

〔VIII〕 英 文 報 告 書

TECHNICAL COOPERATION PROJECT
ON
PIG AND POULTRY DEVELOPMENT
IN BURMA

FINAL REPORT BY DR. MASAYOSHI HIROSE

(10th, April, 1983)

THE HISTORY OF THE

REPUBLIC OF THE UNITED STATES

OF AMERICA

FROM 1776 TO 1863

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PREFACE

I would like to express my gratitude to all those who have given me friendly cooperation, ever since the day I arrived in Burma to take the place of the previous leader, 9th October 1980, until today.

Especially, I would like to express my heartfelt thanks to the Government of the Socialist Republic of Burma, and to all those are in connection with the L.D.M.C., who have cooperated in making my term of duty smooth without any serious trouble.

Fortunately, together with the multiplication of the breeder stocks from Japan and the completion of the transfer of basic modern technology of the breeding administration, it is a pleasure to say that this project has been with success.

On the occasion of my returning home after two-and-half years of my service, I would like to give a summary report on the five years' work from 12th April, 1980 to 11th April, 1983 and I would also like to give a few recommendations concerning the further expansion of the 10th Mile Farm.



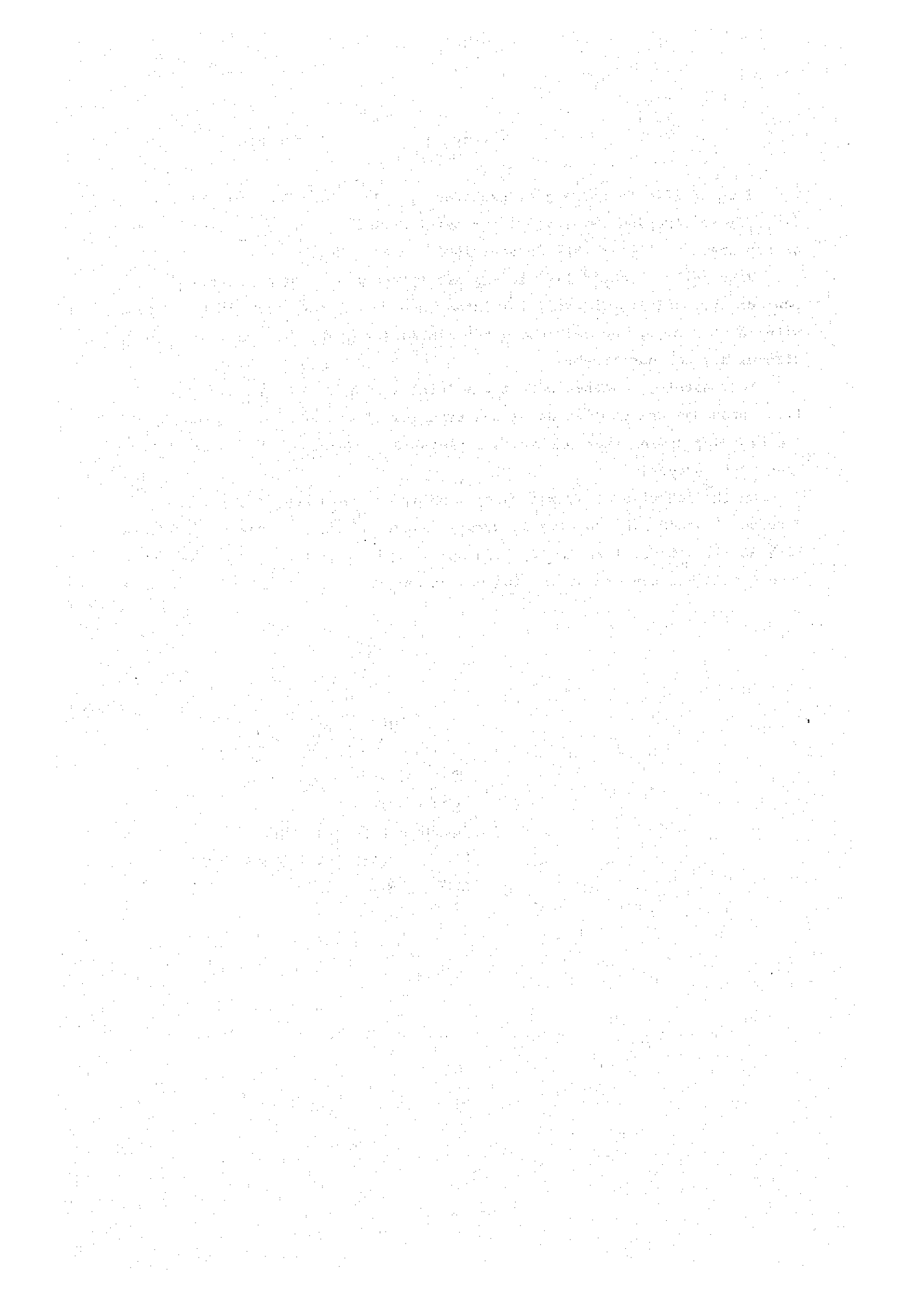
(DR. MASAYOSHI HIROSE)

Team Leader

Japanese Experts' Team,

Pig & Poultry Development Project

LDMC/JICA.



I. PROGRESS OF THE PROJECT

Introduction

The Record of Discussions (R/D) in connection with the Project, was signed on 12th April, 1978, and the Project originated with a co-operation period of four years, but one more year was extended in 1982.

