.

This way of approach is considered also effectively applicable for the development projects of both livestock industry and forestry.

SURVEY ON AGRICULTURE

II. SURVEY ON AGRICULTURE

1. Itinerary of the study, constituents of the survey team

Itinerary of the survey, November 29 - December 17 (19 days), 1976.

Nov. 29 (M)	10.50 16.35	L. Haneda via JL 471 Ar. in Bangkok
30 (T)	10.50 14.30	Ar. in Rangoon Courtesy visit Japanese Embassy
Dec. 1 (W)	10.00 14.00	Courtesy visit Ministry of Agriculture and Forests, and meeting with the chief of Agr. & Forestry Bureau and others and also the staff of Agriculture Corporation. Conference in the Agriculture Corporation.
2 (Th)	7.00- 12.00	Survey of Hamaubi Central Farm
3 (F)	8.00 14.00- 17.00	L. for Nyaung-Oo via UB 791 Survey adjacent villages (Chao)
4 (Sa)	8.00- 14.00	Survey two State Farm Nyaung-Oo and Sepuk and also The-Tein Village
5 (Su)	8.00- 16.00	Survey Mahlaing Central Farm and Township Office
6 (M)	8.00- 10.00 11.00- 12.00 14.00- 15.00	Survey paddy, sorghum and cotton crop cultivation conditions Survey Natogyi Township Office Visit Myittha Cotton Mill
7 (T)	9.00- 12.00	Visit Sagaing Agriculture Corporation Office and survey wheat production area.
8 (W)	14.30	L. for Rangoon via UB 787
9 (Th)	10.00- 12.00	Attend livestock survey report meeting at the Ministry of Agr. & Forests and also made the intermediate report of upland crop survey.
10 (F)	Off	

Dec. 11 (Sa)	7.00	L. for Heho via UB 831 (Survey commenced under army safeguard)
	10.00- 14.00	Survey Heho Seed Farm
	15.00- 17.00	Survey Seed Farm of Aungban Village Cooperative Society Office
12 (Su)	8.00- 9.00	Survey Aungban market
	10.00- 11.00	Talk with farmers at Pwehle Cooperative Society Office
13 (M)	7.00- 9.00	Observation of Vegetable cultivation on Floating Bed of Inla Luke.
	10.30	L. for Rangoon via UB 806
14 (T)	10.00- 12.00	Survey report at Ministry of Agriculture and Forests attended by Vice Minister.
15 (W)	10.00- 12.00	Meeting Ministry of Agriculture and Forests and made survey report and discussion on upland crop cultivation and forestry survey.
16 (Th)	14.00- 17.00	Meeting at Japanese Embassy for survey report and for deliberation of the measures to be taken.
17 (F)	15.00	L. Rangoon for Bangkok via UB 221.

Members of Japanese Survey Team for Upland Crops Development Cooperation

Name	Subject	Position
Mr. Heijiro YOSHIHARA	Leader	Executive Director, Japan International Cooperation Agency (JICA)
Mr. Akira MATSUZAKI	Cooperation Planning	Senior Officer, International Cooperation Division, Ministry of Agriculture and Forestry
Mr. Mutsuo OJIMA	Agronomy	Section Chief, Crops Division, Chugoku Agriculture Experiment Station, Ministry of Agriculture and Forestry
Mr. Minoru KIRIU	Economy	Senior Researcher, The Institute of Developing Economies
Mr. Kiyohiko KINOSHITA	Soils Science	Section Chief, Technical Affairs Division, Japan International Cooperation Agency (JICA)

2. Summary of outcome of the survey

The promotion of disseminating high yield varieties and the improvement of their cultivation techniques of rice crop in the paddy region extending from the middle and on southern part of the Central Plain, and the productivity raise of upland crop cultivation in the Central region around Mandalay and also the production increase of soy-bean and corn in elevated Shan Plateau area are considered to be the key for the development of agricultural production in Burma.

Generally speaking, farm management in the upland crop region is less stable compared with that of agriculture mainly of paddy crop, particularly in the non-irrigated area where the unstable precipitation affects the crop condition directly.

The earning power rate per unit area varies to a great extent from year to year, and this magnifies the instability of farm management due to the drastic fluctuation of upland crop marketing prices.

It is considered necessary to secure technical improvement and at the same time the strengthening of price policy as well as planning and guidance of the production.

Therefore it is also considered essential to attain the technical improvement simultaneously to fully facilitate the basic infrastructure for the upland crop cultivation.

For this purpose, it is considered more effective to promote the technical cooperation of upland crop regional development rather than of each crop unit.

The economic points to be borne in mind regarding the technical cooperation are as follows:

1. The examination and the improvement of the current production structure in the objective region.
2. The examination of the earning power rate of upland crops, and guidance for production plan based on the thorough recognition of the producers' desire for the improvement.
3. The examination and the improvement of the current agriculture extension service system.
4. The selection of the pattern for the technical cooperation, after the examination of the direction for a local agricultural development.

Consequently the principles and the process of the technical cooperation for the development of upland crops are as follows:

1. The selection of the areas mainly for upland crop.
2. The agencies concerned with the Agriculture Corporation.(e. q. the Central Farm) in the selected areas are to be the cooperation base.
3. Study on the feasibility for development (technical and economic) in the selected areas.
4. The examination of cooperation pattern and its implementation.

3. Direction for technical cooperation

Judging from the current situation in Burma, the following points are considered as the responses to the required technical cooperation by Burma.

1. The research on the paddy crop and the upland crops.
2. The plan for the agricultural extension service activities.
3. The training.

In considering the ways and means for the cooperation, first of all, the Agricultural Corporation (A. C.) is to be the suitable agency to which Japanese experts belong.

The main cooperation works are the cooperation for the applied research in the Research Institute of A. C. located in the central part of Burma and including the transfer of the techniques to the adaptability research in the locally scattered Central Farms, State Farms and Seed Farms.

As to applied research (1) the selection of recommendable varieties of rice, corn, sorghum, soybean and etc. , (2) the adaptability research of imported high yielding varieties, (3) the countermeasures for pest and disease control, (4) cultivation research of various crops and (5) the practiced mechanization research and others are to be considered.

