CHAPTER 3 CONTENTS OF THE PROJECT

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3-1 Objectives

The Government of Malaysia is trying, as a member of the ASEAN countries, to realize the project for the establishment of the ASEAN Poultry Disease Research and Training Centre for the purposes of raising the level of poultry disease research in ASEAN countries through the promotion of research and training of related technicians (skilled manpower development) and contribution to the use of research results and propagation of techniques. This is an ASEAN project, to be enforced by Malaysia, with the construction of necessary buildings and the supply of research and training equipment being effected on the basis of Japan's grant aid.

3-2 Study on the Request Contents

3-2-1 Concept for the Centre

(1) ASEAN Project

The plan for the Poultry Disease Research and Training Centre originated in a request for Japan's technical cooperation, made at the fifth session of the Japan-ASEAN Forum in 1982. The original request also called for the construction of reginal poultry disease diagnosis laboratories in counties other than Malaysia to perform diagnosis of poultry diseases actually breaking out in these countries, and extended health guidance there.

Under this situation, it was decided at a meeting of ASEAN-COFAF/CGL held in Brunei in February 1985 to strive for the establishment of a research and training centre concerning poultry diseases, designed to help promote the wholesome development of the poultry industry in the region by conducting necessary examinations and research regarding poultry diseases in ASEAN countries and return their benefits to general farms households through the training of researchers. It was also re-confirmed at the meeting to enforce this project in Malaysia and as an ASEAN project.

Against this background, it was decided that the project will be enforced by the DVS of the Ministry of Agriculture, Malaysia in collaboration with the Coordinating Group on Livestock of the ASEAN-COFAF. Accordingly, the communication of opinions will be made through the CGL so that the wishes of the ASEAN countries can be fully reflected in the content and direction of the activities of the projected centre. Since the chairman of the CGL is the Director-General of the DVS of the Ministry of Agriculture, Malaysia, smooth operation and enforcement of the project can be expected. In this perspective, it can be stated that Malaysia was the best choice as the host country for this project.

(2) Construction Site

Meanwhile, the centre will be constructed on the campus of the VRI in Ipoh City.

The VRI is not only the largest and most advanced research institute of poultry diseases in Malaysia but also has the highest levels of research

in all the ASEAN countries. This means that the projected centre will have a basis for very advanced poultry disease research and also that it will be able to utilize the 137-member staff of the VRI, including the 20 research staff members. In this sense, the VRI grounds can be termed as the most suitable choice for the projected construction site of the centre.

3-2-2 Research Activities

In countries with developed poultry industry, set-ups for prevention of poultry diseases have been established and techniques for control of poultry diseases have been propagated in every sector of the industry. This has resulted from efforts on the part of investigators of poultry diseases and other persons concerned in order to grasp characteristics of poultry diseases, clarify principles to be followed in their control and treatment and spread the knowledge of such to poultry farmers through appropriate means.

It can be said, however, that ASEAN countries have not yet reached this level. Before some serious economic loss is incurred owing to large-scale prevalence of poultry diseases, therefore, it is hoped that related studies will be pushed for by professionals in poultry diseases. Accordingly, ASEAN countries consider it necessary to establish such a set up to be able to spread techniques for accurate diagnosis control and treatment of the diseases rife in the region, take prompt and approriate steps to prevent infection, purify the areas infected with poultry diseases and independently forecast the possible out-break of such diseases.

Since the technical level of professionals toward poultry diseases in Malaysia is high compared with that for other ASEAN countries, the country can be termed as one of the states closest to attaining this purpose. For this reason, higher knowledge and technology in the field of poultry disease research in ASEAN countries are hoped to be developed at the projected centre, and it is strongly believed that there is sufficient possibility of this.

As a consequence of consulting with Malaysia from this viewpoint, it was agreed that research activities should be conducted in the four realms of virology, bacteriology, parasitology and pathology. Furthermore, the following research themes (12 items) in the four fields as the subject for prompt studies and the necessity for such research were stated. Except for some, these researcher themes can be evaluated as common problems for ASEAN countries.

1. Virology
   - * * Formulation of oil emulsion and inactivation of Newcastle Disease Virus
   - * * Development of diagnostic methods of Avian Leukosis and Marek's Disease
   - * * Technical development of fluorescent antibody test
   - * Serological typing of Infectious Bronchitis Virus
   - * Serological test of Avian Influenza Virus and Paramyxoviruses
   - * Method for differentiation of Fowl Pox Virus

2. Bacteriology
   - * * Etiological studies on Chronic Respiratory Disease Complex
   - * * Studies on Enteritis
   - * * Etiological studies on feed contamination

3. Parasitology
   - * * Treatment, control and immunological studies on Coccidiosis
   - * * Vector of poultry diseases

4. Pathology
   - * * Pathological studies on Newcastle Disease, Avian Leukosis, Marek's Disease and other poultry disease

Note: * * Research item with higher priority
* Research item with lower priority

The necessity for the research themes in respective fields and the contents of the studies are as shown below:

1. Virology

1) Formulation of Oil Emulsion and Inactivation of Newcastle Disease Virus

Live vaccines for the Newcastle disease now being used in ASEAN countries can be classified into two types, namely those with mesogenic and lentogenic virus. Of these, live vaccines with mesogenic virus may cause severe inoculation reactions and sometimes invite respiratory diseases or death. Such being the case, U.S.A. and European countries inactivated vaccines causing weak reactions are used instead of these live vaccines. The prevailing method there is to generate the basic immunity through the administration of live vaccine of the leutogenic virus type and then give virus inactivated vaccine of mesogenic virus type, thereby forming complementing immunity. Recently in U.S.A. and European countries oil emulsified and inactivated virus vaccines of mesogenic virus type have been utilized for parent stocks or grand parent stocks and have attained sufficient effects. The real state of affairs, however, is that in ASEAN countries, techniques for the production of mesogenic virus type inactivated vaccine have not yet reached levels of developed poultry industrial countries. Malaysia, therefore intends to conduct research on ways to produce the oil emulsified inactivated vaccine for the suppression of Newcastle Disease in ASEAN countries.

In Japan, on the other hand, the manufacturer of this oil emulsified inactivated vaccine is not authorized, but the manufacture of inactivated vaccine with other adjuvants is permitted. Its single use or combined programmes with live vaccine is helpful control of Newcastle Disease. In the light of this fact, it is considered desirable to carry out research on the inactivated vaccine made with other adjuvants in addition to the oil emulsified inactivated vaccine.

2) Development of diagnostic method of Avian Leukosis and Marek's Disease

For differentiation of Avian Leukosis and Marek's Disease, special techniques are required because both are tumorous by nature and common to all chickens irrespective of sex and breed and also because their symptons and lesions resemble each other. The current practice in ASEAN countries

is to diagnosis them simply by listening to explanations from poultry farmers and discerning macroscopical lesions by sight.

Since Avian Leukosis is a hereditary disease, it is possible to eradicate it through cull (sacrifice) of the affected parent stocks. So far as Marek's Disease is concerned, however, prompt and appropriate measures are required because it is a contagious disease. If the differentiation of Avial Leukosis and Marek's Disease can be effected, correct steps can be taken enabling the limit of damage to a minimum. In consideration of this, it is important to develop this diagnostic method.

3) Technical Development of Fluorescent Antibody Test

One member of the research staff of the VRI reportedly has undergone training in hand techniques regarding tissue culture in Thailand. But since research equipment at the VRI is not sufficient, etc., he has not been able to convey the hand techniques to other research staff. Therefore, the research staff of the VRI has been hoping to learn the tissue culture method and immunological diagnostic techniques.

The technique of making hyper immunized serum to execute the fluorescent antibody test, and the immunological diagnostic techniques, such as the tissue culture method, must be learned by researchers.

4) Serological Typing of Infectious Bronchitis Virus

Infectious Bronchitis in chickens is one of poultry diseases rampant in ASEAN countries. As most chickens reportedly catch this disease during day old to pullet, it is believed that many poultry farms have this virus permanently. Immunologically, this virus is classified into eight types (representative strains), but virus strains of the vaccine now marketed in various countries can be roughly divided into two kinds, the Massachusetts type and the Connecticut type. In the administration of the vaccine for the prevention of the disease, the effect is problematical in the case of vaccine strains with different serum types from that of field virus strains now. Accordingly, the isolation and identification of the virus of this disease and serological typing of isolated strains is believed to form an essential element in the choice of vaccine strains.

5) Serological Test of Avian Influenza Virus and Paramyxoviruses

Influenza Virus belongs to the Orthomyxovirus family, which can be classified into three types of A, B and C. Of these, only A-type influenza virus infects chickens.

The avian influenza, which broke out in the U.S.A. in 1983 and is believed to be rampant in wild bird (H_5N_2) and came to infect against poultry and further spread after its pathogenic nature became virulent virus. Its damage was so serious that a total of 17 million chickens were sacrified in only one year, and a disbursement of U.S.$750 million was required for control of this disease. In Indonesia, the discovery of A-type Avian Influenza virus (H_4N_2, H_4N_6) has been recently reported. This fact suggests that, in ASEAN countries where there are many wild birds, there is the possibility of continued discovery of many A-type viruses pending further research. If Avian Influenza due to A-type viruses with virulent virus breaks out in ASEAN countries its damage will prove beyond measure, possibly undermining poultry industry which has just become rooted in these countries.

As a step to predict such an unexpected prevalence of Avian Influenza, it is necessary to help carry out this research.

6) Method for Differentiation of Fowl Pox Virus

In ASEAN countries a considerable number of Fowl Pox and Pigeon Pox cases are seen. It is known that, although some difference in safety is noted, the immunity of live virus for Fowl Pox and that for Pigeon Pox are not very different. In ASEAN countries, prevention of Fowl and Pigeon Pox is aimed at by means of these vaccines, but reports on their out-break never stop. A reason for this, aside from lack of vaccination, is instances in which the disease breaks out before the vaccination has taken effect. If all introduced chickens are vaccinated, and if guidance is thoroughly pushed to not neglect confirmation of the taking effect of the vaccination and, in the non-effective case, to repeat vaccination, it will become possible to lower the rate of Fowl and Pigeon Pox out-break in ASEAN countries.

Currently, pathogenic research on Pigeon Pox virus is going on in the VRI, which hopes to continue this research for 2 - 3 years. Seeing that the breeding of meat pigeons is in full swing in ASEAN countries, the outcome of the research can supposedly serve as reference information for prevention of Pigeon Pox breaking out in pigeons.

2. Bacteriology

1) Etiological Studies on Chronic Respiratory Disease Complex

Avian Mycoplasmosis Infection is a chronic avian respiratory disease stemming primarily from the infection of Mycoplasma gallisepticum (M.g.), Many of M.g.'s single infection cases end in latent infection. Causes usually seen in field are those of co-mycoplasma infection due to complex pathogenic organisms other than M.g. and stress from the environment.

This disease tops the rank of diseases diagnosed in disease diagnosis in Malaysia, and shows quite a high degree of infiltration in other ASEAN countries as well, thereby seriously affecting poultry farming. Furthermore, since it is a chronic disease posing difficulty in both treatment and prevention, it can be said that the research on the prevention of this disease is worth tackling. If results of the planned research are applied to the endeavors for eradication of M.g. in parent stock farms, it may be possible in the future to root out its egg transmission.

2) Studies on Enteritis

Diseases showing symptoms of enteritis in ASEAN countries are singly or co-infected Avian Salmonellosis, Necrotic Enteritis and Fowl Cholera and Enteritis records, the second highest out-break rate following Chronic Respiratory Disease Complex. Of Salmonellosis in chickens, the main ones are Pullorum Disease, Parathyphoid Infection and Fowl Typhoid with the route of their infection being egg transmission. Since the diagnostic test of Pullorum Disease is enforced on parent stocks under the National Programme for control of Epidemics, cases of this disease have diminished greatly in recent years. As for Paratyphoid Infection

and Fowl Typhoid, a test using an original antigen has not yet been conducted.

As regards Necrotic Enteritis, diagnosis is made on the basis of lesions seen inspection of postmorten and reference of pathogenic organisms but they are not enough for its etiological studies. Therefore, establishment of diagnostic and preventive methods is urgently sought.

In ASEAN countries, especially in those where many ducks are raised, damage from Fowl Cholera is serious. Although vaccine is used for the prevention of this disease and anti-germ agents and antibiotics are administered for the prevention of secondary infection of a bacteriological nature, it is difficult to completely prevent out-breaks of this disease and many cases of it are still seen in various places. It is believed that chickens were probably infected from ducks. Chicken Enteritis causes much damage to broiler industry in ASEAN countries through the increased mortality, decreased weight gain and deterioration of chicken cacass quality.

In order to minimize such damage, it is urgently required to establish methods for diagnosis, prevention and treatment of the disease.

3) Etiological Studies on Feed Contamination

In ASEAN countries, there are many cases in which causes of chicken diseases, brought for disease differentiation, are initially unknown but, after a certain degree of examination, are supposed to be feed contamination. There are many instances of their deriving from feed contamination with salmonella germs. This is allegedly due to fish meal made from inshore fish mixed into the feeds. It is mainly medium or small-scale poultry farmers compounding feeds by themselves that are using raw materials of such poor quality. As a means to eradicate the disease, investigation of contamination routes and typing of salmonella are required. Concerning the latter, it is possible to effect it in parallel with the research on chicken enteritis.

With regard to diseases due to feed contamination, there must be reasons other than pathogenic germs; since biochemical examinations are necessary to discover them a conceivable method is to ask the VRI to conduct the research.

3. Parasitology

1) Treatment, Control and Immunological Studies on Coccidiosis

Coccidiosis, the most representative disease among protozoa in chickens, records a high out-break rate in ASEAN countries, bringing about serious damage to poultry industry. There are nine kinds of Eimeria that are parasitic on chickens, and four of them cause particularly serious damage.

In ASEAN countries, treatment and control of this disease are conducted mostly on private initiative, but poultry farmers are dependent on pharmaceutical companies selling Coccidiostats so it cannot be said that correct treatment and control of the disease and being enforced. Accordingly, it is necessary to conduct studies on the control, treatment and immunity infection relating to the disease and to use the results at the principles for stamping out this disease.

2) Vector of Avian Disease

Caused by haemosporida parasitic on chickens, leucocytozoonosis, Avian Malaria and Avian Filaria can be enumerated.

As the protozoa of leucocytozoonosis, leucocytozoon caulleryi (Vector insect: Culicoides Arakawae) has been generally known. Recently, however, leucocytozoon sabrazi (Vector insect: gadfly) was discovered in Indonesia. Judging from this, there seems to be a sufficient possibility that, if haemosporida diseases in chickens are further examined, many protozoa will be discovered. The same can apply to Avian Malaria and Avian Filaria.

Based on this thinking, it is considered necessary to conduct research on haemosporida parasitic on chickens and also on the ecology of their vector insects.

4. Pathology

1) Pathological Studies on Newcastle Disease, Avian Leukosis, Marek's Disease and Other Avian Diseases

Most of the research items studied in the respective fields of virology, bacteriology and parasitology will have double effects if endorsed by pathological research. For this reason, this is one of the research items that must be studied in the projected centre.