However, the works by experts (Team Leader and Coordinator) in collaboration with the Project Manager were started only from the 30th of September, 1978. (five months delayed after R/D was signed.)

The first poultry was supplied from JICA - Japan in November, 1978 and next, pigs were supplied from JICA - Japan in January 1979.

(1) Title of Project

Technical Cooperation Project on Pig and Poultry Development in Burma.

(2) Cooperation Period

The Project was started first with a cooperation period of four years from 12th April, 1978 to 11th April, 1982, but the Project, including one year extension period, will expire on 11th April, 1983.

(3) Cooperating Institution

Livestock Development and Marketing Corporation (L.D.M.C.)

(4) Farm's Location and Area

10th Mile Farm, 10th mile, Prome Road, Rangoon - Burma and the area is 80.5 acres.

II. DISPATCH OF EXPERTS

There are two kinds of experts, namely, the long term experts and the short term experts. The former serves for a period of more than a year and the latter serves for a period of less than a year.

Following is the list of experts, their designations and the period of stay, since the commencing of the work till now.

(1) Long Term Experts

NAME	DESIGNATION	PERIOD	
Reiji Seki	Team Leader	28. 9.78	27.10.80
Keizo Egawa	Liaison Officer	28. 9.78	28. 4.81
Katsuyuki Nagata	Pig Production & Management	20.12.78	31. 3.80
Noboru Kano	Poultry Production & Management	20.12.78	31. 3.80
Isao Nozaki	Pig Production & Management	24. 3.80	23. 3.82
Takaaki Ishita	Poultry Production & Management	10. 4.80	9. 4.82
Masayoshi Hirose	Team Leader	7.10.80	11. 4.83
Tomio Sawada	Liaison Officer	7. 4.81	11. 4.83
Shigeru Minami	Animal Health	4. 8.81	11. 4.83
Tomio Suekuni	Poultry Breeding	2. 5.82	1. 5.83
Shioichi Matsuo	Pig Breeding	2. 5.82	1. 5.83

(2) Short Term Experts

NAME	DESIGNATION	PERIOD	
Hidetaka Sugamuma	Cage Assembly	27.11.78	18.12.78
Toshio Yusa	Chick Sexing	17. 1.79	15. 2.79
"	"	17. 1.80	16. 4.80
Takashi Kayama	Incubator Installation	25. 1.79	8. 2.79
"	"	2. 5.80	16. 5.80
Masayoshi Kawai	Artificial Insemination Poultry	9. 8.79	29.11.79
Masami Ito	Pig Production	9. 8.79	19.11.79
Eizaburo Furutani	Water Engineering	17. 1.80	31. 1.80
Keizo Watanabe	Water Purification Plant Installation	17. 6.81	23. 7.81
"	"	28.11.81	21. 1.81
Takashi Imura	Processing Plant Installation	28.11.82	21.12.82
Tetsuo Murakami	Nutrition Analysis Engineering	25. 3.83	23. 9.83

III. COUNTERPART TRAINING IN JAPAN

Since the commencing of the cooperation work, in a year 2~3 members of the counterpart from the farm are to receive technical training in Japan. But no counterpart was despatched to Japan in 1978 and 1979 because of various circumstances.

Following is the list of grant of trainees carries out from the period of 1980.

YEAR	NAME	PERIOD		TRAINING PLACE
1980	Mr. Saw Win	15. 5.80	3.10.80	JICA International Training Center (Nagoya).
1981	Mr. Tin Maung Shwe	7. 1.81	7.11.81	Toyohashi Feed Mill Co. Ltd. Shirakawa Livestock Breeding Station, MAFF.
1981	Mr. Aung Kyaw Soe	7. 1.81	7.11.81	Toyohashi Feed Mill Co. Ltd. Ibaragi Branch, Shirakawa Livestock Breeding Station, MAFF.
1981	Mr. Hla Aung	6. 5.81	28. 9.81	JICA International Training Center (Nagoya).
1982	Mr. Htay Aung	14. 1.82	14. 7.82	Hyogo Livestock Breeding Station, MAFF.
1982	Mr. Pe Than	14. 1.82	14. 7.82	Ibaragi Branch, Shirakawa Livestock Breeding Station, MAFF.
1982	Miss Thet Thet Nwe	6. 5.82	30. 9.82	JICA International Training Center (Nagoya).
1982	Miss Mya Mya Yu	6. 5.82	30. 9.82	JICA International Training Center (Nagoya).
1982	Mr. Lu Hla	23.11.82		Inspection Station of Manure & Feed, MAFF.

Note: Group Training Course

IV. EQUIPMENT AND MATERIALS GRANTED BY JAPAN

In the four years cooperation period from 12th April, 1978 to 11th April, 1982, and one year extended period from 12th April 1982 to 11th April, 1983, about (400) million Japanese Yen are granted as the project equipments and materials (such as machines, motor vehicles, breeding stocks, medicines and chemical materials, etc.).

The following data is the total amount of equipments and materials provided by Japanese side from fiscal 78/79 to 81/82.