The adaptability researches at the local research institute on the subjects of the applied researches performed at the central institute are to be conducted to adapt to local climatic conditions.

Areas and crops presumed to be the objectives of the cooperation

The objective areas of the cooperation are presumed to be the plain and elevated areas. It is considered appropriate to conduct the further adaptability researches at those local institutes such as the State Farm and the Central Farm in the upland crop area around Mandalay and the Heho Seed Farm and elsewhere in the elevated upland crop area in Shan State as the presumed objectives of the cooperation, on the subjects regarding the outcome of research performed at the Central Institute.

For the objective crops, sorghum and wheat as the crops in the plain upland area with miscellaneous pulses as the supplemental crops for rotation, corn and soybean as the main crops in the elevated upland area and also wheat in the areas wheresoever the climate is suitable for its cultivation, are all to be taken into consideration.

Training

Japanese experts are also to participate in computation of a training curriculum for the purpose of raising the technical level of the Tract Managers and Village Managers who are engaged in the guidance of farmers. This is considered the most efficient way to transfer the techniques which are outcome of the research and other works through the aforesaid training activities.

Extension

It is extremely important to disseminate the techniques outcome of the research and also of the high yielding varieties. For this purpose, the circumspect prescription regarding agricultural extension service plan, extension services system, extension methods and etc. are to be prepared. The cooperation of Japanese experts in the aforesaid matters can be considered.

Consequently, it is considered ideal that the cooperation of Japanese experts for agricultural extension services is to be in the planning of the extension service system and the direct guidance to the farmers is to be performed by the Village Managers and Tract Managers with the advice of the Japanese experts.

Objective crops

Sorghum

In the upland crop area, such as Padan, Phumaubi, Maharain, Mandalay and etc. , of middle Burma, sorghum has long been cultivated, but those have been mostly of local varieties and their productivities are generally low yield at about the level of 0.7 ton per hectare.

The technical level of the farmer is also extremely low, the prevailing cultivation method is usually broadcasting without fertilizer and also, pest and disease damages are very serious which hinder the productivity upraise.

Generally, the cropping season is from September for sowing to December for harvesting. As the countermeasures for their improvement, the following points are to be taken into consideration for the outline of the current problems on technical cooperation.

- (1) The breeding of the recommendable improved high yielding varieties and their adaptability experiment season by season.
- (2) The selection of imported recommendable varieties, especially for high yield and disease resistant varieties.
- (3) The improvement of crop cultivation methods.
- (4) The rationalization and dissemination of the fertilizer application.
- (5) The dissemination of pest and disease control.

The cooperation for the aforesaid five points is considered vitally essential. It is also necessary to take into consideration the practice of the crop rotation system with pulses and some other crops, because the continuous cropping of sorghum not only increases the pest and disease damages but also exhausts the soil fertility. Therefore the cooperation for the planning of these cropping patterns is also considered essential.

In addition, once the locally suitable high yielding varieties are selected, it will become necessary to multiply those seeds in the Seed Farm for the seed production increase and also to distribute those seeds among the farmers.

The computation of the integrated comprehensive program for sorghum productivity raise has been a weak point in past Japanese technical cooperation, but in

order to raise efficiency of technical cooperation, it should start with formulation of the Master Planning for production as the basis of cooperation to be carried out.

Wheat

In Sagain Province (the adjacent Province on the western side of Mandalay City) as a wheat production area, 44,000 tons of wheat, almost close to 100 per cent of the total national wheat production, is being produced, out of which 25 per cent is the high yielding variety of Mexipak and the trend of its production is also increasing year after year.

The yield of Mexipak is as high as 1.2 ton per hectare while that of local varieties, which is 75 per cent of the total wheat cultivation, is 0.8 ton per hectare. Sowing is line sowing by draft animal and the application of fertilizer is only partially practiced.

The domestic demands for wheat are not met by home produced wheat yet, and are mainly dependent upon imported wheat. Therefore wheat production is one of the important crops to be increased in the area of the middle and the north of the country and also in that of Shan plateau. The problems of technical cooperation for wheat are considered as follows:

- (1) The selection of the recommendable varieties (including the imported varieties).
- (2) The multiplication and dissemination of the recommendable variety seeds.
- (3) The rationalization of the fertilizer application.
- (4) The pest and disease control.

The present main wheat production area is as aforesaid Sagain Changwad in the middle part of the country, but Shan Changwad (plateau area) is also considered as a suitable production area.

Soybean

The soybean production area is limited. In the plain area the miscellaneous pulses, mainly Black Matpe, are the major crops. The suitable soybean production area is Shan plateau and its production has long been practiced, and its future production potential is considered highly promising. The prevailing varieties being produced at present are local traditional varieties, but a Seed Farm has been initiated and Yellow-114 of U.S.A. and some other recommendable varieties, although only a few, are being cultivated. The yield of these varieties are in the range from 0.8 ton per hectare to 1.3 ton per hectare, and they are not low yield. (The average yield in Brazil is 1.4 ton per hectare.)

The increase of their yields is considered possible to attain by practicing the inoculation of leguminous bacteria and cultivation method improvements. While the yield of local varieties are as low as in the range from 0.5 ton per hectare to 0.8 ton per hectare.

The following points are considered as the objectives of the improvements and the fields of technical cooperation.

- (1) The importation of the good varieties and the selection of recommended varieties.

- (2) The multiplication and dissemination of the recommendable varieties.
- (3) The research on the technical improvements.
- (4) The planning for the formation of the main production area.

Soybean is the crop with which to attempt the maintenance of soil fertility and also the increment of the agriculture productivity by crop rotation with wheat, corn and other graminous family crops. It is considered more desirable to seek its production increase as an export product rather than for the domestic demands for edible protein, oil and fat, and other resources can be sufficiently supplemented by other miscellaneous pulses. It is highly desirable to expand aggressively soybean production in Shan plateau known as a vast area of 1,000 m or more above sea level which is one out of the rare suitable areas in southeast Asia for soybean.

Corn

Corn production in the plain is scant. Its main production area is Shan plateau which has the suitable climatic condition for corn cultivation.