3-2-3 Training Activities

As seen earlier, three training courses are to be offered by the organs of Malaysia at the projected centre. With regards to the three courses, the application of a training system in a third country training programme with Japan is being studies.

a. ASEAN Senior of Poultry Disease
b. ASEAN course on Basic Diagnostic Techniques of Poultry Disease
c. ASEAN course on Specialized Diagnostic and Research Techniques on Poultry Disease

Concerning other training courses, the positive attitude of Malaysia toward the effective utilization of the said facilities can be seen in such actions as the submission of their outline programmes by the DVS shown below.

a. Management of Poultry Disease control programme for district staff.
b. Performance indicators in poultry production (Epidemilogical approach to Poultry Diseases).
c. Duck Diseases.
d. Disease and management of other types of poultry.
e. Veterinary Assistant Training (existing)
f. Private sector veterinarians - Course on Poultry Disease control.

The propagation of research results from the centre should be delivered so as to meet the conditions of the respective countries through training of poultry disease researchers and technicians. This is believed to be the most effective method in attaining the purpose of the centre.

3-2-4 Building and Equipment

1. Building

The content of the buildings requested by the Malaysian Government can be broken down by functions, as follows:

1) Research sector
2) Training sector
3) Administration sector
4) Hostel sector
5) SPF Poultry Unit and Experimental Chicken House

Of these sectors, those for research and training can be, by nature, housed in independent buildings, by trainees. However, it is desirable that the two sectors be independent yet that they allow free traffic to facilitate use of equipment in the research sector by trainees. Such being the case, it is necessary to connect the sectors with a corridor or allow some other consideration in the lay-out plans. As both the research and training sectors will have central functions within the projected centre, it is hoped that the administration sector will be placed near them in the building layout plans.

The Hostel sector, on the other hand, is a living space so its function is considerably different from those of the other sectors. For this reason, a separate building in a pleasant living environment will be appropriate.

The SPF poultry unit and Experimental chicken house should by nature, be completely separated from each other and the other sectors. So far as their functions are concerned, the SPF poultry unit will be a Pathogen-free chicken house while the Experimental chicken house will be an accommodation for ailing poultry. It is therefore desirable that they be located as remote from each other as possible.

For this reason, it will be proper to accommodate these sectors in the following four buildings:

1) Research and training building
2) International Hostel

3) SPF poultry unit

4) Experimental chicken house

The results of our study on the necessity and justification of the construction of these buildings are as follows:

1) Research and Training Building

Initially no request was made by the Government of Malaysia for the establishment of a research and training building. As a result of the study on the future framework of technical cooperation at the stage of the preliminary study on the "grant aid" (in July 1985), however, it was judged that the utilization of existing facilities for activities of the projected centre, in addition to those of the VRI proper, would be difficult. Consequently, an additional request was made by the Government of Malaysia in this connection. The necessity for this facility was reconfirmed in the basic design study on the basis of the judgement that, in view of the scale of the existing facilities, it would be difficult to conduct the reinforcement of research activities on poultry diseases and the promotion of training for ASEAN countries at the same time.

With regard to the electron microscope, on the other hand, some people had hoped for its installation in the photographic room in VRI, but it was voiced that its installation in the projected centre is admissible. This is reasonable from the view point of making the centre independent of the VRI.

Regarding the ailing chicken inspection room to be established within the training sector, it is advisable to functionally separate it (in order to prevent the contagion of diseases). It is therefore desirable to locate it along with the Experimental chicken house.

2) International Hostel

Regarding the International Hostel for trainees from ASEAN countries, the original Malaysian request called for facilities capable of accomodating 30 persons. According to the study conducted by the preliminary study for the third country training programme held at about the same time as the basic designing study, however, utilization of the facilities by a maximum of 25 trainees can be expected at one time during the training period. Accordingly, establishment of International Hostel capable of accommodating

the whole population is desirable. In this case, the rate of utilization was questioned in consideration of the period when 25 persons will simultaneously use the facility (about 14 days). However, since training of Malaysian technicians as well as those from other ASEAN countries is currently in progress, effective utilization of the planned facility can be expected. During the period of the survey the research announcement meeting of FAO/APHCA was, by chance, held under the sponsorship of the DVS and took place at the VRI. Judging from this, the projected centre can be expected to be fully utilized on behalf of the ASEAN countries.

Some people advised use of accommodations in Ipoh City, but it was judged appropriate to establish a International Hostel on the campus of the VRI for the following reasons:

a. Since the trainees at the centre will be researchers from ASEAN countries, the personal exchanges made possible in joint use of the International Hostel during non-training hours will prove an important factor in promoting the exchange of information and in deepening friendly relations.
b. When accommodation facilities in the city are utilized, the movement to and from the centre would cause considerable inconvenience and management of the trainees might be difficult, which could hamper smooth training activities.
c. Due to the characteristics of the facilities (poultry disease research, testing, etc.), dispersement of trainees should be averted from the viewpoint of preventing the infiltration of disease contagion sources or contagion medium into the centre.
d. In connection with the future training for researchers from ASEAN countries, enforcement of which is now under study, the Centre will be helpful in securing the researchers smoothly and also make it possible to utilize the saved urban hotel charges effectively for pure research activities.

Accommodation facilities for lecturers were originally requested for five persons. In the course of the discussion it was voiced that the inclusion of such facilities within the International Hostel for trainees would pose no serious problems, although four suites for lecturers were determined to be more desirable. Some expressed the hope that the lecturers rooms will be of higher quality interior finish and somewhat larger. This is understand-

able in consideration of the social situation of Malaysia. Namely, the country has been influenced strongly by Britain in contrast to the Japanese way of thinking of limiting relations between lecturers and trainees to the lecture room and to provide for equal treatment in other aspects of their life is considered irrelevant and unnecessary. Since the invitation of lecturers will be to Malaysia and other ASEAN countries, if necessary, it is believed that the request for four suites for the lecturers is reasonable.

3) SPF Poultry Unit

Results of any poultry disease research can never be trusted unless they are based on the data or information about experiments conducted with the use of Specific Pathogen Free (SPF) chicken eggs. It is essential, therefore, to secure SPF eggs as research materials. Until now, research in Malaysia has been based on Minimum Disease Free (MDF) baby chicks and MDF eggs (5 to 6 day old egg embryos) supplied by the Poultry Multiplication Centre. Since some of MDF eggs and chicks contain pathogen and are therefore unsuitable for research, the experiments and research have been sometimes made on the basis of imported SPF eggs. Due to an unstable supply, however, such problems as postponement of research have occurred. As a measure to cope with this, Malaysia has worked out and studied a plan for producing SPF chicken eggs itself. As the production of SPF chicken eggs requires the knowledge of avian genetics and poultry hygiene as well as delicate breeding management techniques, it has been planned to maintain an SPF flock (only production of SPF chicken eggs is maintained, breeding from the produced SPF chicken eggs is not included) and obtain sufficient knowledge and techniques required to keep of the SPF maintenance flock (continued maintenance of breeding from the produced SPF chicken egg).

The SPF poultry unit at the projected centre is designed to correspond to the preceding stage of the maintenance of the SPF production flock. The SPF eggs to be produced and these subsequent hatched chicks will be utilized by the research centre. If the supply of SPF hatching eggs is stabilized, owing to the proper management of this facility, it is expected to have big effects on the promotion of poultry disease research.

4) Experimental Chicken House

According to Malaysia's request for this facility, 16 pens are required for the research themes in the four fields of virology, bacteriology, parasitology and pathology.

So far as the facility for pathological studies is concerned, however, the joint use of pens with virological and bacteriological research purposes will be sufficient. Regarding coccidiosis within the field of parasitology, it is considered proper, due to its nature, to enforce experiments at the existing experimental house. For studies on Leukozoonosis and Fowl Malaria, the pen will be vacated subsequent to the virological and bacteriological trials, tests should be used. Therefore, establishment of an Experimental chicken house mainly for virological and bacteriological studies is considered reasonable.

2. Equipment

If the research and training activities planned at the centre are to run smoothly, the proper choice of various kinds of equipment suitable for the contents of the activities and their appropriate arrangement will be required.

The choice of equipment for research has much bearing on actual contents of experiments to be conducted. Based on the outcome of the study on the planned research activities in the preceding section, the following items have been selected as the contents of the main experiments accompanying research activities at the projected centre:

a. Isolation and Identification of pathogenic organisms
b. Serological Identification
c. Making of Hyper Immunised Serum
d. Pharmaceutical sensitivity testing
e. Postmortem findings
f. Making of pathological tissue section samples
g. Electron microscope examination
h. Inoculation test in chickens
i. Insect breeding testing

Furthermore, the following items are considered necessary in

conducting these experiments. Completely inclusive of the equipment requested by Malaysia, this equipment can be termed essential for the execution of the said research activities.

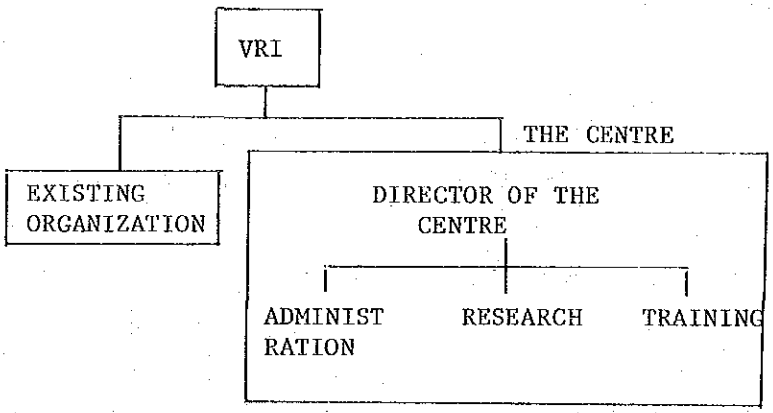
1) Experimental Room
   a. Culture equipment
   b. Serological reaction equipment
   c. Florescent Antibody test apparatus
   d. Enzyme - linked immunosorbent Assay (ELISA)
   e. Lamina-flow
   f. Insectarium
   g. Postmortem dissection instruments
   h. Instruments for making of pathological tissue section samples
   i. Electron microscopes, etc.
2) Common equipment room
   a. Ultra deep freezer
   b. Large-sized ultra-speed centrifuge
   c. Freeze drying equipment
   d. Liquid nitrogen
3) Freeze drying apparatus room (Edwards)
4) Precision machinery room
   a. ELISA system
   b. Flaction Collector set
   c. Electrophoresis Apparatus
   d. Microscope (florescent)
5) Walk-in Incubator room
6) Large-sized constant temperature room
7) Washing and sterilizing room
   a. Large-sized sterilization, disinfection and drying apparatus
   b. Dionizer
   c. Ultrasonic cleaner

So far as the training equipment is concerned, the necessity for a discussion microscope was confirmed, In consideration of its utilization rate, however, installation in the pathology research section is most appropriate. Other kinds of equipment requested are proper in the light of the contents of the training courses.

3-2-5 Operation and Budget

1 Operation

As shown in the chart below, the centre will be operated as a subordinate organ of the VRI, but the latter's sector engaged in poultry disease research will be separated from the VRI and absorbed by the centre. Under this operational formula, some apprehension was entertained over the independence of the centre, but since the organization of the centre is to be maintained intact with the VRI through such steps as the nomination of its own director, the projected organizational form will be sufficient in securing the centre's independence of the VRI and at the same time effecting their coexistence.



The centre will be composed of the three sections research, training and administration. Their outline as well as the study on their appropriateness are shown below:

1) Research Section

As regards researchers, the poultry disease research staff of the VRI will be generally employed. For each of the four research sectors to be established within the centre, one researcher and two assistants will be posted. Whether this setup is reasonable or not cannot be immediately judged, but this setup can be expected to sufficiently deal with the

situation, depending on the scheduling of the annual research programmes with the addition of a full-time staff member for operation of special equipment required for research. With regard to the operation of the SPF poultry unit, a researcher was reportedly sent to Australia to receive training so it is therefore expected that the technical requirement will be fully met by local researchers.

2) Training section

Clerk will be stationed only during the training period. It is currently planned to have the clerk from the administration section take care of general affairs relating to the training. In consideration of the training programme, this setup should be able to cope with the situation for the time being.

Regarding lecturers, it was previously explained that they can be mobilized from the VRI and various other institutions in Malaysia. Thus, a positive attitude was witnessed about securing instructors. Names of the organizations and the number of lecturers to be mobilized are as follows:

VRI	6
University	10
Diagnostic Lab.	4
Poultry Institute	3
MARDI	4
Private	-
	27

In fields where Malaysian lecturers are not available, it was explained that the invitation of experts from Japan or other ASEAN countries is now being comtemplated.

3) Administration section

In addition to the director of the centre and experts despatched when Japan's technical cooperation is in force, at least 4 -5 persons will be posted as clerical staff to the administration section. It is believed, however, that about 14 - 15 more people, including secretaries and typists, will be required.

2. Budget

It is the view of the DVS that no problem concerning the operational budget is anticipated in Malaysia's posture with this regard. According to the director of the VRI, however, Malaysia earmarks a sum of M$600,000 as the development budget for the first year and in consequence there will be no problem at all because the budget covers approximately the same amount of money to be borne by the government of Malaysia with respect to this project. On the other hand, although a total of US$650,000 is set aside as the operational budget for five years, the sum is short for the budget since the yearly expense required for operation of the facilities is tentatively estimated to be M$1,095,000 on the basis of the basic design study of the Centre. Unless this expense is secured, it can be said that the smooth implementation of the project will not be expected. Since the original budget plan has been calculated conforming to the initial contents of the project exclusive of SPF poultry unit and Experimental chicken house, etc., additional budget compilation is requested anew as regards the yearly expense required for this centre.

3-3 Outline of the Project

3-3-1 Executing Agency and Operatioal Structure

1. Executing Agency

This project will be executed by the DVS, the Ministry of Agriculture, in collaboration with the Coordinating Group on Livestock of the ASEAN-COFAF. Liason with ASEAN countries will be conducted through the CGL and also through the ASEAN Secretariat, Ministry of Foreign Affairs, Malaysia. (see Appendix 1 - 4. Minutes of discussions)

2. Operational Structure

The operational structure of the centre will chiefly consist of the following three sections.

1) Administration Section

This will be the central sector in the operation and management of the centre.