Equipments & Materials provided by JICA

	Fiscal 1978/79	Fiscal 1979/80	Fiscal 1980/81	Fiscal 1981/82	Fiscal 1982/83	Fiscal 1983/84	Total
1. Equipments							Yen
1) Budget carried over from the previous year		6,040,000		4,900,000	7,938,523	6,558,862	25,437,385
2) Current budget	80,959,310	57,494,790	90,733,384	71,916,317	62,052,026	-	363,155,827
2. Equipments accompanied by the expert	1,909,819	2,717,838	1,171,224	787,619	2,732,805	5,686,111	15,005,416
Total	82,869,129	66,252,628	91,904,608	77,603,936	72,723,354	12,244,973	403,598,628

Note: The equipments include chemicals, feed additives and breeding stocks.

V. CO-OPERATION WORK

The aim of this Project is to carry out improved techniques for the elevation of production for future Burma concerning livestock promotion based on the development of raising pigs and poultry. Though the main duty is to transfer techniques to the counterparts of LDMC, 10th Mile Farm, establishment for production of feed and raising poultry and pigs, Farm Manager Training Courses of the LDMC farms were held at the farm. The first course was initiated in November, 1980, with about 60 ~ 65 persons attending and lasted for 3 months. The fifth one was ended just recently. At the request of the LDMC, Experts gave assistances for training courses (one expert about 30 ~ 40 hours in charge).

At the same time, the following points gave difficult influences to the accomplishment through the co-operation works.

- (1) The construction of farm facilities were delayed frequently.
- (2) Transference of each section members occurs very frequently.
- (3) Difficulty in maintaining each section as well as the minimum necessity number of members.
- (4) Moderate amount of time was used up for the preparation of general training courses.
- (5) Sometimes, Experts are requested to treat the 'out of their fields' matters.

Especially, since there was a difficulty in the completion of a construction of the farm facilities within the cooperation period decided at the beginning by R/D (April '78 April '82) and although one more year was extended, it is regrettable that some parts of the livestock houses (10 houses for poultry, 3 house for pig sty) have not been completed. Some farm facilities were also not completed yet. In the case of feeding management, it causes overcrowding, and it brought the troubles of vice, outbreak of sickness, going down of performance and to the enforcement of production plan.

(A) PIG SECTOR

(1) Construction of Pig House

The pig houses constructed since the beginning of the project to 28.2.1983 and the ones still under construction are as shown in Table (1). The testing house for various growth test was built in January, 1983, with a part of its construction rate produced by JICA.

It is a pity that as in Table (1), the pig houses were not constructed as planned, and moreover, the time of completion was delayed in a large scale. This somehow caused difficulties to the smooth progress of the work.

The keeping capacity of the pig houses when the under-construction pig sheds are completed will be as shown in Table (2).

If one grower house is used for raising gilts, it can hold a capacity of about 250 heads of adult females (including gilts). In such a case, as the production of piglets would increase, together with construction of weaner house and grower house, it is necessary to promote the selling of breeding stocks at 2~3 months old.

Again, there is necessity to construct, as soon as possible, a boar house where 30 heads of boar necessary for maintenance of pure can be raised.

(2) Introduction of Breeding Pigs

The introduction of breeding pigs was divided into 3 times; January 1979, November 1980 and November 1981.

The breeds and number of pigs introduced are as shown in Table (3). These breeding stocks are maintained as pure bred and a part of them are used for production of crossbred. Since excellent pure breeds are necessary for efficient production of commercial pigs (crossbred), it is important to give effort in maintaining pure breeds.

(3) Management Techniques

Though the transfer of management techniques have been completed, the detailed points of routine administration are not carried out. To improve the result, fulfillment of basic administration is desired.

Most of the matings were done by artificial insemination, to raise the conception rate, it is better to accept natural mating whenever there is a possibility.

In order to keep the condition of the boar's semen favorably, the boars should be kept in a cool environment and in a pen with grazing where individual feeding is possible.

The management (at before and after farrowing) is carried on as the schedule below.

Especially, it is very important to help the suckling of piglets in two days after birth and keep the bed in a dry condition, in order to lower the mortality.

-10 days	Farrowing	10 days	20 days	30 days	35 days
Transferring of farrowing house	Helping of nursing	B.W. Ear notching	B.W.	B.W.	Weaning

Concerning the feed, in order to decrease the percentage of maize, and to reduce the unit cost of ration, a new formula was prepared in December, 1982. Since it showed a favorable result in the comparative test between both the new and the old ration, it has been changed to

the new formula from February, 1983. The results of the comparative test between both the new and the old ration are shown in Table (4) and Table (5).

Together with the change of formula of ration, feeding program was examined, and to plan a cost down, the following feeding program was set up.

When the following feeding program was carried out with the new formula ration, a large scale of cost down would result.

FEEDING PROGRAM

Stage	Ration	Feeding
15 days old	Starter	Self feeding
45 days old	Grower (A)	"
90 days old	Grower (B)	"
60 kg of body weight	Adult	"
Shipping		
Breeding stock		
60 kg of body weight	Adult	Self feeding
120 kg of body weight	Adult	Feeding
Adult	Adult	Feeding

(4) Pig Population

The pig population since January 1979 is shown in Table (6). Though the number of boars and sows increased favorably until 1981 with introduction from Japan, through insufficient number of pig sheds, it shows no increase since 1982.

However, at present (28.2.1983), 56 heads of gilts have been raised and the number of adult females (including these gilts) are 190 heads.

(5) Production and Distribution

a) Farrowing Results:

The breeding pig, introduced from Japan, gave birth for the first time at the 10th Mile Farm in June, 1979. Since then, until the end of February 1983, the total 633 heads of sow have farrowed and 4,695 piglets have been produced.