Its present yield is 1.3 ton per hectare in average, and this is considered not high compared with those of other Southeast Asian countries. But the yield of the recommendable variety is 2.7 ton per hectare and higher than other foreign countries in S. E. Asia, and mainly yellow varieties are cultivated. The productivity of these varieties and their quality is high. The soil fertility maintenance and the rational production practice by the combination of corn and soybean cultivation enable the production area to be maintained for a long time. The existing situation, however, is not like this cropping pattern yet.

The points to be considered for Japanese cooperation are as follows:

- (1) The breeding and selection of the recommendable varieties.
- (2) The research on improved cultivation method and mechanized farming.
- (3) The planning and dissemination of the cropping system.
- (4) The multiplication and dissemination of the recommendable variety seeds.

Because of the fact that water is indispensable during the corn cultivation period, the corn crop is generally once a year, but it is possible to introduce soybean or other crops of higher drought resistance before and/or after the corn crop.

SURVEY ON FORESTRY

III. SURVEY ON FORESTRY

1. Itinerary of the survey, constituent of the survey team

Dec. 7 (T)		L. Tokyo for Rangoon via Bangkok
8 (W)	A. M. P. M.	Courtesy visit and conference at Japanese Embassy. Courtesy visit Vice-Minister of Agriculture and Forests Orientation at Ministry of Agriculture and Forests.
9 (Th)	A. M. P. M.	Courtesy visit President of Timber Corporation Orientation at Corporation. Courtesy visit Director General of Forest Department Orientation at Forest Department.
10 (F)	A. M. P. M.	Aerial survey over Bassein area by chartered plane. Orientation by local agencies concerned in Bassein area.
11 (Sa)		Terrestrial survey in Bassein area.
12 (Su)	A. M. P. M.	L. Bassein for Rangoon by chartered plane. Dinner Party hosted by Vice-Minister for Agriculture and Forests.
13 (M)		Field survey in Tharrawaddy area.
14 (T)		Prepare interim report, confer with counterparts.
15 (W)	A. M. P. M.	Luncheon Party hosted by Survey Team Leader. Report outcome of Survey to Minister of Agriculture and Forests.
16 (Th)		L. Rangoon for Kuala Lumpur via Bangkok.

Members of Japanese Project Finding Team
for Forestry Cooperation in Southeast Asia

Name	Position
Mr. Heizaburo TEZUKA (Team Leader)	President, Forestry Credit Fund of Japanese Government
Mr. Masato FURUYA	Deputy Director (wood processing), Forest Product Division, Forestry Administration Department, Forestry Agency, Government of Japan
Mr. Tadao KUMAGAI	Head of Planning Division, Iwate-Fuji Industrial Co. , Ltd.
Mr. Yoshihiro KOYANAGI	Officer of Second Technical Cooperation Division, Economic Cooperation Bureau, Ministry of Foreign Affairs
Mr. Yoichi NAGATSUKA	Staff of Forestry Development Cooperation Depart- ment, Japan International Cooperation Agency, Japanese Government

2. Summary of outcome of the survey

Through (a) the aerial and terrestrial survey of wind damaged area of evergreen broad leaf forest in the southern part of Arakan Yoma (Mountain Range) located between the Bassein River flowing southward and the Bay of Bengal in the southwest part of Burma, (b) the terrestrial survey of the operation area of the mixed forest of the evergreen and deciduous broad leaf trees, mainly teak, in the hilly area of left side of the Irrawady River in Tharrawaddy region, and (c) the discussion with those of the central and local Government agencies concerned, the Survey Team arrived at the following opinions:

- (1) The traditional forestry techniques in Burma have been formulated mainly on the basis of the operation of selective cutting of teak and other broad leaf trees in the area of comparatively gentle slope.
- (2) As for the timber extraction system, draft elephants and buffalos, girdling, rafting and other typically local methods have been used, but recently chainsaws, timber collecting tractors, trucks and other machines have been also introduced, and this is the current situation.
- (3) Gradual future increments of machinery utilization ratio are anticipated, but in the present conditions some improvement are considered necessary in selection of machinery types, in the operation and maintenance of machinery in promotion of efficient machinery utilization, in construction techniques of forest roads and also in development of integrated operation implementation system.
- (4) Regarding timber extraction operations in the steep hilly area, almost none of techniques have been acquired and accumulated so far, and the exploitation of forest in the steep mountainous area has not been initiated yet. Even if the exploitation of forest in the steep area should be attempted by adopting the timber extraction method of pulling on the ground, it is needless to remark that this will cause damage to the timber to be transported, increase of operation risk ratio, diminution of sprouts and young forest trees, spoilage of surface soil and other miscellaneous problems. Due to the fact that soil in the mountainous area is generally forestry soil of latosol type, there is fear for serious decline of the forest regeneration capability. Therefore it is considered worthwhile to study timber extraction method by cable logging system which is broadly practiced in the mountain forest in Japan.
- (5) The wind damaged trees in Bassein area are mainly in a condition such as tree crowns blown off, but distinct pest damage has not been found so far, yet because of the fear for forest fire risk tree decay, and others, it is considered urgently necessary to establish firmly a prompt exploitation system. For this purpose, the replenishment of equipment is considered essential.
- (6) In addition, the environs of the wind-damaged forest area are gently sloped land, but inside there are many steep hilly areas, consequently, it is considered necessary to introduce promptly the cable logging system as aforesaid in (4), and without this an appropriate forestry management is considered very difficult.

- (7) In the wind-damaged forest areas, it seems hard to practice the general exploitation method for broad leaved forests of cutting trees with breast height girth over 7 feet (breast height diameter over 68 cm). As to the wind-damaged trees, it is considered unavoidable to adopt the method of cutting even comparatively small diameter trees in so far as their marketable value is worthwhile. Therefore, according to the seriousness of the wind-damage, in some areas the operations required are almost close to clear cutting. In such areas, for the purpose of assisting forest conservation and regeneration, their supplementary reforestation is considered essential. As to the method of such operation, it is considered necessary to establish a suitable method to fit in with the local forest condition after a deliberate study. This is also necessary not only for these areas, but as the supplemental techniques for selective cutting system of forest. In Burma, artificial afforestation although in a small scale (annually about 2,800 ha.), has been carried out. This has been done not as the supplemental reforestation in the forest of selective cutting but in a sense as the substitutional timber stock. The tree species are mostly limited to the following three, teak, pynkado and eucalyptus; in contrast to this, in Bassein area the regeneration of gajin, tountanit and other preferential species should be considered.
- (8) According to the aforestated, it is considered desirable to develop the comprehensive forestry operation system suitable for features of the forest area involving steep hills so as to acquire and teach the techniques of cable logging system, to improve the technical level of forest road construction, to consolidate the machinery maintenance and repair system and to establish artificial forest regeneration and supplementation methods. For this purpose, it has been acknowledged Japanese so-called project type technical cooperation is to be highly effective.
- (9) Arakan Mountain Range, extending further to the north of Bassein wind-damaged forest area, is rich in forest resources. But most of this forest area is outside the objective for forestry exploitation due to steep topography. Therefore, the Government of Burma is looking forward to develop the forest region of the Arakan Range by taking advantage of effective utilization of the results of the technical development aforestated in (8).