2) Research Section

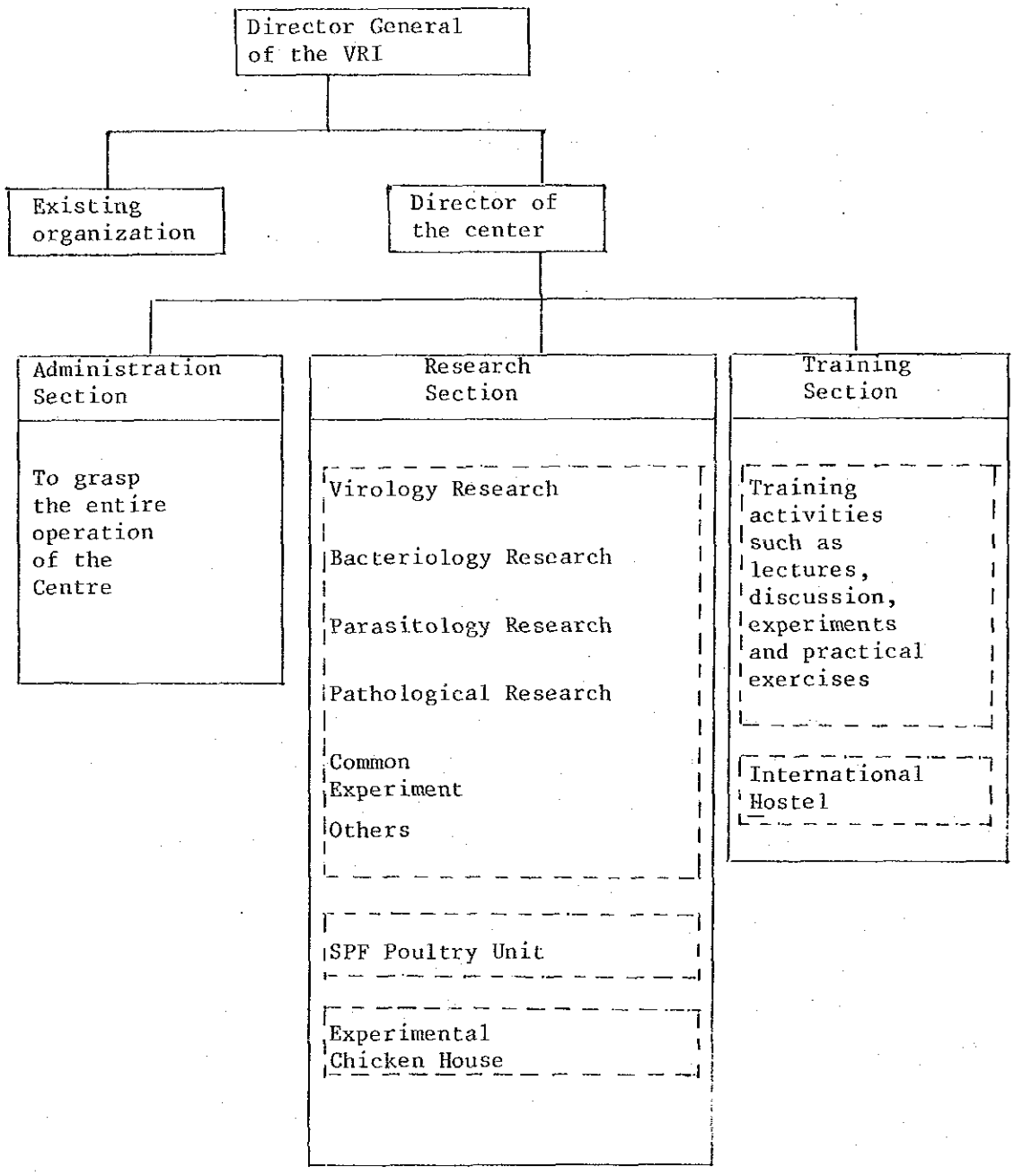
The research staff of the poultry sector of the VRI will be generally employed, but a researcher (Laboratory Head) and two research assistants will be posted, in principle, in each of the four research sectors. When the enforcement of Japan's technical cooperation is decided, Japanese experts will also conduct long or short-term research work in addition to the Malaysian staff during the cooperation period. The researcher sent to Australia for SPF related training can be expected to cope technically with operation of the SPF poultry unit and Experimental chicken house.

3) Training Section

During the training period, an administration section clerk will be stationed in the administration room of the training section so as to serve concurrently in the two sections. With regard to the management of the International Hostel, on the other hand, it will be necessary to consider the employment of a permanent caretaker at least during the

training period.

The organization chart and personnel distribution considered suitable for smooth operation of the centre are shown below:



ORGANIZATION CHART

Personnel Planning

Staff 40 (Assuming three Japanese experts will be despatched)

Administration Section

	No. of Persons
Director of the Centre	1
(Japanese Experts)	(3)
Chief Clerk	1
Clerk Finance	1
General Administration (one clerk stationed in the Training Section when operating)	1
Secretary for Japanese Experts	1
Typist	2
Office Boy	1
Watch Man	1
Driver	2
Labourer	4
	15 (3)

Research Section

Virology Lab.	Head	1
	Assistant	2
Bacteriology Lab.	Head	1
	Assistant	2
Parasitology Lab.	Head	1
	Assistant	2
Pathology Lab.	Head	1
	In Charge of Electron Microscope	1
	Assistant	3
Washing & Sterilizing Room	Labourer	2
Storage	Store Keeper	1
SPF Poultry Unit	Supervisor	1
	Labourer	1
Experimental Chicken House	Labourer	1
		20

Training Section (when operating lend 1 person from Administration Section)

International Hostel	Caretaker	1
	Cook (Temporary)	2
	Labourer	2
		5

3-3-2 Plan of Operation

3-3-2-1 Research Plan

Numerous kinds of poultry diseases are now breaking out in Malaysia, and there are many research fields (items) yet to be studied. In order to carry out a series of research, therefore, a considerably long time is believed necessary. To solve this issue, it is essential to select urgent research items and formulate a research plan to be executed during a fixed period of time. Accordingly, the plan for research of poultry disease in ASEAN countries is divided into long-range and short-range plans, which will have the contents as shown below. With regard to the short-range pland, the formulation was made on the basis of the study results concerning reasonableness of research activities planned to be executed at the Centre by Malaysia.

1. Long-range plan

A. Research plan

1) Virological research

Diseases to be studied

a. Newcastle Disease
b. Avian Infectious Bronchitis
c. Marek's Disease
d. Avian Leukosis
e. Infectious Bursa Disease
f. Avain Laryngotracheitis
g. Avian Encephalomyelitis
h. Fowl Pox
i. Avian Influenza
j. Reovirus Infections

Research activity in virological area:

Diagnosis of Viral Diseases and Development of Vaccines

a. Isolation and identification of viruses

b. Viral infections

a) Propagating viruses by cell-culture methods

b) Factors that affect viral infections

c) Distribution of Virus in chicken bodies

d) Appearance of clinical signs and gross lesions

c. Serological identification of viruses

a) Antigenicity of viruses

b) Antigen-antibody reactions in related viruses

d. Viral interference

a) Relation between interfering viruses and cells

b) Mechanism and factors of viral interference

c) Viral interference and immunity

e. Immunity of viral diseases

a) Immunity of spontaneous infections

b) Immunity of artificial infections

c) Mechanism of infections and immunity

2) Bacteriological research

Diseases to be studied (including fungal infections)

a. Avian Mycoplasmosis infections

a) Mycoplasma gallisepticum Infection

b) Mycoplasma synoviae Infection

b. Avian Salmonellosis

a) Pullorum Disease

b) Paratyphoid Infection

c) Fowl Typhoid

c. Avian Colibacillosis

d. Infectious Coryza

e. Avian Staphylococcosis

f. Avian Aspergillosis

g. Fowl Cholera

Research activity in Bacteriological area

Diagnosis, prevention and treatment of bacteriosis in chickens

a. Isolation and identification of bacteria
b. Bacterial infections and development of diseases
    a) Factors that affect bacterial infections
    b) Distributions of bacteria in chicken bodies
    c) Appearance of clinical signs and gross lesions
c. Serological identification of bacteria
    a) Antigenicity of bacteria
    b) Antigen-antibody reactions in related bacteria
d. Immunity of bacterial diseases
    a) Development of immunity
    b) Acquisition mechanism of immunity
e. Drug sensitivity of bacteria

3) Parasitology research
Parasitosis to be studied

a. Intestinal parasitosis
    a) Ascaridiidae
    b) Capillariidae
    c) Heterakis gallinae
    d) Cestodes
b. Protozoa
    a) Coccidiosis in chickens
    b) Black-Heads
c. Blood Protozoans
    a) Leucocytozoonosis
    b) Avian Malaria
    c) Avian Filaria
d. External Parasites
    a) Northern Fowl Mite (Ornithosis sylviarium)
    b) Chicken Mite (Dermanyssus gallinae)
    c) Chicken Lice Menacanthus
    d) Feather Mite (megninia cubitalis)

e. Vector Studies

Research activity in Parasitological area

Prevention, treatment and immunization of Parasitosis in chickens

a. Isolation and identification of parasites
b. Life cycle of parasites
c. Factors and pathway of infections
d. Development of clinical signs and gross lesions
e. Drug sensitivity
f. Emergence of drug resistance
g. Immunity
   a) Species specificity of immunity
   b) Acquisition mechanism of immunity
   c) Control of immunity
h. Insect breeding test

4) Pathology Research

Research activities conceivable for the pathology section.

Morphopathological studies of the diseases of poultry

Morphopathological studies will be made on research items assigned to virology, bacteriology, and parasitology.

B. Contents of the experiments accompanying the research plans

Contents of the experiments accompanying the enforcement of long-term plans are to include the following.

Since the experiments indicated above will be a basic method for excuting short-range research plan shown 2 short-range plan, some of and/or all of the experiments will be operated..

1) Virological research

a. Virus isolation technique
   a) Chicken embryoculture technique

b) Cell culture technique

c) Organ culture technique

b. Serological reactions

a) Haemagglutination and Haemagglutination-Inhibition

b) Agar gel diffusion precipitation

c) Virus-Neutralization

d) Enzyme-linked immunosorbent assay

c) Fluorescent antibody technique

d) Examination of minute tissue and shell structure by the use of an electron microscope

e) Making of hyperimmunized serum

f) Inoculation tests in chickens

2) Bacteriological research

a. Isolation of bacteria

a) Aerobic culture method

b) Anaerobic culture method

b. Serological reactions

a) Haemagglutination and Haemagglutination-Inhibition

b) Agar gel diffusion precipitation

c) Neutralization

d) Enzyme-linked immunosorbent Assay

c. Fluorescent antibody technique

d. Examination of minute tissue and shell structure by the use of an electron microscope

e. In-vitro sensitivity tests

a) Broth or Agar-dilution methods

b) Disc-diffusion methods

f. Drug resistance tests

a) Resistance test in vitro

b) Resistance test in vivo

c) Test for transfer of drug resistance

g. Inoculation tests in chickens

3) Parasitological research

a. Isolation, culture and stock of protozoa

b. Identification of developing protozoa

a) Cell culture method for sporozoite and merozoite

b) Chicken embryoculture technique

c. Seriological reactions

a) Enzyme-linked immunosorbent Assay

b) Pigmentation test

d. Fluorescent antibody technique

e. Examination of minute tissues and shell structure by the use of an electron microscope

f. Evaluation of anti-protozoa drugs

a) Cell culture method

b) Chicken embryoculture technique

c) Battery and floor pen trials

g. Drug resistance test of anti-protozoa drugs

a) Experiment on emergence of drug resistance

b) Acquired drug resistance test

h. Efficacy trials of anti-protozoa drugs (Disinfectants)

i Insect breeding test

4) Pathological research

a. Postmortem examination

b. Histopatholgical examination

c. Histochemical examination

d. Enzyme Histochemical examination

e. Fluorescent antibody technique

f. Examination of minute tissue and shell structure by the use of an electron microscope

2. Short-range Plan

After examining the requested research themes, then themes, excluding the two following, were judge appropriate research items in the first stage.

Research on the method for differentiation of Fowl Pox Virus in virological category
(Method for differentiation of Fowl Pox Virus)

Etiological studies on feed contamination in the bacteriological category
(Etiological Studies on Feed Contamination)

The short-range research plan in the four categories has been worked out as follows:

Since "Technical Development for the Fluorescent Antibody Test" in the research themes is important for immunological diagnosis of poultry diseases, it must be carried out by the use of SPF flocks and techniques in the chicken embryo culture, the cell culture method and the organ culture method and in the flourescent antibody method should be acquired by technicians in the laboratories of the centre as early as possible.

1) Theme of Virological Studies

a. Research on the Development of Oil Emulsion and Inactivation Vaccine of Newcastle Disease Virus.
Regarding oil emulsion and the inactivation vaccine, its safety and immunity will be confirmed by at least the following examinations.

(1) Safety of the vaccine
(2) Influence of antibodies on the vaccine's effect
(3) Influence of producing antibody by vaccination

For confirmation, histopathological tests, cell culture tests, serological tests, inoculation test in chickens and other test methods will be applied.

b. Diagnosis of Avian Leukosis Complex and Marek's Disease

Regarding diagnosis of Avian Leukosis Complex and Marek's Disease, there are many problems left for research, but at this point histopathological tests and immunological tests must be tried through symptoms, age and gross lesions

c. Serological typing of Infectious Bronchitis Virus

Virus isolation using inoculation to embryonating eggs, chickens and cell culture method, and cross-neutralization using hyper immunized serum will performed. Research through the fluorescent antibody test method and serological reaction will also be carried out. The results of this research are expected to contribute to vaccine development with due respect for local characteristics.

d. Separation of the subtypes of Influenza-A-type viruses

These viruses are divided into H-type and N-type, with there are 12 subtypes in H-type and 9 subtypes in N-type. All the subtypes have been separated from birds in various combined forms of H and N.

The following experiments will be made on fowls and wild birds, and the distribution of virus will be investigated as date for expectations of occurring of future Influenza-A-type.

(1) Histopathological tests
(2) Isolation of virus
(3) Properties of isolated strains

2) Theme of Bacteriological Studies

a. Etiological studies on Chronic Respiratory Disease Complex

As methods of seeking the etiological cause of Chronic Respiratory Disease Complex, the following experiments will be performed for Mycoplasma gallisepticum (M.g.) and pathogenic organisms of complex infectious diseases.

a. Separation of pathogenic micro-organisms
b. Identification of isolated organisms
c. Tests of drug sensitivity of isolated organism
d. Inoculation test in chickens

The results of this research are expected to be helpful to prevent this disease.

b. Studies on Avian Enteritis

These studies concern Avian Colibacillosis, Avian Salmomellosis, Avian Necrotic Enteritis and Fowl Cholera.

Regarding Avian Colibacillosis distinction between coli bacilli inhabiting normal intestine and coli bacilli relating to diseases has been made to some extent through serum isolation. However, since coli bacilli cause co-infection with M.g., the functions of coli bacilli should be determined in "The Etiological Studies on Chronic Respiratory Disease Complex"

The following experiments and tests will be carried out for Paratyphoid Infection and Fowl Typhoid because the method of serological diagnosis has not been established for salmonella infection.

a. Serological properties and pathogenicity of separated bacteria
b. Various factors influencing infection, the appearance of symptoms and the discharge of bacteria
c. Drug resistance tests
d. Inoculation test in chickens

In Avian Necrotic Enteritis, the following tests will be performed.

a. Histopathological tests
b. Bacteriological tests
c. Drug resistance tests
d. Inoculation test in chickens

Regarding Fowl Cholera, the following tests will be performed.

a. Histopathological tests
b. Bacteriological tests
c. Drug resistance tests
d. Antibody production by vaccine
e. Inoculation test in chickens

In this study, it may be necessary to acquire the techniques of the anaerobic culture method. These studies will make the actualities of Avian Enteritis clear and will help work out plans for treatment and prevention of the disease.

3) Theme of Parasitological Studies

a. Studies on prevention, treatment and immunity from Coccidiosis in chickens

Coccidiosis in chickens is, for the most part, co-infection. The sole infection route is the oral infection of oocysts excreted in feces. Therefore, the studies will be made by means of the following examinations.

a. Pathological examinations of chickens sampled from chicken flocks culture and identification of oocysts, confirmation of developing protozoans, and differential diagnosis
b. Culture of sporozoite and merozoite
c. Efficacy trials for coccidiostats
d. Drug resistance of coccidiostat
e. Immunity of affected chickens and immunity for the purpose of disease control.

b. Studies on prevention, treatment and immunity from haemosporida parasitic on fowls

There seem to be a lot of unexplored fields in Leucocytozoonosis Avian Malaria and Avian Filaria in the ASEAN countries. These diseases are infected by insects. These insects rearing tests should be performed along with the following tests.

a. Confirmation and identification of haemosporida, and detection of antibodies
b. Effect of anti-haemosporida agents
c. Efficacy trials for insecticides

Insect rearing tests

a. Confirmation and identification of insects transmitting the diseases
b. Development environment and behaviour

4) Theme of Pathological Studies

a. Pathological studies on Newcastle Disease, Avian Leukosis, Marek's Disease, Fowl Pox and other diseases of fowls

Morphological studies will be made on research items assigned to virology, bacteriology and parasitology by means of the following tests.

a. Postmortem examination
b. Histopathological examination
c. Examination of minute tissue and shell structure by the use of an electron microscope
d. Examination by the use of immunological methods

3-3-2-2 Training Programme

Through joint research by the Basic Design Study Team and the third country training programme's Preliminary Study Team, and after negotiation with Malaysian officials in charge of this programme, the general outline of the programme for ASEAN countries has been established as follows, to be implemented as Japan's third country training programme.