The result of farrowing according to year is as shown in Table (7). Though the number of farrowing and the number of produced piglets have been increasing favorably until 1981, because of lack of pig sheds, the result in 1982 was as the same as the previous year. There is a tendency of increase in average litter size.

b) Mortality:

Though there was tendency of gradual increase in mortality rate of young pigs from middle of 1982, the tendency towards betterment was seen once again (Figure 1).

The reasons of an increase in mortality rate were that there was a shortage of farrowing pen during the repairing of farrowing house, and that as the number of farrowing increases there was a neglect in administration concerning each birth.

The cause of piglets lost investigated from June 1981 is as shown in Figure 2.

The causes of mortality of piglets are mainly due to weakness and mother pig's press. The weakness comes from no suckling and diarrhea. Therefore, aid of suckling piglets in two days after birth as well as keeping the floor in dry condition are necessary for the low mortality rate. The necessity of dry bed is also shown in Figure 3, concerning seasonal mortality.

The mother pig suffers a great stress before and after farrowing. As the stress is great especially under hot environment, it is very important to reduce the stress before and after farrowing, as much as possible in tropical country.

c) Interval from Weaning to First Estrous:

As shown in Table 8, the interval from weaning to first onset of estrous is quite long on account of the high temperature environment. An improvement, however, is seen in 1982 compared with 1981, probably because the resisting power of the breeding pigs improved little by little.

To improve the period from weaning to first estrous, an experiment concerning the effects of the stimulation of boar and green feed on weaned sow was carried out in 1982.

As shown in Table 9, a good result was obtained from the treatment of boar contact and green feed. Therefore, this type of administration should be applied by all means for it does not need any expense.

d) Growth:

As shown in Table 10, the growth rate of piglets is not so good. The cause of it is because there was no appropriate starter ration and because some mother pigs come down with MMA syndrome.

At present, since the feedstuff for ration is limited, it is difficult to develop a suitable starter feed. In future, to find the effective feedstuffs and develop the starter feed is expected.

Daily gain of body weight is as shown in Table 11.

The growth is not so good due to overcrowded housing by the lack of pig house. Especially in the dry season when feed intake declines, growth becomes bad.

The feed conversion of pork-type pig investigated in 1981 is as shown in Table 12. The feed conversion is made better probably due to a few consumption of energy in hot condition.

e) Distribution:

The number of shipped breeding stock and pork-type pig is as shown in Table 13.

The number of distributed breeding pigs since the beginning of the project till 28th February 1983 has reached (1506) heads. It is a great pleasure to see that these breeding stocks are playing an active part in all over Burma.

However, the percentage of breeding stocks in the shipped pigs has declined recently. Since 10th Mile Farm holds a position of breeding farm, promoting the selling of breeding stock and contribution to level up the pig industry of Burma is expected.

(6) Breeding

Though the 10th Mile Farm holds a position of a breeding farm, it does not yet have the steps for full scale genetical improvement.

The selection program carried on at present is shown in the following chart.

The main purpose of this program is the maintenance of the purebred and through 3 selections, replacement breeding stock for 10th Mile Farm are selected.

The basic criterions of selection are to have the desirable body type and condition as breeding stock, to be suitable for the maintenance of the purebred and growth rate as a meat production performance.

Birth	10 days	3 months	5 months
	1st selection	2nd selection	3rd selection
Selection items	(Pedigree ((No. of teat ((Genetic deformity	Body type	(Body type ((Daily gain

(B) POULTRY SECTOR

This Project, which was started in 1978 at the 10th Mile Farm, performed as its first step, investigation and choice of suitable breeds, house style and feeding management. Both the pure line brought in from Japan and the crossbred has shown favorable efficiency. Especially the layer crossbred has shown high laying performance which has not been seen in this country before.

As the second step, these layer crossbred were given the name of Burma-Norin, and day-old chicks were supplied to LDMC farms, military farms and individual poultry raisers. At this time, the females of the Burma-Norin were crossbred with the males of broiler breeder, white Cornish, and meat purpose chicken were produced. These are given the name of semibroiler. The demand for semibroiler was expanded rapidly with the military farm as the center and it exceeded the possibility rate of supply. Moreover, at this time, the pure line was not brought in with complete situation of female and male.

For the third step, the pure line was supplied from Japan with complete female and male together. Genetic improvement for breeding stocks was began at 10th Mile Farm so as to stop the decline in efficiency of Burma-Norin as well as Semi-broiler. Pure line was supplied to layer breeding stocks in July, 1981, and to broiler breeding stocks in April, 1982.

(1) Poultry House

At present (end of February, 1983), poultry houses possible for usage and their possible capacity of amount of poultry is as shown in Table (14).

Since the number of adult females, in general decides the production rate of that farm, the capacity ability of the laying house should be in balance with the capacity ability of the brooding house. There is no problem for the capacity ability, since the smount of brooding house has

been increased for the enforcement of isolated brooding.

When growing house is compared to the laying house, it is 54 birds to 23 birds. Therefore, the capacity ability of laying house is a little low.

The possession of breeding stocks at present is 5 strains but soon it will be 6 strains. Individual performance test is necessary for selection of these. One laying house for one strain is needed, though it will take a long time to accomplish that. Since it is pure line, poultry house for the accommodation of male is necessary.