3. Direction for technical cooperation

Although the assistance to extract promptly the damaged timber are highly desired by the Government of Burma, the mere execution of this is not considered sufficient to be in the category of technical cooperation. It is, however, possible to cooperate for the establishment of forest exploitation technical system taking a part of Bassein area as a model area. It is considered also certain, that this is to be the basis of the operation system, of course, in the Arakan Range and also in any areas of steep hills to be the objectives of future development. Even the cooperation for forestry, having been started already by the International Bank for Reconstruction and Development and others, has not included the cooperation for the purpose of the forest exploitation in the steep hilly areas. It is considered highly effective for the increment of the timber production in the whole of Burma, to transfer mainly the

techniques of logging by the cable system suitable for timber production in steep hilly areas, and to consolidate the repair and maintenance system for timber extraction operation.

In consequence, wherever technical cooperation is to be carried out in Japan, it is considered necessary to deliberate the technical cooperation in view of establishment and upraise of technical level of the system for timber extraction, including the transfer of the techniques for the cable logging system. In this case, the points to which attention should be paid are not to deny the traditionally and locally prevailing draft animal power and reasonable operation method and also to include these in establishing timber extraction system and adjust it to mechanical operation.

In addition, although the regeneration of the logged-over areas may be mainly dependent upon natural regeneration, examination of necessity of artificial supplementation is not to be neglected, and the cable logging system should be deliberated so as not to spoil the forest bed vegetation and soil conditions. These points are to be taken into special consideration for technical cooperation in Burma where special caution has historically been taken for sustained yield forest management.

In order to promote the forest exploitation of Bassein area, including the forest in Arakan Range, it is considered essential to deliberate the comprehensive project including the transfer of cable logging techniques, the consolidation of timber harvesting system concerned with it and guidance and training in the necessary techniques.

The following points are considered as the substantial schemes to be the objectives of the technical cooperation for the project:

- (a) The establishment of the comprehensive technical system for timber extraction.
- (b) The formulation of the plan for the forest road construction and logging, and their technical guidance and training.
- (c) The guidance and training for the introduction of the cable logging system and the development of their application techniques.
- (d) The improvement of a Workshop and the establishment of the machinery repair and maintenance system.

It is considered necessary to carry out these activities, establishing a Forestry Technical Center (tentatively so called) as their base, and the technical guidance and training are to be conducted actually on the spot by setting up a model area in the project area. It is also considered necessary to deliberate some appropriate location in Arakan Range including Bassein area as the objective area to establish the center in accordance with the request of the Burmese Government with a view to coordination with cooperation projects by other international organizations and the possibility of technical cooperation.

Moreover, the Regional Forest Office which has jurisdiction over the Arakan Range is located in Rangoon, and the Forest Department has jurisdiction to formulate plans for forest development exploitation and regeneration, and the Timber Corporation to execute timber extraction. Since this project is related substantially to both organizations, it is considered necessary to adjust and coordinate these two organizations and also necessary to dispatch an chief expert to the Ministry of

Agriculture and Forests which has jurisdiction over the two organizations.

It is learned the Government of Burma has the intention to deliberate and propose a substantial plan regarding the prompt request for project cooperation and also to start the project in April 1978, at the commencement of the Third Four-Year Plan.

As to what to do now, it is considered necessary to await the proposal of the substantial plan by the Burmese side and to dispatch a survey team to formulate the framework of the technical cooperation project. Because of the brevity of this survey period, a further detailed survey is considered desirable for the purpose of smooth promotion in future. In addition, computing the time schedule of starting cooperation in April 1978, it is considered necessary to confer and deliberate promptly the formulation of the framework for cooperation, and for this purpose also necessary to dispatch promptly the surveyors for a longer period. And also in order to implement smoothly the technical cooperation in future, it is considered necessary to facilitate the reception of those Burmese concerned as trainees in Japan prior to the start of the project, especially as regards cable logging because no experienced person is to be found in Burma and also because it will take some time to acquire these techniques, it is considered necessary to deliberate the early reception of the trainees for this field.

Furthermore, it is considered desirable, from the viewpoint of effective application of the achievement of the aforesaid technical cooperation, to deliberate in future the possibility of cooperation to formulate the broad regional development plan for the mountain forest, and also the possibility of technical cooperation in the field of silviculture.