1) ASEAN Seminar on Poultry Diseases and Prevention
(approx. 14 days, 25 trainees)

The Malaysian side regards this programme basically as "an occasion for each country to benefit from suggestions arising from discussion and exchange of opinions." The purpose of the seminar is "to realize the situation of poultry diseases (the extent of prevalence as well as the current state of diagnosis and prevention, etc.) in ASEAN countries and to improve poultry hygiene through increased knowledge of epidemic and disease prevention.

2) ASEAN Course on Basic Diagnostic Techniques of Poultry Diseases (up to 3 months, 7 trainees)

This course mainly consists of practical exercises and some lectures. It has been confirmed that VRI staff members can take charge of the course for 3 months provided that the number of participants is limited to 7. The purpose of the course is "to improve the ability to perform basic diagnosis of poultry diseases".

3) ASEAN Course on Specialized Diagnostic and Research Techniques on Poultry Diseases (approx. 14 days, 7 trainees)

This course mainly consists of practical exercises and some lectures. The purpose is "to learn the latest diagnosis techniques as well as the specific technique of vaccine productive processing".

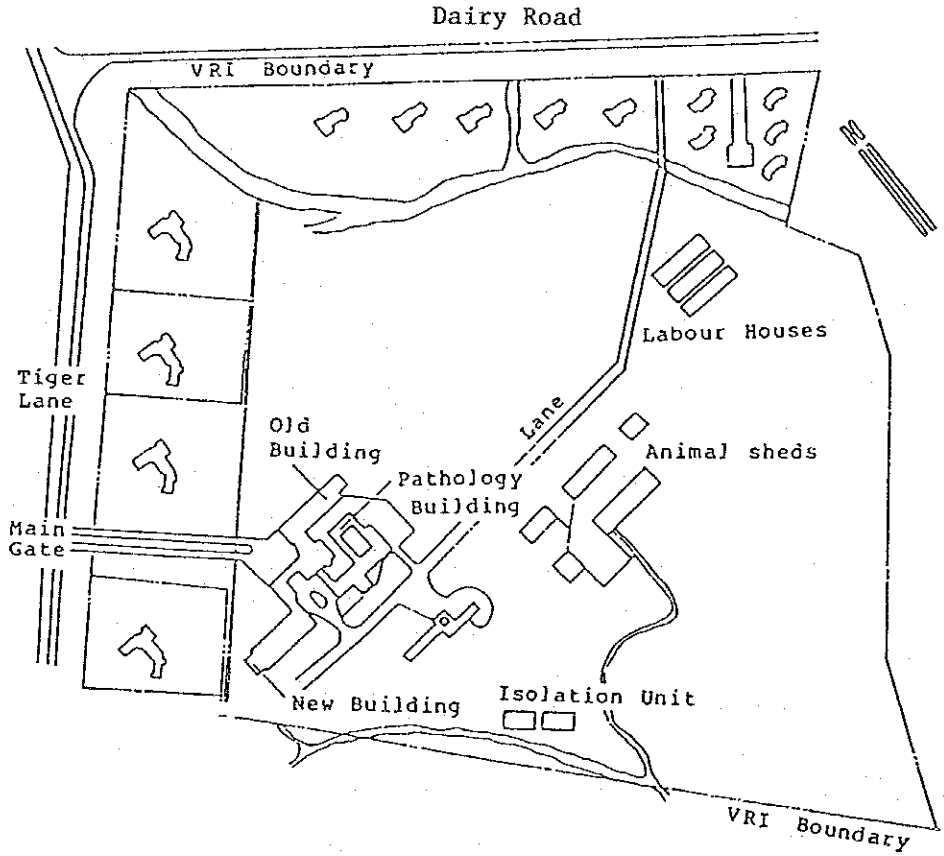
Concerning the original training programme by ASEAN countries (outside the scope of the Third Country Training Programme), no clear plans were heard of since the study team contacted only Malaysian officials. However, the DVS submitted a plan outline in which Malaysia can take initiative. They also claim that this is their original training programme and that they are prepared to add to the list of programmes if they have facilities in which to implement them.

3-3-3 Project Site and Environment

3-3-3-1 Construction Site

VRI, the construction site of the centre, is in Ipoh City, capital of Perak state. It lies about 170 km to the NNW of Kuala Lumpur, the state's capital, and has a population (close to 350,000 in 1980) second only to Kuala Lumpur. The city has long prospered on its tin and rubber.

VRI lies on the east border of Ipoh City with its front gates facing Tiger Lane and back gates facing Dairy Road. In the south, beyond a small forest, is a golf course, while to the north across Dairy Road are school. The surroundings are that of quiet city suburbs.



VRI's campus is fairly flat. Close to the two roads that border the campus is the housings for the executive staff, such as the director, and for the research staff. Each house is directly accessible to a road. This housing serves as a buffer for research facilities located within by reducing any distrubances from the roads. Diagonally from east to west of the campus runs a path, on either side of which all major facilities are located. On the west side of the path is the research facility which fulfills the major functions of VRI, including administration. The facility consists of three 2-storeyed buildings, as described below:-

a. Old Main Building: constructed in 1953 through grant aid from the UK
b. New Main Building: completed in 1964 and houses the management section
c. Pathology Building: completed in 1983 and houses the training section

Across the path toward the south is a one-storeyed hostel (with 6 double rooms, chiefly used for women) for trainees trained in the Pathology Building. Further back and toward the south are two Isolation Units, constructed in 1972 and 1980. The south side of the path, a little east from centre area, are animal sheds for cows, goats, pigs, rabbits, etc.

3-3-3-2 Natural Environment

Malaysia is influenced by a marine climate from the Indian Ocean and the South China Sea and has two monsoon seasons. From October to February is the season of north-east monsoon which blows in a vast amount of rainfall from the South China Sea to the East Coast of the Malay Peninsula and the coastal area of Sabah, Sarawak on Borneo Island. The South-west monsoon from the Indian Ocean blows from May to September. Average yearly precipitation is between 2,000 - 2,500 mm.

The average temperature is 70 - 90°F (21 - 32°C) in the plains. In the heights, such as Cameron Highland and Mt. Kinabalu (in Sabah, Borneo Island), the temperature varies and records show an extremity of 36 - 70°F (2 - 26°C). Humidity is generally high at around 80%.

Ipoh City and its environs are in the tropics and are influenced by south-west monsoons from the Indian Ocean. Humidity is 70 - 80%, average temperature 27.5 °C, average high 33.5°C and average low 23.7°C. Average yearly precipitation is 2,107.5 mm. The rainy season is from September to November. The dry season is January to August, and it is driest in June, July and August, while it rains moderately in April and May. As is characteristic with the tropics, it squalls in Ipoh. The rain continues only for an hour or two per day, sometimes bringing down 50 - 60 mm per hour. For about 30% of the year the wind blows from the north-west, and for another 30% it blows from the south or south-west.

3-3-3-3 Conditions of the Infra-Structure

1) Water supply

Water pipes are laid underneath the VRI campus and the roads nearby, providing a satisfactory water supply. The following shows location, size and water pressure of the water pipes.

Location	Size	Water Pressure
Diary Road (outside)	Ø150,200 mm	3 kg/m²
Tiger Lane (outside)	Ø300,375 mm	
VRI Campus	Ø 100 mm	

2) Sewage

No sewage is found on or near the construction site. The existing buildings have septic tanks to treat sewage before releasing it into the river.

3) Gas

No gas pipes are laid in or around site. The existing buildings have propane gas cylinders from which pipes lead to each facility.

4) Electricity

There are 2 power transformer stations that tap electricity from underground power cables through loop transformers and provide electricity to the rest of the facility. The supply of electricity at the site is satisfactory, and there has been no past power failure due to suspension of service.

Voltage and other data of electricity are as follows:

		Hz	Ø	W
High Voltage	11 kV	50	3	3
Low Voltage	415/240V	50	3/1	4

5) Telephone

From the MDF room on the 2nd floor of VRI's New Main Building is a branch extension cable for the other buildings. VRI's New Main Building has the telephone exchange system described below.

Line	8	Installed	4
		Uninstalled	4
Extension	100	Installed	50
		Uninstalled	50

3-3-4 Outline of Building and Equipment

3-3-4-1 Building

The following is an outline of buildings judged proper to be constructed by the activity plan for the projected centre.

1) Research and Training Building

This building, as the main building of the Centre, will consist of 3 sections, a. Administration Section, b. Research Section and c. Training Section.

a. Administration Section
With a management office, a conference room etc.

b. Research Section
With laboratories for each of the 4 research divisions, a common laboratory room, a washing and sterilizing room, data processing room, and an electron microscope room under the Parasitology division

c. Training Section
With a lecture room large enough for 25 people and a practical experiment room large enough for 7.

2) International Hostel

The hostel will have a.section for trainees from ASEAN countries and b. section for lecturers from ASEAN countries, etc.

a. Section for Trainees
With 25 single rooms, a dining hall, and a lounge

b. Section for Lecturers
With at least 4 suites containing a bedroom and a living room (studying room)

3) SPF Poultry Unit

This will be the facility for SPF chicken egg and SPF chick production, for later use in experiments. The unit will comprise the parent stock flocks for hatching imported SPF flock hatching eggs (PS-Production Group), raising the chicks and eventually producing SPF parent stock eggs, and the rearing group for raising the chicks hatched out of the eggs thus produced. A Barrier System will be adopted in the rearing zone to insure biological isolation. In order to prevent the infiltration of pathogenic organs into the rearing zone from the outside highly effective filters will be installed and dust from the outside will be collected while the air pressure in the zone will be set at higher levels than outdoors.

4) Experimental Chicken House

SPF Chicks will be moved from the rearing flock in the SPF Poultry unit to the experimental chicken house for research experiments relating to the isolation of pathogen organs, immunity, diagnosis and treatment on the premise of vivo tests. Since the inoculation of various kinds of viruses or bacterias with high dissemination or virulent strains will be involved in the experimental process, highly effective filters will be installed to prevent their spreading while the air pressure inside the zone will be set at lower levels than outside.

Because of the need for seclusion, as is the case at the SPF poultry unit, a Barrier System will be provided.

3-3-4-2 Equipment

The equipment judged proper to be facilitated in view of the research and training programmes of the centre is roughly the following:

1) Equipment for Research

   a. Equipment necessary under research plan

   b. Commonly used equipment such as freeze drying and washing machines, etc.

2) Equipment for Training

   Equipment necessary under training programme

3-3-5 Management Plan

1) Building

In principle, the administration section of the Centre will be in charge of maintenance and management. However, since the Centre becomes the Malaysian government's property upon completion, the Public Works Department of Malaysia will undertake maintenance as the necessity arises.

2) Equipment

Some of the more intricate and expensive equipment, such as the electron microscope, require special technology for maintenance. In such cases it will be necessary to send for engineers from the manufacturer.

3) SPF Poultry Unit and Experimental Chicken Houses

SPF Poultry Unit are designed to be maintained by a full-time caretaker, who has received sufficient training, while the management of the chicken houses is to be conducted in such a way as not to hamper the raising of poultry. Concerning management for growing chickens and their fledglings, suitable experimental feeds and drinking water are essential, and maintenance of indoor environments at the appropriate temperature and humidity is required, while it is necessary to keep the room germ free through the use of high performance filters. The filters play the role of preventing the infiltration of dusts and pathogenic organs into the room, but it is impossible to maintain their function at the same level for a long period of time, so regular exchanges are required.

At the experimental chicken house, tests of the inoculation of pathogenic organs into chickens and their observation will be conducted. Here, too, approriate environments must be maintained just as with the SPF poultry unit.

Experimental animal feeds fed to the chickens naturally must not include any additives. They also have to be highly nutritive feeds and undergo disinfection processing. In Malaysia, however, a set up for the supply of such feeds has not yet been fully established and it is considered almost impossible to obtain feed through common distribution routes. Accordingly, it can be stated that the best solution will be to build a centre to manufacture experimental feeds. The annual consumption of feed at the centre will roughly be as shown below:

a. SPF Poultry Unit

1) Breeder Group

	g	chicks	days	times	
For Young Pullet	15	x 300	x 21	x 2	= 190 kg
For Pullet	65	x 130	x 130	x 2	= 2,900 kg
For Breeder	15	x 300	x 365		= 3,800 kg

2) Experiment Chicks Group

	g	chicks	days	operational rate		experimental rate		
For Young Pullet	15	x 500	x 365	x 75%	x	50%	=	1,030 kg
For Pullet	65	x 340	x 365	x 75%	x	50%	=	3,000 kg

b. Experimental Chicken House

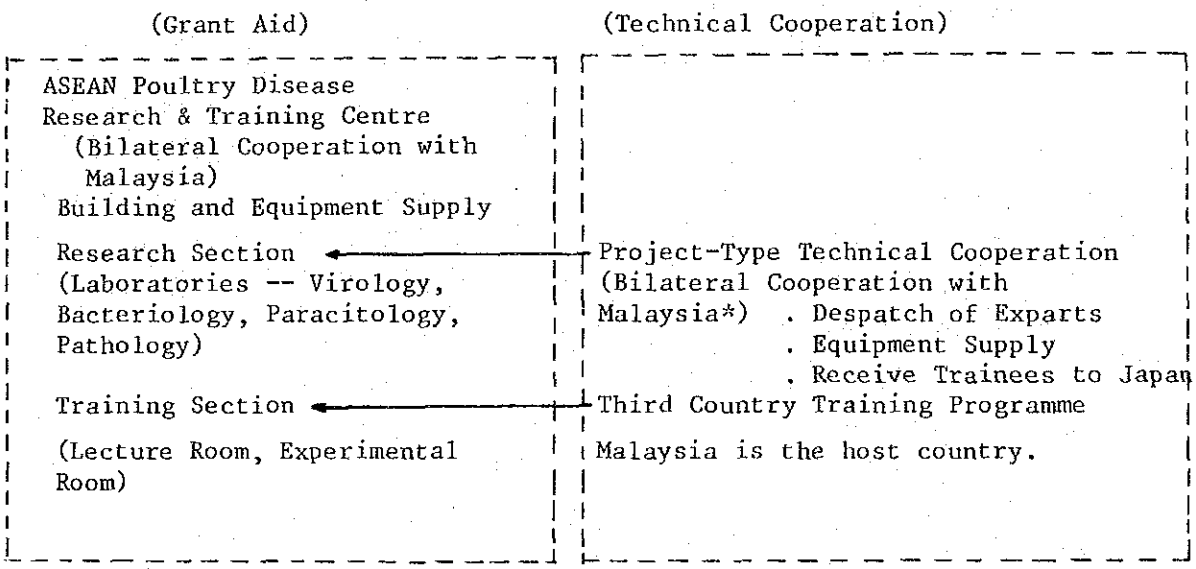
	g	chicks	days	operational rate		experimental rate		
For Young Pullet	15	x 472	x 365	x 75%	x	50%	=	970 kg
For Pullet	65	x 4720	x 365	x 75%	x	50%	=	4,200 kg

Technical cooperation from Japan is being planned and prepared for this project. For both principal branches of the project, namely research and training, Japan is providing cooperation.