Burma-Norin as well as RIR has been produced at floor breeder house and Semi-broiler has been produced mostly at cage laying house, and there will be a few changes in the condition. Therefore, immediate counterplan is necessary.

(2) Introduction of Breeder Stocks (Day-old chicks)

The day-old chicks imported since November, 1978, to February, 1983, is as shown in Table (15), totaling a number of 8986 birds; out of which 3246 birds are male and male and 5740 birds are female. Besides these, in April 1983, there is a plan to import 1400 birds of day-old chicks.

Commercial day-old chicks produced from these bird as parent until now can be divided into five kinds

Purpose	Crossbred Name	Mating System
Layer	Burma Norin	WL * RIR
Layer	RIR	Pure line 06 strain
Meat	Semibroiler	WC * Burma Norin
Meat	Broiler Semibroiler	WC * Semibroiler
Meat	Pure broiler	WC * WPR

Besides, there 2 kinds of shaver male were introduced in September 1982. If this is included the possession of strain at present is as follows.

Layer : 06, 11, shaver 288, shaver 566.74 (in plan)

Broiler: 71, 41, 21

(3) Management Technique

The effect of proper management is much greater than the effect of selection according to correct data.

Poultry industry which uses modern facilities is the production comparatively near to industry in animal husbandry. Therefore, feeding management as a kind of system decides the natural environment, the structure of poultry house with its center which is the physiological requirement of the chicken.

The feeding management system which is used at the farm at present, was established 1~2 years after the beginning of the Project. (Figure 4).

When the conditions of poultry sector of that time and present time are compared, the following different points can be approved of.

- a) The laying performance of flock is generally lower at present, and sexual maturity is also late.
- b) The number of poultry before was half of the present one (about 3000 4000).
- c) There were no pathogenic bacterias, because disinfection was completed before importing breeding stocks. All the previous groups of poultry were reduced gradually until they were gone. The following points can be considered as the causes for these.

- 1) The contents of technical transfer by experts changed from the improvement of feeding management to breeding finally. Also the number of poultry has increased. Therefore, the technical level of feeding management could not be performed well enough.
- 2) Together with the requirements of the Burma-Norin and Semi-broiler, importance was set on the production of these and maintenance of conditions of sanitation was neglected.
- 3) Together with the renewal of the generation replacement of breeding stocks, some genetic abilities decreased.

But in case of (2) above, construction of brooding and housing plan and its enforcement; in case of (3) above, breeding with selection can all be solved. Concerning (1), it can be solved by changing some parts of the feeding management system in correspondence to the flock requirement.

Of course, these three points are not independent, but somehow or the other, has a deep relation between each other.

The important decision points are as follows:-

- (1) In the growing period, it is important that flocks' average body weight and variance are set within the target of the final

stage by controlling of daily feed amount according to the result of measured body weight.

For example, 20 weeks old body weight is one of target in the growing period and should not be the result of habitual feeding.

(2) The following works should be completed two-three weeks before the laying starts.

i) Transferrance to laying house.

ii) Alteration of debeaking.

(3) Change from growing feed to laying feed is not 120 days old, but should be decided at the condition when laying starts.

(4) The feed amount is decided by the result of challenge feeding or body weight.

(4) POULTRY POPULATION

From 30 November, 1978 to February, 1983, the number of day-old chicks brooded at the 10th Mile Farm is as shown in Table (16). The yearly number of adult female chickens is as shown in Table (17). The times of brooding according to year (does not include irregular ones) is as follows:

Year	Times
1978 - 1979	2
1979 - 1980	13
1980 - 1981	24
1981 - 1982	27
1982 - 1983	

From 1980 - 81, the brooding is more than twice per month. In the brooding house, more than two kinds of flock which have difference in day age is put in at the same time. It resulted in an outbreak of disease and is dangerous. The main reason is because the transmission of maternal antibodies declines and it is the period when the resisting power is weak.

Therefore, construction of brooding and housing plan and construction of isolated brooding house are necessary.

The number of adult females have increased in order during the period of four years. The capacity ability of poultry house has more than the numbers, if the present year average of capacity ability of female

number is measured, with not taking the two birds per cage system. For 8050 birds, if it is the cage system, it would be 2 birds per cage and would number 13600 birds. But in reality, since there is the breeding stocks, 2 birds per cage cannot be applied for. There is a limit of 11000 birds.

(5) Production and Distribution

Since the beginning of the Project till February, 1983, the production of eggs and day-old chicks are as shown in Table (18) and (19). In the year 1982 - 1983, the number of females have increased and in spite of this, (Table 17), the number of produced eggs have not increased. The cause is thought to be of as follows:-

- a) Total decrease in egg-laying rate of birds.
- b) Increase in number of low egg-laying birds such as Semi-broiler and broiler breeding stocks. The production of day-old chicks of RIR and Burma-Norin is stagnant compared to the remarkable quick increase of Semi-broiler. The RIR is a pure line which has lower rate in egg laying and late sexual maturity than the 11 strain. But it has been distributed as a commercial stock because of much demand on its brown shell color. The 11 strain, because of its white egg shell, does not have a demand. The production rate for the year 1982 - 83 is only Grand Parent stock (G.P.) and Parent Stock (P.S.).