SURVEY ON LIVESTOCK INDUSTRY

IV. SURVEY ON LIVESTOCK INDUSTRY

1. Itinerary of the survey, constituent of the survey team

Itinerary of the survey

Nov. 29 (M)	10.50 16.35	L. Tokyo via JL 471 Ar. in Bangkok
30 (T)	10.25 10.50	L. Bangkok via TG 301 Ar. in Rangoon Received by Mr. Hara, secretary, Japanese Embassy, staff concerned from Burmese Government, Agriculture Corporation and Livestock Corporation and also conference on the itinerary.
Dec. 1 (W)	10.00- 12.00 14.00-	Coutesy call and conference, Ministry of Agriculture and Forests (together with Upland Crop Survey Team). Visit Livestock Corporation Orientation on Livestock industry situation in Burma and talk on what are desired of Japan by the Managing Director of the Corporation, and conference on subjects of survey and itinerary.
2 (Th)	10.00- 12.00 14.00-	Visit to Rangoon area, Poultry Farm (9 miles) of Livestock Corporation, Piggery (experimental) (10 miles) Dairy Farm (9 miles). Piggery, Feed Mill Factory, Duckyard.
3 (F)	7.20 14.00- 18.00	L. Rangoon for Nyaung Oo, via UB 791. Farm Household survey at Kyao Village, overnight at Pagan.
4 (Sa)	8.30 9.30- 10.30 12.00	Nyaung Oo Farm (Agriculture Corporation). Farm Household survey at Tet Thein Village. Kyaukpadaung Farm (Vineyard, Agriculture Corporation) overnight at Meiktila.
5 (Su)	9.30 11.00 14.00 18.00	Thaphan Sheep Farm (Livestock Corporation). Thaphan Poultry Farm. L. Meiktila. Ar. at Mandalay.
6 (M)	8.30 11.00 11.30	Patheingyi Livestock Developing Center (Poultry, Pig, Cattle, Livestock Corporation). Mandalay Area Office, Livestock Corporation (Artificial Insemination Center included). Piggery in Canning Factory (Collective Farming).

	12.00	Thu Yein Nan Poultry Farm.
	15.30	L. Mandalay via UB.
	17.00	Ar. in Rangoon.
7 (T)	9.00	Artificial Insemination Center, 9 miles.
	10.30	Veterinary Research Institute, 9 miles.
	11.00	Rangoon, Institute of Animal Husbandry and Veterinary Service (Ministry of Education, 9 miles) Poultry Farm (Insein).
8 (W)	3.00-	Pig slaughter house, check and study materials collected
	4.30	staff meeting of the team.
	19.00	Dinner Party Vice-Minister (Inya Lake Hotel).
9 (Th)	10.00	Report survey outcome to Vice-Minister of Agriculture and Forests, Director of Planning and Statistic Department and staff concerned.
	19.00	Dinner Party hosted by Survey Team Leader (Strand Hotel).
10 (F)	9.00	Report survey outcome to Ambassador of Japan.
	15.00	L. Rangoon via UB 221.

Members of Japanese Survey Team for Livestock Development Cooperation

Name	Subject	Position
Mr. Kazuo EGUCHI	Leader	Executive Director, Japan Meat Grading Association
Mr. Morio IKEDA	Animal Production	Director, Oou National Livestock Breeding Station, Ministry of Agriculture and Forestry
Mr. Tadaji IDEUE	Forage Production	Head, Forage Division, Fukushima National Livestock Breeding Station, Ministry of Agriculture and Forestry
Mr. Kazuo KANAYA	Animal Health	Senior Veterinary Quarantine Officer, Animal Health Division, Livestock Industry Bureau, Ministry of Agriculture and Forestry
Mr. Hideo ONO	Co-ordinator	Livestock Development Division, Agricultural Development Co-operation Department, Japan International Cooperation Agency (JICA)

2. Summary of outcome of the survey

(1) City of Rangoon Meat Sufficiency Plan

The following explanation was given by U Pyi Soe, the Managing Director, Livestock Development and Marketing Corporation (hereinafter L. D. M. C.) on "City of Rangoon Meat Sufficiency Plan" which is an urgent problem for L. D. M. C.

- i) The entire territory of Burma consists of 7 Provinces and 7 Districts, and in one of these, Rangoon District, livestock product (meat and egg) demands have increased considerably and it is an urgent problem to meet the demands. The population of Rangoon City is about two million and that of Rangoon District as a whole is about three million. Animal protein required per capita according to WHO standard is calculated at 4.8 ticle (76.5g, 1 viss = 100 ticle = 1.6 kg).

The present animal protein supply sources are 60 per cent raw and dried fish and 40 per cent livestock products. The necessary amount of animal meats is figured out as shown in the Table. 1. The total is 93,920 viss (15,027 kg hereinafter viss is converted to kg).

The present amount of daily supplies according to 1974 census of the poultry market and public slaughter house of Rangoon City are said to be 4,000 chickens, 2,000 ducks, 300 pigs, and 280 sheep and goats, and 100 cattle and buffalo. But in fact, the aforementioned is not the whole amount, because of existence of free market meats. It is impossible to supplement the deficit amount all at once, therefore according to annual plan, from the State Farm 10 per cent of the deficit in pork and chicken are to be supplied in the first year (1976-77), 20 per cent in the second year (1977-78), 30 per cent in the third year (1978-79), and 50 per cent in the fourth year (1979-80). Up to 50 per cent of the deficit is planned to be supplied by increasing annually by 10 per cent of production increase. To implement this plan, Japanese cooperation is being desired.

Table 1. Animal Protein Supply by Sources

	Supply (%)	Ratio (%)
Fish and Fish Products		60
Beef	15.33	}
Pork	15.33	
Chicken	4.09	
Duck	3.39	
Mutton (Sheep) and Goat Meat	1.86	

Necessary Amount of Meat per Day

Items	Necessary Quantity per day (heads)	Meat Content per head (kg)	Total Amount (kg)	Present Quantity of Supply (heads)	Deficit Quantity (heads)
Cattle and Buffalo	400	144	57,600	100	300
Pig	1,200	48	57,600	300	900
Chicken	16,000	0.96	14,400	4,000	12,000
Duck	8,000	1.12	8,960	2,000	6,000
Sheep and Goats	1,120	9.60	10,752	280	840

- ii) There are two slaughter houses in Rangoon, one for cattle, goats and sheep and the other for pigs. These are separated so that a Mohamedan does not touch a pig. The facilities are old and slaughter method and treatment are not hygienic. The construction of the public slaughter house is being planned with foreign aid (A.D.B.). The slaughter-house is under the supervision of the Commission of Municipal Corporation and L.D.M.C. is in the position to extend technical advice. As is stipulated by law, cattle to be slaughtered are to be over 16 year old, slaughter charge is 2.5 kyat (hereinafter abbreviated ky) weight at slaughter is 220 kg, the carcass yield rate is 40 per cent, pigs are slaughtered 1.5 year old in average, the average weight at slaughter is 45 kg, the carcass (with hide) yield rate is 60 per cent, lard is highly demanded for cooking fats and its price is higher than meat price. The chicken weight of improved varieties reach 0.9 - 1.2 kg in average 1.1 kg in 2-3 months (male and female), local varieties are delivered at 18 months old for egg laying.
- iii) In Rangoon District, there are five L.D.M.C. Farms; one each for dairy cattle, chicken, duck and pig and one is mixed for cattle, pig and chicken. Besides these, there is one Feed Mill Factory.
- iv) As to the modernization of livestock industry, for chicken, the original stock (parents) of Hyline and others are imported from U.S.A.; for pig, Land-Race, Large Yorkshire, Duroc and others are imported from Australia, Viet Nam and other countries, and cross breeding with local varieties is tried and they are distributed to farmers.
- (2) 10 Mile Production and Research Farm (pig and chicken)
- i) Chicken
- The egg incubator is Japanese made "Matterhorn" with capacity of 15,000 eggs, two sets of which are in full operation, and there is one brooder with capacity of 6,000 eggs. At present, four sets, each with capacity of