The research programme at this Centre is as described in 3-3-2-1. The research plan are deemed necessary in order to improve the standards of research for poultry diseases conducted in ASEAN countries. Japan's project-type technical cooperation will be planned and executed for some of these themes.

Concerning training, Japan will plan and execute, as the third country training programme, some of the programmes described in 3-2-2-2.

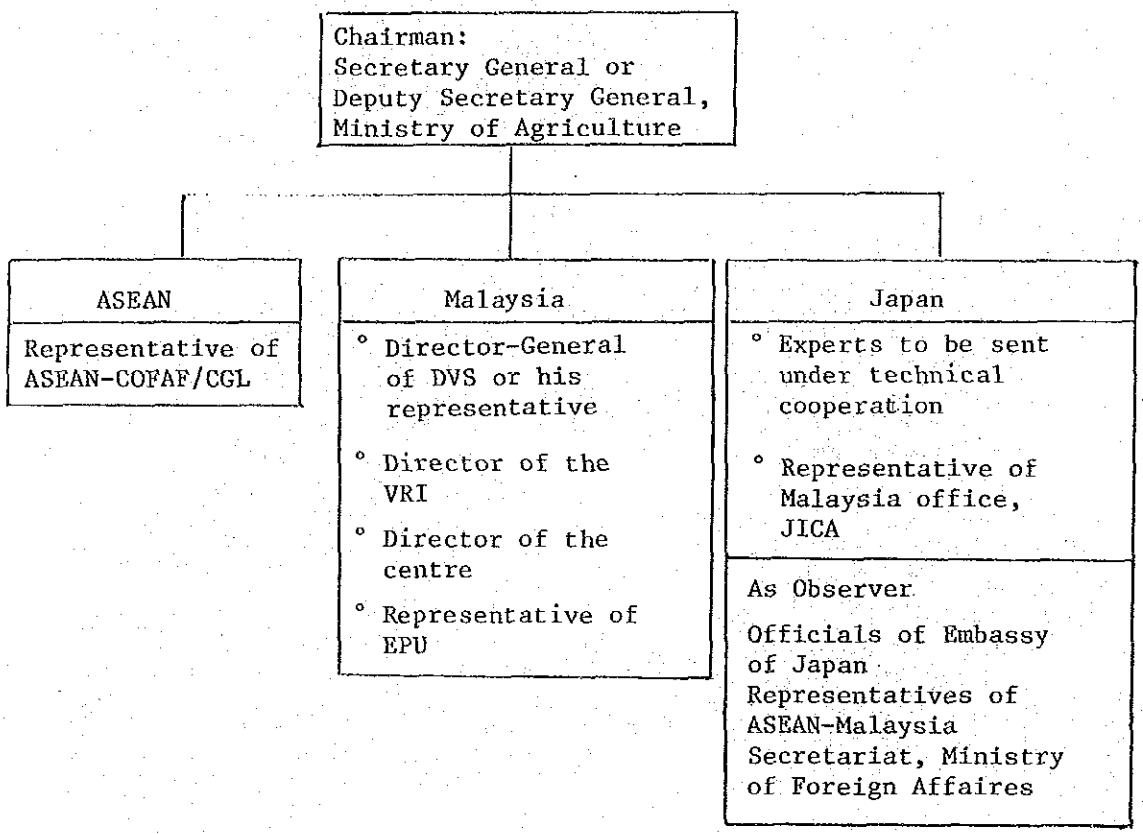
The relation of grant aid and technical cooperation is shematized below.



* Malaysia shall prepare the counterparts and operation cost.

A Joint Committee will be established for Project-type technical cooperation.

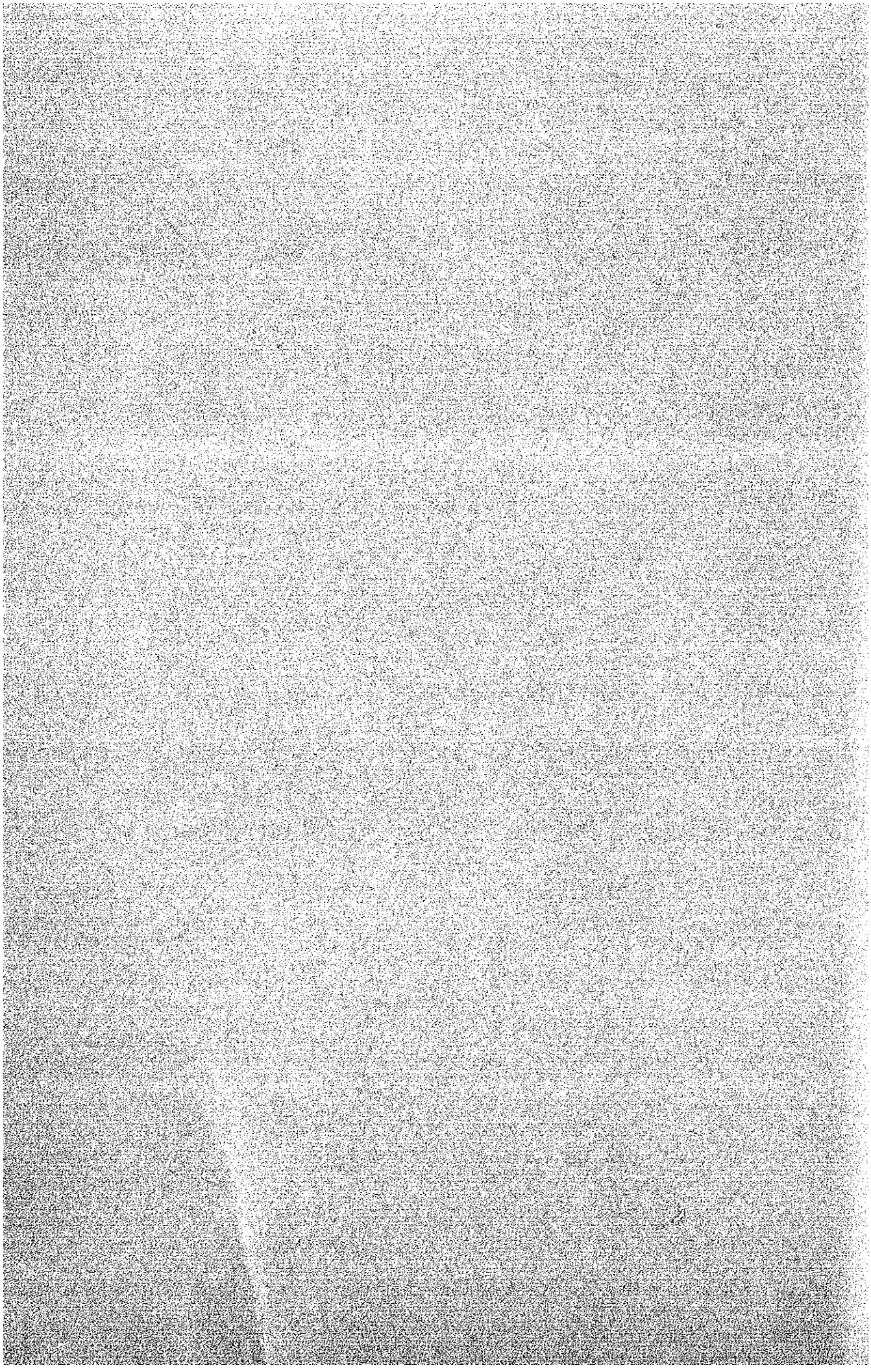
The organization will be as shown below.



The joint committee will meet at least once a year, its main functions as follows:

a. Formulation of plans for project groups
b. Evaluation of project activities
c. Consideration of other special matters relating to the project

CHAPTER 4 BASIC DESIGN



CHAPTER 4 BASIC DESIGN

4-1 Basic Principles

The major functions of the Centre are research of poultry diseases and training of researchers and technicians from ASEAN countries. Although the Centre will be located in Malaysia, it is more a common facility for all ASEAN countries. Based on this assumption, Basic Design were made according to the following principles.

1) This Centre is to be a central facility for poultry disease research for ASEAN countries, and therefore should be furnished to function as such.

2) As Japan's technical cooperation and third country training programme will be conducted at this Centre, it should be furnished to function accordingly.

3) Since the research and training equipment is also considered to be supplied by means of technical cooperation within its formwork, high priority in grant aid formula is given to the equipment which is closely related to building facilities in installation, as well as plumbing and exhaust work and so forth.

4) This Centre should be independent of existing facilities on the site, although certain communal use of the facilities should be smoothly carried out.

5) Effective use of the limited amount of land should be considered for existing facilities (chiefly cattle sheds) are scattered about the site.

6) Maximum use of locally available building materials as well as adoption of local building methods is advised for ease of maintenance.

7) The contents will be agreed with the system of Japan's grant aid.

8) Natural circumstances and social circumstances will be fully considered.

4-2 Design Criteria for Basic Design

Requirements for the Basic design have been determined according to the research and training programme.

This Centre will consist of 4 buildings as below :

1) Research and Training Building
2) International Hostel
3) SPF Poultry Unit
4) Experimental Chicken House

The following shows functional and scale requirements for each building and requirements for building facility.

1. Functional Requirements

1) Research and Training Building

The building shall have the following 3 sections :

a. Administration Section
b. Research Section
c. Training Section

a. Administration Section

The director and Japanese experts on technical cooperation shall have individual offices. Japanese experts shall, in principle, have laboratories in which to conduct research work with their counterparts. The conference room in the section will be large enough to hold approximately 50 people, the total research staff, trainees and lecturers, and shall have an audio-visual system.

b. Research Section

One laboratory shall be allocated to each of the following divisions : Virology, Bacteriology, Parasitology and Pathology. Each laboratory unit shall have a laboratory, a media preparation room, a dark room, a head office and a meeting room. The pathology laboratory unit shall have a Autopsy room (and a treatment room) and an electron microscope room, and in addition, an Vector Inspection room.

The size of the common rooms, such as the common lab, data processing room, thermostatic rooms (high and low), and washing and sterilizing room, shall be determined by the scale and layout of the equipment as well as by the work involved.

The scale of the storage room can follow Japanese examples but should be slightly larger, considering that expendables take longer to deliver there and therefore need to be stored in larger amounts.

The reference library shall have documents on worldwide poultry diseases, including ASEAN countries, for reference. The storage space shall be large enough to store 50 periodicals (3,000 copies for 5-year storage) and 2,000 books and reports. For comparison, VRI currently has 2,270 periodicals, and 4,000 books and reports.

c. Training Section

It will be difficult to keep this facility in use all year round. Preparation and follow-up takes some time at both ends of the training period creating inevitable gaps between programmes. Accordingly, there will be no permanent staff for this section, but one staff member from the administration section shall be chosen to take charge during training periods.

According to the training programme, 7 people will be assumed to share a practical exercise room and a laboratory. The layout space for the instructor's experiment table and dissecting table should also be considered in determining the size of the room. A storage room and a preparation room shall also be provided, as well as a locker room for trainees, whose male-female ratio is assumed to be 2:1.

The lecture room will be attended by 25 trainees. The room should be designed to serve for both lecture style and discussion style. The room shall be equipped with an audio-visual system and an exhibition corner for specimens, etc. Adjoining the lecture room shall be a preparation room and lecturer's office. A lounge for trainees shall also be provided.

2) International Hostel

The International Hostel shall accomodate 25 trainees at one time. The trainees are not students but full-fledged researchers and/or technicians in their respective sectors of their ASEAN countries,

therefore the rooms shall be single-rooms, to be graded somewhere in-between a dormitory and a hotel. Each room shall have a sink but baths and toilets are to be common. Although the male-female ratio is assumed to be 2:1, there is no need to introduce a different design for male rooms and female rooms.

The dining hall shall have 30 seats to include lecturers. For improving the life style in the Hostel, a multi-purpose room will be provided.

Four suites will be provided for the lecturers and scientists from ASEAN countries. The suites should be of higher quality than the trainees's rooms and each shall have a bedroom, a living room (studying room), a bath and a toilet.

3) SPF Poultry Unit

a. Maintenance of the SPF production group and the amount of eggs produced.

The production of SPF-type eggs will be implemented by importing suitable SPF-type eggs, incubating them, raising the chickens and allowing the grown hens to lay eggs. SPF-type eggs can be imported from Rohman Co. of Germany and The Houghton Research Laboratory of the UK, with which Malaysia has established import routes, from CSIRO of Australia, which has received our SPF trainees, or from producers in Japan.

To maintain the SPF flocks, it will be necessary to create an optimum environment and to monitor for infectious diseases with specific pathogens. The laboratory at this centre will be fitted out for serological diagnosis of SPF flocks. Implementation research requires a SPF-type egg production rate of at least 200 eggs per week, therefore we will develope an equipment plan to achieve this goal.