(6) Breeding

After the starting of the Project, a number of raising management as well as other transfer of techniques were enforced and crossbred was chosen as suitable for Burma. The techniques improving flock performance by selection are also transferred.

a) Choice of Crossbred:

For this purpose, the crossbred raised at 10th Mile Farm became more than 10 kinds, such as for egg laying and for broiler. From among these, 11 x 06 is chosen as egg laying, and for broiler (WC x 11.06) was chosen and used up to present. The result is made clear in Table (19).

b) Selection of Birds:

At the beginning of the Project, as a daily management technique, (outlook of chicken, deformity, comb, color, of leg, length between pubis) which are for differentiation of egg laying as well as raising

technique transfer was enforced. This object omits the non-economical bird from among the group and raise the earnings of the group. This technique is still used at present, and is an important factor on the side of the administration.

For practical performance, a number of reasons are given and though it is not enough, once a week a day should be decided for selling out and if not, other means are necessary.

Concerning the afterwards of importing male and female lines, only the high performance birds are selected according to their individual records, and for contributing to the production of next generation-enforcement in transfer of technique for good line is carried out. This transfer of technique is not completed as yet, but by good feeding management if variation of environment is limited, there is a possibility of being able to choose effective ones. But in reality, prevention of outbreak of diseases, inequality quality of feed, un-uniformity of techniques among persons in charge of the breeding administration, are the unsolved problems in performing breeding of pure line.

The breeding work in poultry sector is to collect the data from many sections in one place, and analyse them systematically. Then the total amount of desk work is enormous.

When performing breeding, in future at 10th Mile Farm, organization responsibility is necessary for such works.

c) Recording:

To record flock and individual performance, work was started at the same time with the importation of the first group.

By using these data, there is a possibility of improvement of daily management, selection and comparative efficiency among flocks. The measuring program used at present at 10th Mile Farm is shown in Figure (5). The records and the relation of breeding is shown in Figure (6).

d) Performance of Flock:

The efficiency of poultry raised at 10th Mile Farm is as Table (20). When compared to brooded numbers of birds in Table (16), there is a great difference in the number of birds. This is because of incompleteness of collecting data, sales, insufficient recording during this period.

When compared with the result from Japan as shown in Table (21), there is a special feature concerning the smallness in the weight of the egg, at 10th Mile farm. This is thought to be because of the high temperature environment. When the present results are compared to those at the beginning of the start of the Project, there is a decline in laying rate and delay in the sexual maturity. The causes for these are already stated in the feeding management chapter.

e) Crossbred Production Plan in 10th Mile Farm:

Though at present there is a position in 2 strains of egg laying and 3 strains of broiler, there is a plan to import another kind of egg laying in the near future. The combination used at present is besides Burma-Norin (11.06) as well as Semi-broiler (WC x 11.06), the ones on Figure (7) are considered.

Concerning the meat purpose, chicken if large size are desired, then the desire for pure broilers would be hopeful. As for the layer, combination using a few of the three strains 11, 06, 74 is considered, but in Japan 11 x 06 has a good result as shown in Table (21).

f) Breeding of Pure Line:

The flow chart of breeding of pure line at 10th Mile Farm is as shown in Figure (8). If 10th Mile Farm is to be a farm of breeding, there is a necessary for enough poultry houses and high degree of breeding techniques.

(7) Transfer of Modern Technology

The basic transfer of techniques for feeding management and others have almost completed.

a) Chick Sexing: (Sexing of Day-old chicks)

Chicks sexing was performed from 17 Jan. 15 Feb., 1979 for the first time, and the second time from 17 Jan. 18 April, 1980, by sexers who came to Burma from Japan and thus this technique was transferred.

This technique is the best one to separate male and female in the day olds and it was begun in Japan. At the 10th Mile Farm, ten persons have learnt this technique, but at present only three persons continue working.

Moreover, if this technique is not used constantly for sexing, the level will begin to decline. Therefore, it is important to send, at the earliest opportunity, two persons of the sexing group to Japan

for about ten months to one year for practical training.

b) Artificial Insemination:

This is necessary together with the production of Semi-broiler and the techniques have already been transferred. At present at the 10th Mile Farm, 1000 - 2000 female birds per day are applied artificial insemination for producing Semi-broiler. It cannot be said that 75 - 80 degree of fertility is good. To maintain the fertility more than 90% and to perform artificial insemination to 100 - 2000 birds per day, to maintain completely the number of members necessary for artificial insemination, and to inject the female as soon as possible after the collection of semen.

(8) Subject Hereafter

Please note carefully the following points, which are to be considered as the subjects hereafter for the poultry sector.

a) Concerning the breeding house:

If the brooding house, which are under construction now, are completed, strengthen the isolation system in 10th Mile Farm.

b) Use the method of controlling body weight during growing period, as it has an efficient effect when the bird is well grown. Therefore, execute this body weight control technique.

c) Management of sick birds and bad birds:

These kinds of birds should be quickly sold out or disposed by killing. This would strengthen the part on hygiene and the selling capability and disposal by killing.

(C) ANIMAL HYGIENE SECTOR

The construction of an Animal Hygiene Laboratory was delayed in a big scale and was only completed in January, 1982. Until the arrival of the experts of the animal hygiene sector to Burma in August, 1981, animal hygiene works were done by each expert.