60,000 eggs, are under order. The average hatching rate is 60 percent. The percentage of sterile egg at the 1st check (one week after incubation) is 15-20 percent, the hatching rate is 60 percent, the brooding rate is 92 percent, the rearing rate from started pullet to ready to lay pullet is 95 percent, and 12 incubations a year are conducted, and it requires a week to disinfect the incubator once a month. Because of high price of egg, demands for chick from farmers are great.

The price of one chick (unsexed) is 1.5 ky, the sale price of one breeding egg is 0.7 ky, and that of one eating egg is 0.5 ky. The present breeding chicken is a descendant of the strain originally imported 12 years ago, and after many generations their performance is not particularly good. 20 years ago A. A. A. white leghorn were once imported from Japan.

The annual average laying egg number of is 180, and the laying chickens are kept for two years in this Farm, while farmers sell generally their chickens as fryers at one year or one and a half year. At present breeding chickens for broiler Teager 70 of 24 weeks old have been introduced through the courtesy of Australian Ambassador and their performance is being tested. These chicks are supposed to be able to be marketed in 8-10 weeks. At present in this Farm 18 staff keep 15,000 birds, but by February 1977, this Farm is to be a broiler farm. A national Poultry and Piggery Center is to be established in Nyuengoh with A. D. B. aid, and 100,000 egg lay chickens are to be kept. For this purpose, in this Farm the comparative tests are being conducted for Hyline, TM 70, WMM, HBP, HCM, HCP, WLM, WLP, Arbor Acres, Harco, Indian River and other superior strains. By the middle of 1977, the recommendable strains are to be determined and their grand parents are to be introduced, thus it is planned to ship out 30,000 chicks a week. It takes three days to transport the day-old-chicks by air, the mortality ratio during transportation is high. At present 463 chicks of Hyline and 3635 chicks of TM 70 - 276 are being kept for experimental test.

ii) Pig

4 head of male and 14 head of female of Land Race, Large Yorkshire and Duroc respectively have been imported from Thailand (the original are from U. S. A.) and their comparative experimental tests are now being conducted. 17 years ago, Duroc was imported by BEDC and showed excellent feed efficiency record. The mating starts at 6-7 month old. Delivery of piglets is to be once a year for the first birth and twice a year for the second birth onwards. The average number of piglets at one birth is six (8 piglets are delivered but 2 die during milking stage). For breeding, male is used up to 4 years old and female up to 3 years old. (note: female is middle grade but male is not good either in growth or in strain.)

iii) Danyingone Pig Breeding Farm

U Htay Aung, the manager of this Farm studied in Japan for 6 years (1957 - 63) piggery in Chiba and Poultry in Gifu. The Danyingone pig Farm started in 1956 as an Army Poultry Farm, later, piglets were produced and supplied to farmers as their task but in 1976 this Farm was transferred

to the jurisdiction of LDMC, and the piglets, eliminated from various Farms where improvements were implemented, have been collected in this Farm so it is understandable that their quality is not satisfactory. 9 head of male, 120 head of female including piglet, 452 heads of Berkshire strain (1964, 300 heads from Australia, prior to this 3,000 heads of Japanese strain mixed breed from Viet Nam) are being kept. The number of the staff are 18 persons, the piglets weaning at 6 weeks old with weight of 9 kg are distributed among farmers at the price of 150 ky per head either male or female. The prevailing market price is 300 ky. Farmers rear the female for breeding, and castrate the male for fattening, but the demand for female is generally greater. Since April this year 600 heads have been sold. The price of pork is now high at 12.5 ky per kg because it is prior to the festival season, but the price falls to 9.38 ky during the season when fish is plentiful. (the fluctuation is drastic at 12.5 - 15.63 ky) One leg is 6 ky and a head is 15-20 ky, the intestine is a little cheaper than these meat. In the vicinity of Mandalay meat market is open to goat and chicken but in other areas Chinese brokers are found. Medium-grade pork is for food use. Even with old pig, cheaper meat is preferred. Generally speaking, pigs and chickens are alike savings for farmers, so it is common practice to sell some of those whenever money is necessary. They rear those livestock with no thought of profit, no taking any cost account for self-supplied feeds or family labour. The local chicken lays about 12 eggs and sitting over egg for hatching four times and breed 5-10 chicks a year.

The chicks are sold at their weight about 0.9 kg. One bird is 10 ky and one time sale is about 50 ky. Of this piggery Farm the monthly expenses are 4,000 ky for personnel, 4,000 ky for feeds, 1,000 ky for maintenance and 9,000 ky for total while income accounts are 10,000 ky for sales of piglets with target of about 1,000 ky for profit but the facts are not necessarily so favourable as prospect. The problem what the piggery farms encounter in Burma are (1) feed (farmers generally feed banana leaves and kitchen wastes) (2) sanitary problems. The problems for which once Japanese cooperation are to be desired, are for equipment for artificial insemination and vaccine. The retail price of meat in Rangoon are 15-15.6 ky per kg same for either beef, pork or chicken meat, that of chicken egg for wholesale is 0.45 ky per egg, and that for retail sale is 0.6 ky or 6 ky per dozen of egg. At present the scale of piggery farmer (non-government) is up to about 30 pigs, but it is considered possible to raise up to 100 head scale and 30,000 bird scale for poultry. Due to existence of brokers in the course of commodity distribution, the income of farmers could not be raised so much as the retail price raised up.

iv) Demand and Supply of feeds

In Burma, especially in Rangoon area, the demand for livestock products increased considerably and the problem to have adequate supply to meet the demand is now developing to be an agriculture and forestry administrative problem.