b. Maintaining a SPF-type egg production rate of 200 eggs/ week

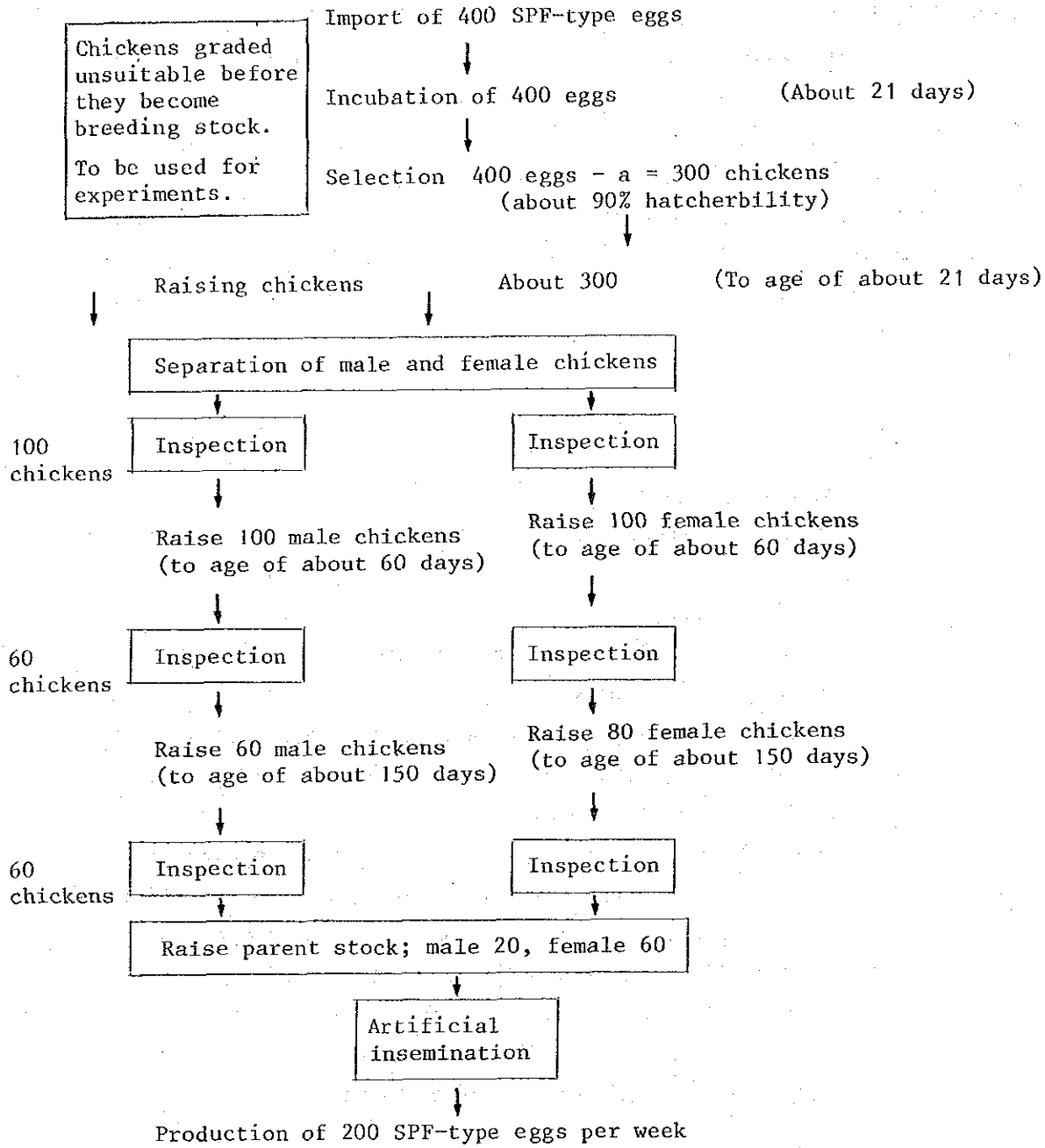


Fig. A Production Plan

Figure A shows the flow of production of SPF-type eggs at a rate of 200 eggs per week. The number of eggs and chickens has been set presuming probable egg production rates, fertilization, and good hatching eggs in consideration of the state of affairs in Malaysia. It is feasible to maintain a production rate of 200 or more eggs per week under the condition of 60 parent stock x 7 days x 47.61 per cent good hatching egg production rate (egg production rate x fertilization rate x rate of good hatching eggs) 200 eggs/week, provided this rate of good hatching egg production is sustained. This rate will continue until the chickens reach 60 weeks of age (see Fig. B), so permanent maintenance of the production rate of 200 or more eggs per week requires repetition of the process in Fig. B every 30 weeks (see Fig. C). After 60 weeks of age, selection is required for preventing diseases and preparing for the next step. If actual growth and the good hatching egg production rate is better than the levels set in this production plan, longer process periods may be used.

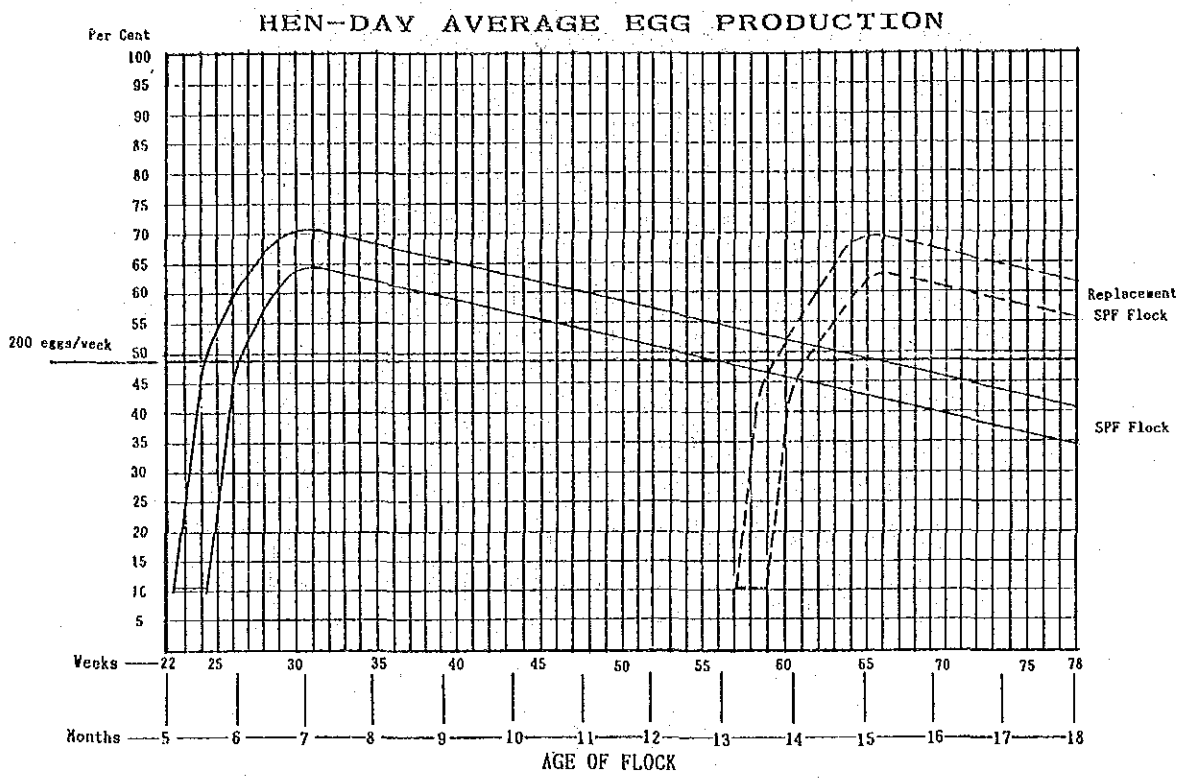


Fig. B Production Rate of SPF-Type Eggs

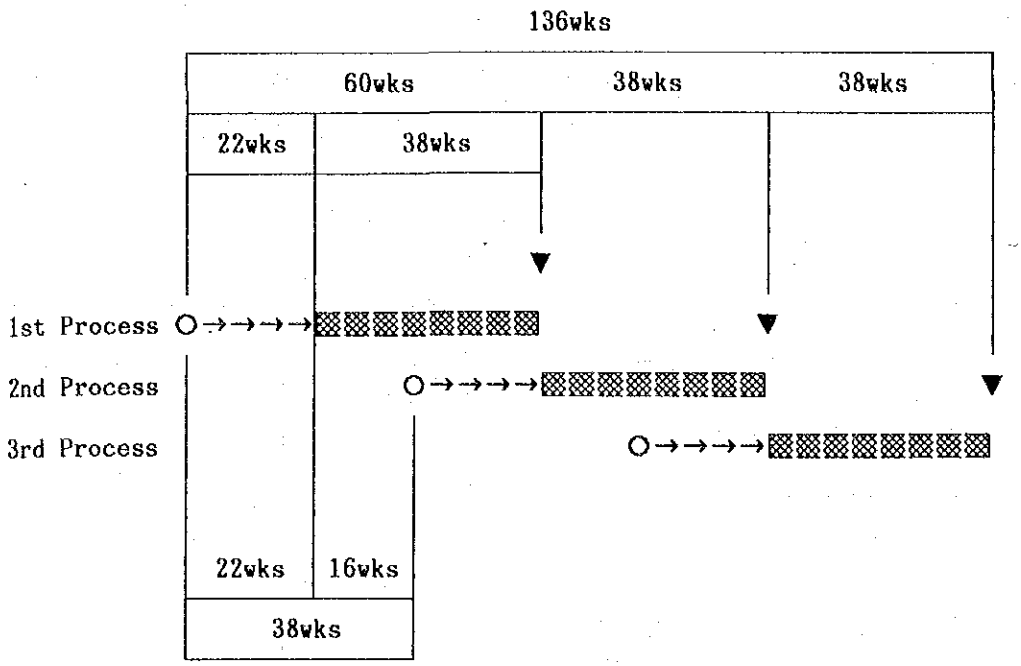


Fig. C

○ Starting hatch of SPF-type eggs

→ Raising period to egg laying

▩ Egg-laying period (over 200 acceptable eggs)

▼ Selection

c. Utilization of SPF-type eggs

A basic design will be developed assuming that of the 200 SPF-type eggs produced every week, 100 will be used for experimental eggs and another 100 will be tested after hatching and growth (details of such divisions will differ depending on the contents of the experiment performed).

d. Facility planning policy

Parent stock flocks (SPF) require facilities for being sustained up to the end of the production plan, shown in Fig. A, while growing chicks require facilities for hatching and growing into chickens. For the present, we will use a system in which both groups are raised within the same barrier. This system has a high managerial efficiency since it allows thorough going SPF control at all times. To make cleaning and disinfection control easier, pullets will be raised in cages and fertilization will be carried out artificially. Because both groups will be raised within the

same barrier, the facility must have the following capacity for different purposes ranging from egg storage to breeder-fowl raising.

	Capacity
Egg store	500 eggs
Incubator	500 eggs
Brooder	300 chickens
Pullet raising room	280 chickens
Large pullet raising room	196 chickens
Parent stock flock room	80 chickens

4) Experimental Chicken House

In accordance with the theme of the short-range plan in this centre, the present facility is set up according to the experiments to be carried and in consideration of the number of staff members to operate the facility. The raising rooms are of such scale that virological, bacteriological, parasitological experiments can all be carried out at the same time.

a. Assumption of experiments to be carried out

In each area of research, the following experiments will be repeated two or three times.

Virology :
1. Isolation of viruses
2. Infection with viruses

Bacteriology :
1. Inoculation with isolated bacteria
2. Confirmation of antibodies
3. Sensitivity to drugs
4. Inoculation with field strains
5. Prevention of infection

Parasitology :
1. Infection of protozoa
2. Efficacy to drugs
3. Resistance to drugs

b. Setting the scale of the raising room for virological experiments

1. Raise all chickens in isolators
2. Install a total of 100 isolators in six pens
3. Set the isolators

   Two types of isolators will be installed according to the contents of the experiment.

   Type A : Applicable to experiments on chickens up to 10 weeks of age (capacity, 20 chickens (10 weeks old)) (One isolator in each of the two pens in the raising room).

   Type B : Applicable to experiments on chickens up to six weeks of age)capacity, 10 chickens (six weeks old)))Two isolators in each of the four pens of the raising room).

c. Setting the scale of the raising room for bacteriological experiments

1. Chickens used for experiment from an early age (hatched to three weeks of age) will be raised in isolators, and chickens used from four weeks of age will be raised in cages.
2. Setting of the isolators

   Type B : Applicable to experiments on chickens up to six weeks of age (capacity, 10 chickens (six weeks of age)) (Two isolators in the pen of the raising room).

3. Setting of the cages

   Applicable to the raising of chickens from four weeks to 12 weeks of age.

   Capacity of one cage; six chickens (12 weeks of age) 13 chickens (six weeks of age)

   (Eight cages in each of the three pens in the raising room).

2. Scale Requirements

These scale requirements has been determined by consulting Japanese standards and examples as well as Malaysian standards, and are judged to be suitable for the principle and purpose of the project.

Data for area method estimate
* Unlisted source is Constructure Ministry Tsukuba Standard

I. Research and training building			
by organ	Rooms	Standard of Japan*	Remarks
A. Administration section	1. Office	4.0m² x (exchange staff)/person 4.0m² x (office staff x exchange rate)/person Exchange rate : Director class 18 (72 m²/person) General MGR class 9 (36 m²/person) Manager class 5 (20 m²/person) Assistant MGR class 2.5(10 m²/person) Chief clerk class 1.8(7.2m²/person) General class 1 (4 m²/person)	Standard of Malaysia (Guideline for the Implementation of Open Plan Office) 1.Office Space Guide Superscale 'A' and above 42m² Superscale 'B','C' and 'D' 36m² Superscale 'E','F' 28m² Heads or deputy heads of departments in Superscale 'G' and below 18m² Other officers eligible for rooms 15m² 2.Estimates of working space Superscale 'G' 14m² Other officers in category 'A' 9m² Other officers categories 'B','C' and 'D' 5m² Typist 4m² Office attendant 3m²
	2. Conference room	used by more than 25 persons 2.1m²/person used by more than 50 persons 1.6m²/person	
B. Research section	1. Laboratory	4.0m² x (exchange staff)person 4.0m² x (research staff x exchange rate)/person Exchange rate : General Manager class 9 (36 m²) Chief class 5 (20 m²) Researcher 1.8(7.2m²) Researcher assistant 1 (4 m²)	
	2. Standard laboratory	16m²/person	
	3.Special laboratory Attached laboratory room	appropriated separately according to the fact	
	4. Library	42m²	Accommodates 2,000 books, 3,000 magazines (2,000 + 3,000) ÷ 160 copies/m² = 32m² Reading area for 5 persons 2m²/person x 5 persons = 10m² ∴ 32m² + 10m² = 42m² Authority of "Data collection of Architecture and design" edited by the Japan Architecture Society

Data for area method estimate
* Unlisted source is Constructure Ministry Tsukuba Standard

I. Research and training building			
by organ	Rooms	Standard of Japan*	Remarks
C. Training section	1. Lecture room	1.0-1.3m²/person	Authority of "Data collection of Architecture and design" edited by the Japan Architecture Society
	2. Lecture room	4.0m² x (exchange staff)person 10m²/person level	
	3. Lounge	1.0m²/person	
	4. Experiment room	16m²/person	
	5. Administration room	4.0m² x (exchange staff)person 4.0m²	

Data for area method estimate
* Unlisted source is Constructure Ministry Tsukuba Standard

II. Trainees International Hostel			
by organ	Rooms	Standard of Japan*	Remarks
D. International Hostel	1. International Hostel for lecturers	42m²/room (single)	Based on hotel sweet room for extended stay (living room, bed room, laboratory, shower, closed, kitchenette)
	2. International hostel for trainees	12.5m²/person x 1.25 16m²/person 16m²/room (single)	12.5m²/person is UK boarding house standard (bed room, laboratory, cloak, balcony) Lavatory
	3. Shower for trainees	Lavatory 0.53m²/person Toilet 0.53m²/person Shower 1.5m²/person	NTT Standard NTT Standard
E. Dining room	1. Dining room	2.0 - 2.3m²/seat (company dormitory)	29 seats 3 seats (spare)
	2. Kitchen	dining room area x05	Authority of "Data collection of Architecture and design" edited by the Japan Architecture Society
F.	1. Lounge	1.0m²/person	Authority of "Data collection of Architecture and design" edited by the Japan Architecture Society
G. Administration section	1. Caretakers' room	16m²	same level as trainee's hostel
	2. Office	4.0m² x (exchange staff)/person 4.0m²	

* Additional room area will be estimated by layout.

The following table shows the required area for each room at the Centre.