(1) Animal Hygiene Counterplan until the arrival of the Experts of Animal Hygiene Sector to Burma

a) Pig Section:

At the beginning, emphasis was given to heat prevention counterplan and effort was made for the improvement of environment. As for the

prevention of illness counterplan, abnormality was discovered at an early stage and complete treatment was given. Together with this, washing of pig houses, repetition disinfection and enforcement of periodical vaccination was done.

As counterplan for prevention of reproductive disturbance, during the time of artificial insemination, hygiene administration treatment was given.

b) Poultry Section:

At the beginning, emphasis was given to better environment.

Investigation was done to all the groups which have been already raised on the farm and enforcement on blood examination was done.

Post mortem examination was performed on the death. As a result, it was made clear that pullorum disease and mycoplasmosis positivity rate was very high.

Repetition of disinfection and reducing of all groups were done completely before the chicks were brought in from Japan.

Even after the importation of chicks, hygiene counterplan was perfected, periodic diagnosis of pullorum disease, mycoplasmosis, was done.

Maintenance of health of all groups was carried out by preventing vaccidiosis and by giving various kinds of vaccination.

(2) Animal Hygiene Counterplan carried out by Hygiene Experts after arrival in Burma

a) Re-examination as well as decision for the Hygiene Program:

(See Table 22)

The already enforced hygiene program was re-examined, and as a result, the already enforced was continued to be used, but re-examination of subdivisions by different methods was strengthened.

b) Early stage discovery of Disease and its prevention:

(i) Blood Examination

(a) Pullorum Disease: - Plate agglutination test was carried out for 10% of day old chicks, 30 days or 70 days' old and for all 150 days' old. For those with positive reaction, plate agglutination test, tube agglutination test, Agar Gel precipitation reaction was enforced by serum.

(b) Mycoplasmosis (Gallisepticum and Synoviae): - Taking the 10% of day old, 30 days, 70 days, 150 days' old as the subject,

plate agglutination test was carried out, and for those with positive reaction plate agglutination test by serum and tube agglutination test was enforced.

- (c) New Castle Disease:- HA HI test was carried out for the established investigated group.
- (d) Brucellosis:- With breeding stock as subject, plate agglutination test was carried out and for positive reaction, tube agglutination test was enforced.
- (e) Toxoplasmosis:- With breeding stock as subject, H.I. Test was enforced.
- (f) Others:- With breeding stock as subject, inspection was done for Japanese Encephalitis and Parvo Virus Infection.

(ii) Parasitologic Examination

- (a) Poultry:- Inspection was done every month from floor poultry house to pick-out random.
- (b) Pig:- Inspection was done once every three months, of pig houses, one picked out after another.
- (c) Post Mortem Examination:- The cause of disease is examined and performed as soon as possible and detailed bacteriological examination was done when necessary.

(iii) Haematologic Examination

Inspection was carried out with sick pig as subject. Assistance was given so that effective medical treatment could be given.

(iv) Destruction of Harmful Animals

Enforcement was done at all times for destruction of stray dogs and field mice.

(v) Water Administration

With water supply within the farm as subject, bacteriological examination was done and administration of clean water supply was done.

(vi) Enforcement of Training Course of Animal Hygiene

Enforcement of practical training and lecture on basic animal hygiene is carried on by Farm Manager Training Courses of LDMC and also by short-term training courses on farm.

(3) Transfer of techniques

The electricity and water equipments with the hygiene laboratory was completed in January, 1982, five months after the arrival of the animal hygiene experts to Burma.

Moreover, since the machine parts which have been sent before were kept for a long time in the store house, a lot of damage was done due to the rats. Therefore, the first duty was in repairing and fixing these machines.

But since these parts are the basic parts of the laboratory, there was insufficiency in testing apparatus and various kinds of medical (diagnosis) liquids. These were no reagents and the necessary amount had to be provided from Japan.

Since transfer to techniques had to be done under such circumstances the theory and practical techniques do not always agree.

But, transferring to techniques for the following has been done.

a) Virological Examination: (See Table - 23).

Pullorum disease, Mycoplasmosis, Brucellosis, Toxoplasmosis, Parvo Virus infection, Japanese Encephalitis, New Castle disease.

b) Method of Inspecting Parasite: (See Table - 24).

Direct method, Floating method, Precipitation method, Counting E.P.G.

c) Diagnosis of Post Mortem Examination: (See Table - 25)

d) Basic Bacteriologic Examination:

e) Basic Haematological Examination:

(4) Future Problem Points and Subjects:

Some equipments for the hygiene laboratory were complete when the animal hygiene experts came to Burma. But, it is in a situation where there were no equipments for examination and also no reagents.

Later, though work was accomplished with some equipments bought from Bangkok and some under request, the number was still very few.

Although almost all equipments were included in the budget of 1982, the arrival of the equipments were delayed in large scale. Basic technical transfer was finished but practice of techniques was not established in a short period. In such circumstances, if the future problem points and subjects are to be mentioned, they are as follows:-

a) The counterparts are thought of as not having done basic experiment and training as course work in high school education. Therefore, there is a tendency to swallow whatever is taught. Moreover, they

are not used to having a doubt of 'why' in basic science. As a result, most adaptation cannot be done.

Though they are able to apply whatever they have learnt directly, if there is a slight change in the circumstance, they are in doubt whether they can expand the technique or not. If one staff of animal hygiene laboratory can go on a fellowship training to Japan, he or she will be able to transfer to his fellow staff, the practical techniques he would have learnt there.