Thus the Government of Burma is devoted to consolidating the function of the Livestock Development and Marketing Corporation for the purpose of increasing livestock production.

Among the various livestock development plans, basic land improvements and production developments for feed are taken as important schemes. For the purpose to promote the livestock industry, feed supply problem is considered closely related and indispensable. Regarding this, it is considered there is no fear for securing the feed materials according to the impression acquired through on the spot investigation made by the Survey Team, because the authorities of the Livestock Development and Marketing Corporation are storing broken rice, rice bran, sesame seed cake, peanut cake and other grain by-products, maize, sorghum and other grains, especially as to maize, at present 1,000 baskets (1 basket = 45 lb) are stored and fish meal production is also possible.

Furthermore, once the efforts by L. D. M. C. is adequate enough, there is enough production possible to export remainder of the miscellaneous grain after the domestic supply. And also as to the domestic distribution of feed, since there are feed mill factory managed directly the Government and direct sale stores to sell feed directly to farmers and so forth it is comparatively optimistically pondered.

In Burma the main feed materials are by-products of paddy and other grain crop, the trial calculation made as the shown in the following Table 2, for the latent amount of productions of the main agricultural products and their by-products reproduced thereof.

Table 2. The Production Amount of the Main Agricultural Products and their By-products

Items	Acreage (1,000 acres)	Yield per acre (1,000 tons)	Production (1,000 tons)	By-products (trial calculation)	
				Production Ratio (%)	Production Quantity (1,000 tons)
Paddy (unhulled)	12,250	0.636	7,791	-	-
Rice (polished)	12,250	0.370	4,530	8.4	380
Pulses	1,706	0.161	275	77.0	212
Peanuts	1,588	0.266	422	50.0	211
Sesame	2,318	0.043	100	46.0	46
Cotton (fiber)	519	0.073	38	-	-
Cotton (seed)	519	0.123	64	500	32
Jute	184	0.272	50	-	-
Rubber	200	0.085	17	-	-
Sugarcane	221	6.791	1,501	10.0	150
Tobacco	122	0.410	50	-	-
Wheat	161	0.161	26	25.0	65
Maize	210	0.281	59	-	-

Note (1) Excluding (polished rice), Acreage and Production of other crops are 1960-61 and average of 4 years from 1972-73 to 1975-76 (estimate) and those of (polished rice) are 1961-62 and average of 3 years from 1973-74 to 1975-76 (estimate).

(2) As to yield of cotton, data for Burma was not obtainable, so the world average figure was used.

(3) Production Ratio of By-products, as to oil cake, figures from Japan Oil and Fats Ass. and as to Rice bran, rice polish ratio (91.6%) are used.

Production Quantity of by-products was calculated by using the aforesaid standard but in villages, oil is extracted by a method with draft cattle, in consequence, the actually produced oil cake quantity is considered larger than trial calculation figures. Out of the main agriculture products, peanuts and other oil crop, and cotton and other fiber crop, rubber, sugar cane and some others are mostly for domestic use.

Rice is only export commodity, and its highest pre-war record of export was 3 million tons and highest post-war record was 2 million tons, but the export amount fell year after year down to 0.166 million tons in 1974-75 due to population increase and production decrease.

Agriculture techniques in Burma are entirely pre-modern style, solely by manual labour totally dependent upon motive power of cattle and buffalo and their productivity is extremely low as shown in the Table.3

The trial calculation for number of head of pigs and that of chickens possible to be fed only with the available feed provided in the Table 4 are shown in the Table below:

Besides this, fish meal products are known, but the exact amount of its production could not be acquired, therefore only the trially calculated by-products of the main agriculture product are used for this trial calculation.

Table 3. Trial Calculation for Number of Head of Pig possible to feed (1)

Items	Nutritive value of feed			Production amount of feed	Amount of DCP	Amount of TDN
	DM %	DCP %	TDN %			
Raw Rice Bran	87.2	10.7	72.8	380,000	40,660	276,640
Bean cake	88.1	45.1	72.2	212,000	95,612	153,064
Peanut cake	91.2	41.7	70.8	211,000	87,987	149,338
Sesame cake	91.6	33.6	62.8	46,000	15,456	28,888
Cotton seed cake	89.0	26.4	50.1	32,000	8,448	16,032
Wheat Bran	87.8	12.2	60.1	—	1,793	3,907
Maize	86.5	6.8	80.7	59,000	4,012	47,613
Total					252,968	675,532

Note (1) Bagasse is excluded because this is not usable for piggery.

Table 4. Trial Calculation for Number of Head of Pig possible to feed (2)

Items	Necessary amount of supply (kg)	Amount of Production (t)	Necessary amount per head (t)	Number of head of pig possible to feed (head)
Mixed feed	320	-	-	-
DCP	35	252,968	0.035	7,225,942
TDN	240	675,532	0.240	2,814,716

Remark (1) The base of trial calculation is the case of finisher of pig weight of 90 kg at 7 month old.

In case fish meal (DM 91.0, DCP 54.6, TDN 61.9) is added, TDN is up lifted and the nutrient ratio is better balanced, thus the feedable number of head of pig is increased.

Furthermore, because the number of head of pig to be fed is to be limited according to the production amount of TDN, it is advisable to attempt use of coconut cake (DM 91.0, DCP 13.6, TDN 69.7) and palm kernel cake (DM 89.0, DCP 8.4, TDN 61.9) which can be locally supplied.