1) Research and Training Building

a. Administration Section

Room	Required Area (m^2)
DIRECTOR ROOM	36
EXPERT ROOM (1)	36
EXPERT ROOM (2)	36
ADMINISTRATION OFFICE	90
CONFERENCE ROOM	80
PREPARATION ROOM	20

b. Research Section

Room	Required Area (m^2)
VIROLOGY LABORATORY	(158)
EXPERIMENTAL ROOM	42
LABORATORY	64
PREPARATION ROOM	32
CLEAN ROOM	10
DARK ROOM	10
BACTERIOLOGY LABORATORY	(148)
EXPERIMENTAL ROOM	42
LABORATORY	64
PREPARATION ROOM	32
DARK ROOM	10

Room	Required Area (m^2)
PARASITOLOGY LABORATORY	(158)
EXPERIMENTAL ROOM	42
LABORATORY	64
PREPARATION ROOM	32
DARK ROOM	10
VECTOR INSPECTION ROOM	10
PATHOLOGY LABORATORY	(188)
EXPERIMENTAL ROOM	42
LABORATORY	64
PREPARATION ROOM	32
DARK ROOM	10
AUTOPCY ROOM	20
TREATMENT ROOM	20
COMMON APPARATUS ROOM	44
FREEZE DRYING ROOM	22
CONSTANT TEMPERATURE ROOM	
37° C	13
4° C	13
-20° C	13
PRECISION MACHINERY ROOM	44
WASHING STERILIZING ROOM	90
ELECTRON MICROSCOPE ROOM	84

Room	Required Area (m^2)
DATA PROCESSING ROOM	37
REFERENCE LIBRARY ROOM	42
EQUIPMENT STORAGE	67
MACHINE ROOM (AIR CONDITIONER)	75

c. Training Section

Room	Required Area (m^2)
LECTURE ROOM	67
LECTURER ROOM	40
PREPARATION ROOM	22
EXHIBITION CORNER	22
EXPERIMENTAL ROOM	90
PREPARATION ROOM	22
STORAGE	22
ADMINISTRATION ROOM	15
LOUNGE	50
LOCKER ROOM	22

2) International Hostel

Rooms	Required Area (m²)
LECTURERS' SUITE	4 units x 42 = 168
TRAINEES' ROOM	25 units x 16 = 400
DINING HALL	70
KITCHEN	35
OFFICE	15
FOOD STORAGE	6
MULTI-PURPOSE ROOM (TV LOUNGE)	75
LAUNDRY ROOM	15
STORAGE	10
LINEN STORAGE	10
CARETAKER ROOM	15

3) SPF Poultry Unit

Rooms	Required Area (m²)
PREPARATION ROOM (1)	20
PREPARATION ROOM (2)	25
STORAGE	4
FEED STORAGE	4
FEED BAG STERILIZING ROOM	5
AIR LOCK ROOM (1)	4
WORK ROOM (1)	4
EGG STOCKER INCUBATOR ROOM	16
BROODER ROOM	23

Rooms	Required Area (m^2)
YOUNG PULLET ROOM	23
PULLET ROOM	23
WORK ROOM (2)	12
BREEDER ROOM	16 x 2= 32
AIR LOCK ROOM (2)	3
DIRT ROOM	7
AIR CONDITIONING ROOM	58
FEED PRODUCTION ROOM	14

4) Experimental Chicken House

Rooms	Required Area (m^2)
PREPARATION ROOM (1)	30
PREPARATION ROOM (2)	25
STORAGE	4
FEED STORAGE	8
FEED BAG STERILIZING ROOM	4
AIR LOCK ROOM (1)	4
WORK ROOM (1)	5 x 10 = 50
EXPERIMENT ROOM 1-7	10 x 7 = 70
EXPERIMENT ROOM 8-10	13 x 3 = 39
FILTER ROOM	3 x 7 = 21
AIR LOCK ROOM (2)	5
TRAINEE ROOM,	10
WORK ROOM (2)	6
AUTOPCY ROOM	15

Rooms	Required Area (m^2)
STORAGE	6
DIRT ROOM	10
AIR CONDITIONING ROOM	80
VENTI-CONDUCTING ROOM	35

4) Others

Rooms	Required Area (m^2)
INCINERATOR • PUMP STATION	36
POWER STATION	48
GENERATOR ROOM	48

3. Building Equipment Requirements

The requirements for building equipment are as follows :

1) Hygiene Equipment

a. Water Supply

Water will be supplied from the main water supply of Ipoh City and subsequently distributed to each building through a water supplier.

b. Hot Water Supply

Hot Water will be supplied to the laboratories, SPF Poultry Unit, Experimental Chicken House and the lecturer's suites.

c. Sewage Disposal

Sewage will be treated in septic tanks and released into the drainage on the site, as there is no public sewage.

d. Gas

As no gas supply service is available, each building shall have liquid propane gas cylinders for gas supply.

e. Protection Against Fire

Equipment required by Malaysian regulations shall be installed.

f. Incinerator

A unit capable of incinerating experimental chickens will be installed.

2) Air-Conditioning

a. Air-Conditioning and Ventilation

Working rooms within the research & training building, living rooms for lecturers in the International Hostel, the SPF Poultry unit and the experimental chicken house will be air-conditioned. Living rooms, warehouse, W.C. and other rooms will be ventilated as a frequency of 5 - 15 times per hour.

The indoor air-conditioned air temperature will be maintained within the range of 22 - 27 degrees Centigrade, while the common Space air-conditioning temperature will

be decided on the basis of the local metrological data.

3) Electric Equipment

a. Power Supply

Electricity will be supplied by the National Electricity Board. A power transformer room will be provided for in-house supply.

b. Emergency Power Supply

A power generator shall be installed in case of emergency for the SPF Poultry Unit and Experimental Chicken House, etc., which cannot tolerate power failure.

c. Light Electrical Appliances

A telephone, inter-communication and TV antenna will be installed or necessary terminals will be provided where appropriate.

d. Protection against Fire

Equipment required by Malaysian legislation will be installed.

e. Illumination

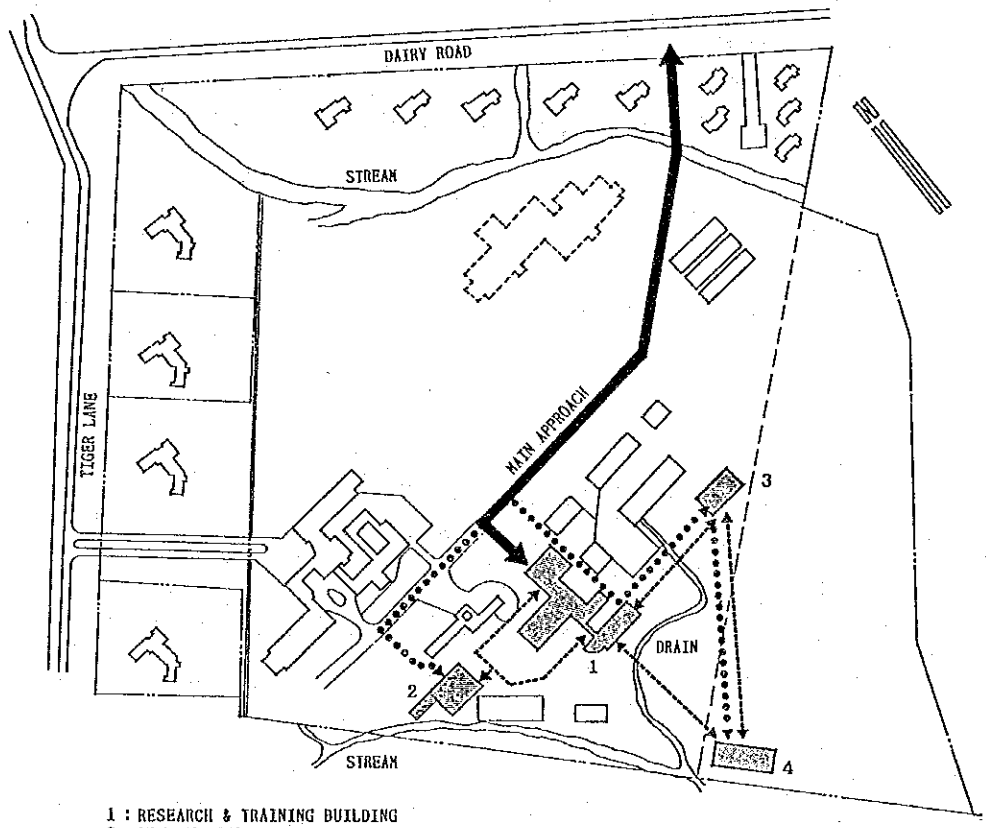
The intensity of illumination will be fixed within the range of 100ℓX - 300ℓX.

4-3 Basic Plan

4-3-1 Site Plan

4-3-1-1 Site Plan

The main approach to the existing VRI is by Tiger Lane which ends at the VRI main building. To use this road as the approach to the Centre a detour around the existing facilities is required, however, passing nearby under windows of the laboratory will disturb research activities. Presently, a plan is under way to build a Biologics Unit in the campus of the VRI, the approach to which will be by Dairy Road, for which the Government of Malaysian currently has a plan to widen and modify. The use of this road as the approach to the Centre will be the best solution.



1 : RESEARCH & TRAINING BUILDING
2 : INTERNATIONAL HOSTEL
3 : SPF POULTRY UNIT
4 : EXPERIMENTAL CHICKEN HOUSE
----------: CONNECTION ROUTE
°°°°°°°°°°: SERVICE

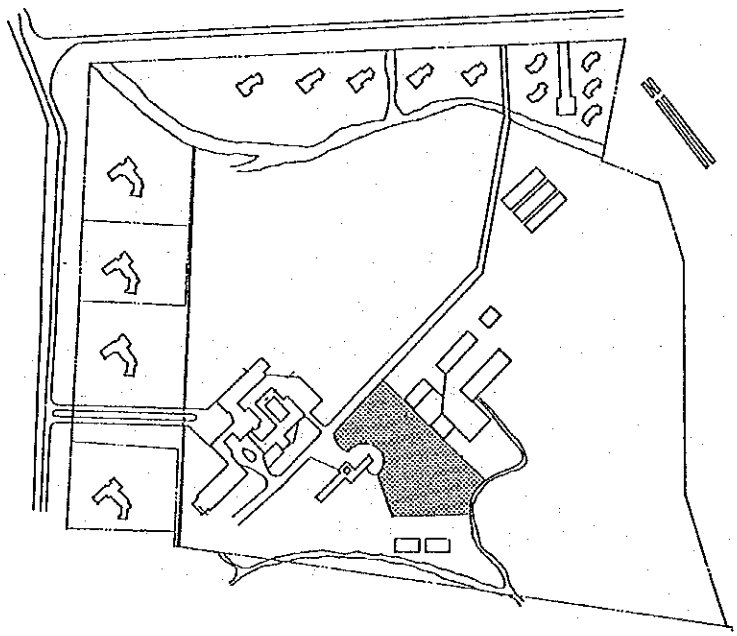
MAIN CIRCULATION DIAGRAM

1) Research and training building

The building site measures about 30 metres east to west and about 90 metres north to south and is located between animal sheds of VRI and the existing trainees' hostel (mostly female). The land slopes toward the south and a small stream (drainage) forms the boundary. This is a rather narrow piece of land for the proposed research and training building.

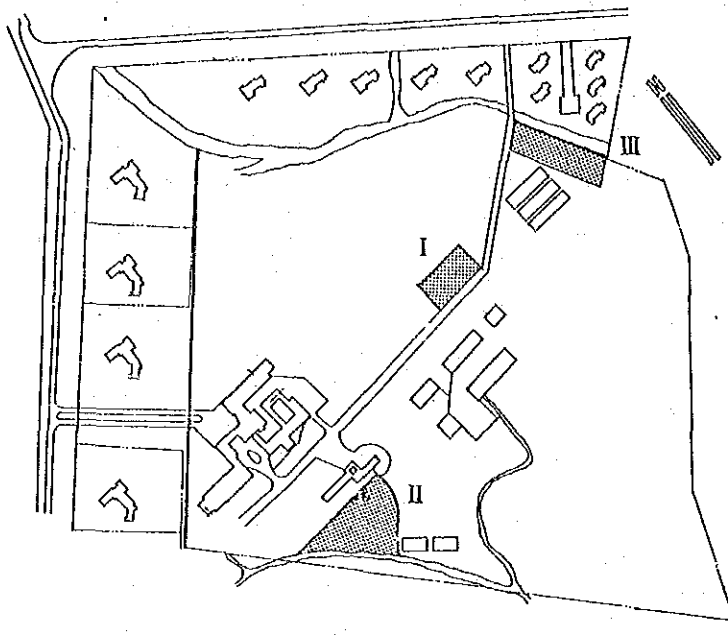
Since the building will house administration, research and training sections, the possibility of a multifloor construction seems suitable, but in view of environmental considerations, three-stories or more is not appropriate. Thus, the three sections will have to be spread horizontally (partially two-storeyed) with each section connected to the others yet maintaining independence.

The building will have long walls running east to west to prevent direct sun light. A right angle will be built in the direction of the wind, dominant throughout the year, that blows from the north-east and south-west. This concept is also in conformity with the VRI's site plan.



2) International Hostel

Three areas of the lot in the VRI were offered as the site during the field survey.



Each site has the following advantages and disadvantages.

Site I. Advantage : The building will be monumental since it will have an open environment along the road.

Disadvantage : It is inconvenient in consideration of integrating all the facilities since the site is a distance from the research and training building.

II. Advantage : It is easy to integrate the centre since the site is adjacent to the research and training building; it is also convenient for the planning of building equipment.

Disadvantage : It is adjacent to the existing shed for Disease Isolation Unit.

III. Advantage : Located in the living zone.

Disadvantage : Integration of the centre is impossible since it is too far from the research and training building. The living

environment is inferior since the land is lower than the surrounding area and is located at the rear of the existing labourers' quarters.

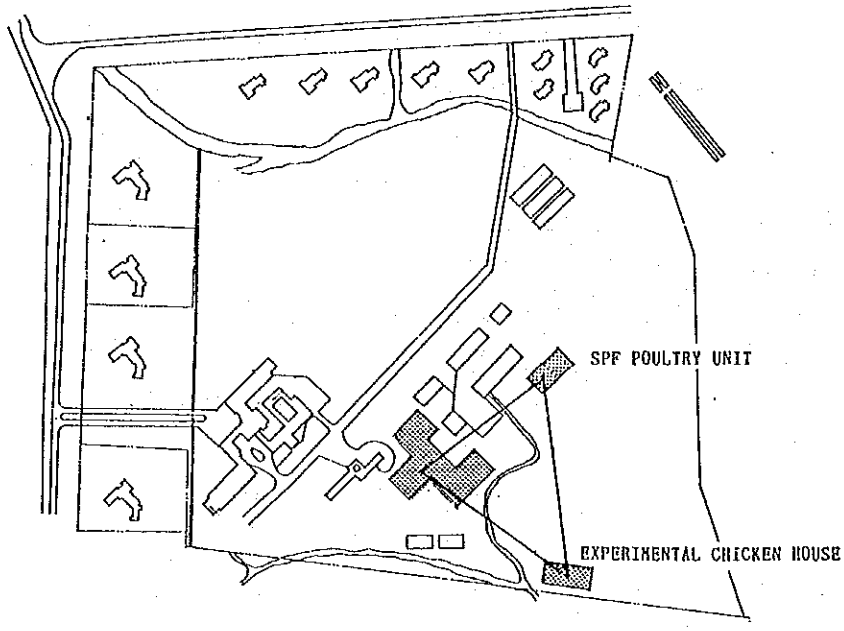
We suggested that the Site III with inferior environmental conditions for the Living space be excluded, to which VRI agreed. We checked the other Site I and II.

Thus, Site II was selected for the reasons described below.

a) Independence of the centre (for integration of the centre) will be maintained.
b) Easy access to the main building (training section) to which the centre requires close contact
c) A savings in construction costs and easy maintenance are facilitated since integration of functions is possible in terms of a planning of building equipment.

3) SPF Poultry Unit

VRI animal houses are separated into houses for healthy animals and for experimental chickens. As the chicken house is expected to be built in an area where the occurence of pathogenic organ will be prevented, it will be kept completely separate from the experimental animal house (especially the chicken house).



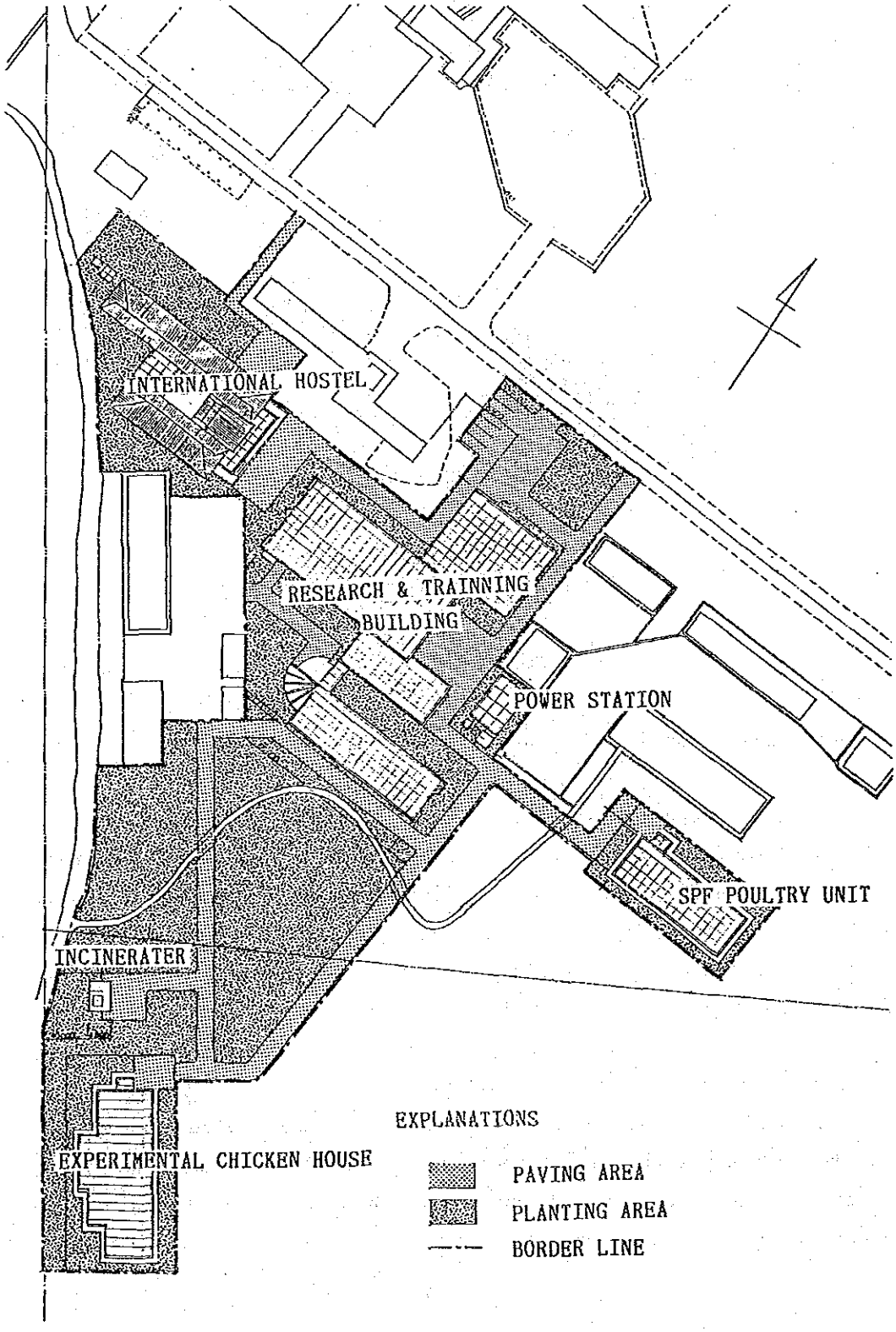
Further, in taking a serious view of the research and training building and considering the traffic line between the two, the SPF will located on the south side of the rabbit breeding building.

4) Experimental Chicken House

As the experimental chicken house must operate free from pathogenic organs, it must be separated from the healthy animal houses (especially the chicken house) and also located in consideration of airborne infection (direction of the wind). Accordingly, the experimental chiken house is expected to be located far from the SPF poultry unit, however these two units are closely related with each other. Further, the experimental house will maintain a close relation with the research and training building and so will be located at the top of the triangle, as shown above.

4-3-1-2 Landscape Plan

The Landscape plan of the centre is as follows

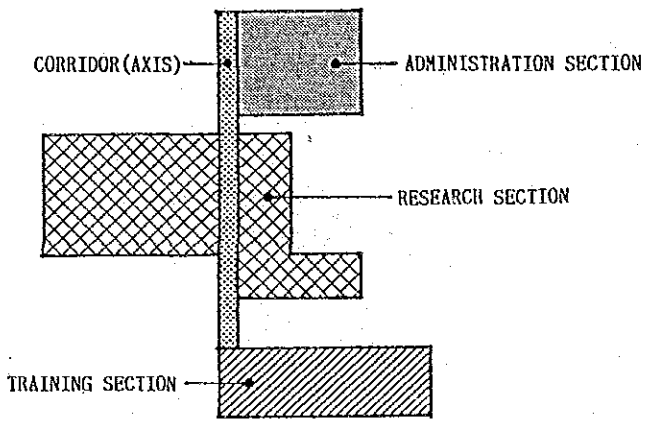


4-3-2 Architectural Plan

4-3-2-1 Floor Plan

1) Research and Training Building

As the name implies, the Research and training building is for research and training, the main activities of the centre. The facility consists of, a. Administration, b. Research, and c. Training, with each section connected to a corridor as shown in the following drawing.



LINKAGE DIAGRAM

The floor plan for each section is described below.

a. Administration section

The administration section is a single-storeyed. This section will contain the director's room, offices and conference rooms, etc., and shall be located adjacent to the entrance hall to command full view of the approach and to facilitate contact with existing VRI facilities.

b. Research section

The research section is two-storeyed. The pathology laboratory (with the autopcy room, which must have a doorway to the outside, and the room for the electron microscope, which must be on the ground floor because of its function) and the parasitology laboratory will be on the

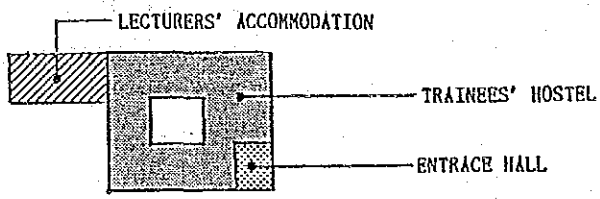
first floor, which will be frequently used by researchers of both the bacteriology and virology laboratories.

c. Training section

The training section will be two-storeyed with the experiment room on the ground floor, in consideration of plumbing, and the lecture room and the lounge adjacent to the stair case on the first floor. The entrance hall, will be provided for passage to the International Hostel for trainees and lecturers. The administration room will be located adjacent to the hall.

2) International Hostel

This building will consist of two accomodation facilities, one for trainees and one for lecturers. These will be connected shown as follows :



LINKAGE DIAGRAM

The trainees' Hostel will be two-storeyed with part of the bed room and dining room (also used by the lecturers) and lounge on the ground floor, and the bedroom on the first floor. The courtyard located in the centre will be for ventilation and light to improve living conditions.

The accomodation facilities for lecturers will be a two-storeyed building connected to the trainees' Hostel. The lecturers' suites are planned to be somewhat larger and better furnished than the trainees bed rooms.

3) SPF Poultry Unit

In order to avoid carrying in pathogenic organs from the outside and to maintain the SPF environment, the system is designed so that before feeds, apparatus, etc. are carried into the clean zone, they will have to pass through an autoclave, germicidal trap and showers and be fully cleaned. Upon the caretaker's entry into the SPF Poultry Unit, he will be designed so that the caretaker carries the feed to the dirt corridor, from where it is pushed out by means of sweepers. In working out the movement lines of the caretaker, feed, apparatus, and dirt, it is possible to preclude contamination as much as possible.

4) Experimental Chicken House

The movement line program is designed so as to separate the movement lines of the caretaker, the chicken fledglings, eggs, apparatus, feed and dirt and to prevent the crossing of movement lines stretching from the clean zone and the contaminated area. In the case of carrying apparatus, etc. into the clean zone, it is planned so that nothing can be brought in unless it passes through the autoclave, germicidal trap and shower and is sufficiently washed. For the purpose of precluding the contamination of the pathogenic organs, it is designed to avert the movement of men from the clean zone of the dirt zone and effect the movement of equipment, filth,and post-experimental fledglings by means of the pass box. As for the disposal of dirt, etc. contaminated through the the innoculation of pathogenic organs, it will be carried through the germicidal trap into the incinerator for animals for eventual disposition. With regard to the entry or exit from the contamination zone, it is planned that everyone must pass through the shower so that the infiltration of pathogenic organs can be prevented.

4-3-2-2 Section Plan

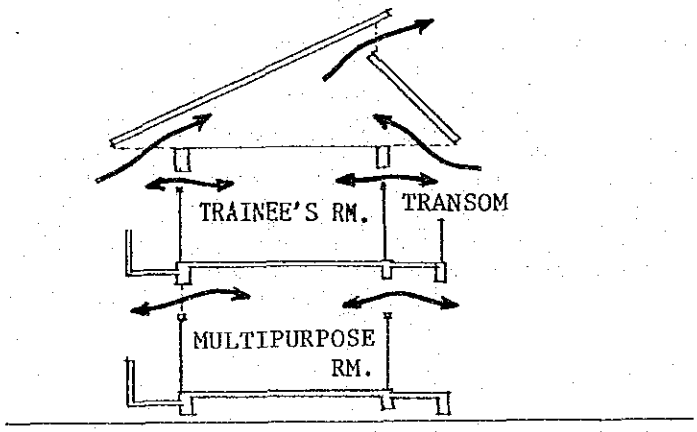
1) Research and Training Building

As the building must be flexible in order to meet future changes in purpose, content, quality and quantity, special consideration has been given to plumbing and electricity. Floor height will be 3.7 metres with a space for building equipment provided inside the ceiling of the laboratory where the ceiling height will be 2.7 metres in order to facilitate a draft chamber duct, etc. The floor of the ground floor will be 1.7 metres from ground level, considering maintenance of plumbing under the floor.

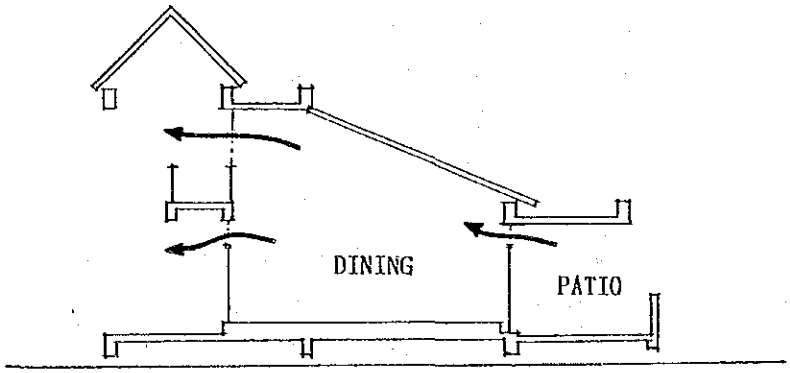
Each laboratory shall be provided with a balcony for natural light control and to be used as space for downspout, drain pipes, exhaust ducts, etc. and for ease of maintenance. Although the laboratories will be air-conditioned, each room will have transoms to provide ventilation.

2) International Hostel

This consists of the two-storeyed trainees' Hostel with the court-yard and the two-storeyed lecturers' suites. The main purpose of the section plan is to study the ventilation and heat insulation of each room. The building will be basically of RC rigid frame structure with roof frames made of wood. The roof will be sloped and divided for the rooms and the corridor shown below.



This structure will provide ventilation and heat insulation for the attic over the hostel. Transoms will be provided on the upper sides of the doors and windows, etc. in the corridors and balconies of the rooms to catch north-eastern and south-western winds that blow through the balconies and open corridors to the court yard. The dining room shall have a single sloped ceiling and roof for controlling heated air inside and providing a cozy atmosphere. The floor height of the ground floor will be 80 cm for trainees' hostel and 120 cm for lecturers' suite from ground level in order to provide under-floor ventilation.



3) SPF Poultry Unit and Experimental Chicken House

In addition to the fact that no past record of flood near the planned location of the centre exists, the site calmly inclines toward a water channel and is therefore believed to be able to cope with the characteristic concentration of heavy tropical rain. Accordingly, a plan in consideration of flooding is unnecessary and the floor height will be ground level 300 mm. Otherwise, space between the ceiling and the roof will depend on the size of the air-conditioning exhaust duct, but will be in the range of 2,400 - 2,700 mm.

4-3-2-3 Structural Plan

1) Frame work

The following frame work has been adopted in consideration of the usage of the facilities, construction and local conditions.

a. Research and Training Building

The research and training building will be mainly a rigid frame sructure of reinforced concrete with the outer walls made of brick.

Reinforced concrete walls will be partially used as reinforcement.

b. International Hostel

A rigid frame construction of reinforced concrete with a wooden trass roof, the outer walls and reinforcement walls will be the same as those of the research and training building.

c. SPF Poultry Unit and Experimental Chicken Houses

From the view point of functions of the facility, air pressure should be maintained at levels higher than usual in the barriers of the SPF Chicken House and lower in the case of the Experimental Chicken House. Furthermore, room temperature is required to be maintained at around 25° C. Therefore, these chicken houses are designed to be of the reinforced concrete wall structure, which is characterized by air-tightness and is capable of maintaining a high average heat load.

2) Structural design

Malaysia established uniform building By-laws in 1973 to assure safety and fire-resistance. The By-laws cover the basics specifying only the weight of materials, load, the soil and the width of the foundation wall. It also specifies that buildings must comply with the BS (British Standard) and BSCP (British Standard Code of Practice); this construction complies with these standards.

a. Fixed load

The fix load shall be calculated according to the weight of the materials used and the actual conditions of construction.

b. Load

The use of the building and room are taken into consideration in determining the load, as follows :

Roof	0.25 kg/m	26 kg/m
Office	2.5	255
Laboratory	3.0	306
Lecture Room	3.0	306
Hostel	1.5	153
Corridor, balcony	3.0	306

c. Earthquake force

There are provisions for the force of earthquakes specified in the construction plan, but as there is no history of earthquakes in Malaysia the plan does not include earthquake load.

d. Wind load

Only a small wind load is considered in construction plans in Malaysia. The proposed rigid frame construction with reinforced concrete will withstand the wind load.

e. Foundation

The ground rigidness around the building site is, according to what the study team learned, in the order of 1 ton/sf. Direct foundation will be appropriate for the centre area.

3) Construction materials

The use of cement and reinforcing iron rods made in Malaysia is compulsory. The quality and quantity of materials will be satisfactory for local procurement.

a. Concrete

The ratio of ingredients of the concrete for the main construction is 1:2:4, and the compressed strength after four weeks is 300 psi (210 kg/cm).

Concrete with a relatively stiff consistency will be used and may be supplied from a concrete plant.

b. Iron rods

Ordinary iron rods (yield strength : 36000 psi 7500 kg/cm) and high strength deformed iron rods (yield strength 60000 psi - 4100 kg/cm) will be used. The high strength rods shall be used as main rods for main pillars and beams and ordinary rods for others.