The next table is trial calculation for number of layers chick breeding and broiler, same as that of pig is made as follows:

For the First, the Nutrients are to be calculated

Table 5. Calculation Table of Nutrients

Items	Nutritive value of feed				Production amount of feed	Amount of DCP	Amount of TDN	Amount of CP
	DM %	DCP %	TDN %	CP %				
Raw Rice Bran	87.2	10.2	66.4	13.4	380,000	38,760	252,320	50,920
Bean cake	88.1	39.3	60.2	45.8	212,000	83,316	127,624	97,096
Peanut cake	91.2	40.3	59.1	45.8	211,000	85,033	124,701	96,638
Sesame cake	91.6	36.0	58.3	44.5	46,000	16,560	26,818	20,470
Cotton seed cake	89.0	29.6	46.3	38.0	32,000	9,472	14,816	12,160
Wheat Bran	87.8	11.8	50.5	15.4	6,500	767	3,283	1,001
Maize	86.5	7.7	77.8	9.0	59,000	4,543	45,902	5,310
Total						238,451	595,464	283,595

3. Direction for technical cooperation

(1) The Government of Burma started the Second Four Year Plan in April, 1974 with a slogan "Production Increase and Production Efficiency Raise" and thus have been promoting the economic development aggressively. The key for the successful economic development in Burma is considered to be the promotion of agriculture, particularly the promotion of livestock industry as one of the most important measures.

Draft cattle are not only vitally essential power for cultivation in paddy as well as upland area but also indispensable element for local transportation means. The slaughter prohibition of male and castrated cattle up to 16 years old has been imposed to secure conservation of the resources. On the other hand, in response to the increasing demand for livestock products, it has become an urgent requirement to supply milk, meat and eggs constantly. And in addition, from the long term point of view and also in view of securing national nutrition level it is considered necessary to attain a rapid long stride production development. Furthermore, it is considered extremely effective means for improving soil fertility to apply the compost and stable manures. As aforesaid, the role played by the livestock industry for the socio-economic development in Burma is considered extremely great.

For this purpose, the Government has established Livestock Development and Marketing Corporation in December, 1975, as an agency for the management and operation of 24 State Farms set up all over the country, and also as a single supplying agency of basic materials, recommendable breeding stock, commercial feeds, drugs and medicines necessary for the development of livestock industry. Thus, the Veterinary and Animal Husbandry Department, Ministry of Agriculture and Forests, and L.D.M.C. share each function on their own and also cooperates with each other to promote the development of livestock industry.

Actually fairly satisfactory achievements have been attained to far and further outcome is considered promising. The greatest problem for the development of livestock industry under the present condition is to attain the targets of up lifting livestock farm management efficiency, and of increasing the income of livestock farmers, also of attaining stabilized supply of livestock products, by improving the low livestock productivity and the poor feed efficiency of some local varieties, to provide stocks of economically high performance with appropriate rearing management.

For the purpose to promote the breeding of recommendable livestock varieties by improvement and multiplication of the livestock and the development of rearing and management techniques well adapted to local environments, and also the furtherance of production enlargement and productivity up-lift, especially in Rangoon area where the demand and supply situation for livestock products is critical, L.D.M.C. has been requesting Japanese technical cooperation for the development of piggery and poultry. The Survey Team has conducted the field survey and feasibility study for cooperation, keeping these requests in mind. As to the substance of the technical cooperation, it is considered desirable to adopt a form of cooperation by the establishment of "Rangoon Regional Piggery and Poultry Development Center" (tentatively so-called) and in strengthening functions of L.D.M.C. through the improvement and increment of livestock and the development of rearing and management techniques. As to the means for the cooperation, dispatching experts in the

field concerned, provision of necessary equipment and materials, reception of individual trainees in Japan, and anything else deemed necessary are to be considered.

As to the site where the project facilities are to be located, the State Farm of L. D. M. C. in Rangoon Region is considered to be appropriate.

(2) In the case of Burma, the feed materials are being produced to a certain extent; in addition, the condition is now such that a good deal of various kinds of vaccines can be locally self-supplied and some techniques concerning livestock industry have been accumulated and also some materials have been obtained, therefore cooperation for reinforcement of State Farm for the purpose of supplying pork, chicken meat and eggs to the city of Rangoon as is desired by L. D. M. C., is considered possible.

In this case, it is, of course, important to adjust with the FAO/ADB development project of pig and chicken, and also necessary to cooperate from the planning stage of State Farm consolidation programme.

Technical cooperation and guidance

- 1) As regards pig and chicken, cooperation for the aforesaid consolidation programme, countermeasures for feed production increase (related to upland crop project) and cooperation for sanitation countermeasures.
- 2) In case of pig, guidances are necessary for breeding livestock management and improvement of feedstuff, elevation of pig improvement techniques and artificial insemination techniques.
- 3) In case of chicken, it is considered appropriate to offer guidances for incubation and brooding techniques, management techniques of layer and broiler, improvement of feedstuff, elevation of chicken improvement techniques and sexing techniques.

Provision of equipment and materials

- 1) As to the common matters, mobile power such as lightvans (small motor car) etc. , livestock and feedstuff, small and standard trucks for transportation of material, power driven fumigators, veterinary instruments and materials, medicines (disinfectants, treatment, certain types of vaccine), dissecting tools and instruments, electronic computer for data recording and card system equipment and materials and others.
- 2) For pig, body weight scale (for pig and piglet), retaining stall, ear mark and ear print tattooing implements, water bowls, feeding wheels, artificial insemination instrument (infusion syringe, collecting receptacle, dummy, containers for storing and transporting semen, testing instruments such as microscope and others, milk for piglet and feed additives, simple slaughtering implements (hoist, various types of knife and saw, dressing table, skin stripping scalding, boiler and other), light trap and others, and piglet (commercial parents, in some case, grand parents).

- 3) For chicken, incubator, hatcher, egg candler, sexing instrument, breeding egg sterilizer, brooder, feeding utensils, water supply implements, de-beaking instrument, formalin sterilizer, wing band, and peckers, leg band and pinchers purpose feed additives, dissecting table, feather picking instrument, feeding wheel, cage stand for poultry and others, chicks (commercial parents, in some case, grand parents) for layer, broiler and also for combined use are to be prepared.

Experts

It is considered necessary to have one person to take charge of supervision, planning and other affairs, one person to take charge of pig, one person to take charge of chicken and one person to take charge of feedstuffs, in total four persons and it is also necessary to include one veterinarian among them.

It is highly desirable to select the aforestated personnel as early as possible so that at least for two to three months they can have time to study local conditions, the reading of Burmese writing and other matters deemed necessary. Particularly as to Burmese writing, it is supposed to be considerably inconvenient unless Burmese writing can be understood to a certain extent, because almost none of the sign boards carry English writing along with Burmese any more as practiced in previous days.