- b) 10th Mile Farm has an aim of producing pure breed for the development of Burma's livestock industry. If the stock forwarded from this farm is smudge with disease, there is a possibility that it would spread to the whole country.

Even after the completion of the Project, some kinds of antigen for diagnoses should be maintained without fail, and should be checked strictly in order to distribute healthy livestock. It is a necessity to call strictly if positive sign is shown as a result of the diagnosis.

- c) As can be seen as result of each blood examination, 10th Mile Farm which was perfect 2 - 3 years ago, has evaluate in showing positive signs in contagious diseases little by little. This probably is due to the fact that quite a number of excursion groups have visited the farm which is an advanced technique farm of the LDMC. Besides the dirty circumstances of the surrounding has invaded gradually.

Therefore, quick investigation is necessary so that consideration should be put on the hygiene of livestock when making courses for the excursion groups and admission.

(D) FEED SECTOR

At the end of 1978, an eave was added temporarily to the roof of the storage so that space was made for the setting of feed mixer and feed grinder. And making of formula feed of pig and poultry to be used at the farm was started. With the completion of the feed mill in January 1981, full scale formula feed production was started. Manufactured feed is a formula feed, for pigs and poultry, and Premix.

At the beginning the produced formula feed was only for the 10th Mile Farm, but from June, 1982, it was sold outside of the farm since the production amount was increased rapidly even up to now.

Moreover construction of a nutrition laboratory was started in

Aug. 1982, and it would be completed in the near future. When this is completed, the laboratory can be used for analysis of feed and design of formula feed. Transfer of modern technology is thus begun in this way.

(1) Design of Formula Feed:

The rate of feedstuff, because of the condition of supply of feedstuff and of the decrease in cost, together with the formula feed of pigs and poultry was altered several times.

The percentage of formula ration used at present is as shown in Table (26) and (27).

The sample of analysis of feedstuff and formula feed has been sent to Japan. The result is as shown in Table (28) and (29) as well as.

The problem which arise here is concerning the green feed which represents the alfalfa meal and its supply is now completely unable to get.

As can be seen from Table (28) and (29), because of the unstableness of ingredients of feedstuff, the analysed value of formula feed are not uniform. Therefore transfer of technique in analyzing and design are necessary.

(2) Production and distribution of Feed.

The produced amount of formula feed as well as premix are as shown in Table (30) and (32).

Among these, the distributed amount of formula feed and premix are shown in Table (31) and (33). The supplements used in producing this formula feed was supplied by Japan in the budget of 1981 and that was the last.

Up to February 1983, the remaining amount is as shown in Table (34). As can be known from the table, most of the supplements were supplied by LDMC Head Office.

As this, the production of formula feed at 10th Mile Farm can be considered as of being on the right track.

(3) Nutrition Laboratory

The nutrition laboratory which was started in August, 1982, might be completed in March 1983, and is now waiting for the arrival of the analyzing equipments sent from Japan.

This nutrition laboratory is equipped with analyzing equipments

for the ingredients of feedstuff and formula feed such as protein, fat, fiber, nitrogen free extract (NFE), and minerals. For Burma, it will be a development of new feedstuff which is expected to have a great contribution to the development of animal husbandry.

(4) Transfer of Modern Technology

Feed sector can be divided into three parts such as production administration, design for formula feed, analysis of feedstuff and formula feed. The transfer of technique is roughly as follows:-

a) Production Technique:

Production technique has been almost transferred. Hereafter, it is necessary that the establishment of method to produce high quality formula feed stably.

b) Design of Formula Feed:

The design of formula feed used at present is planned by the Japanese experts, the technical transfer is, the second stage after nutrition laboratory will be established.

c) Analysis of Feedstuff:

It is important to know the ingredients of formula feed for the pigs and poultry. With the completion of the nutrition laboratory, the technique of analysis of feedstuff would be obtained.

(E) BASIC FARM MANAGER TRAINING COURSE

Basic Farm Manager Training Course sponsored by LDMC was first held at 10th Mile Farm from 10th Nov. 1981 to 27th Feb. 1981, with 60 persons attending. At present the fifth course has finished.

As for the subjects of this training course, lectures were given by the experts of this project, and at the beginning one expert carried on about an average of more than 50 hours, and this hindered some parts of duties which are the main duties of the experts. Since the second training course, one expert instructed about an average of 30-40 hours.

The training subjects, the number of trainees and the term is as shown in Table (35).

VI. SUMMARIZATION

Preface

This project, which was started on 12th April, 1978, was to finish on 11th April, 1982, but was extended a year at the request of the Burmese government and is to be completed on 11th April, 1983. In re-collecting the period of five years, it can be divided, having October 1980 the replacement of team leaders as cardinal point, as the former period from September 1978 to October 1980 and the latter period from October 1980 and the latter period from October 1980 to April 1983.

(A) THE FORMER PERIOD

The main works of the former period can be given as below:-

- (1) Improvement of environment and basic land readjustment.
- (2) Introduction of breeding stocks from Japan.
- (3) Transfer of basic techniques of breeding administration.
- (4) Transfer of techniques of artificial insemination.

The former period stresses the importance of clean environment for breeding of livestock, and the necessity of complete washing and disinfection of sheds before introducing the livestock. The transfer of this basic technique was done in the former period. This transfer of techniques was with success. The transfer of the technique of feed and water supply was done once but application is still not enough.

The prophylactic measure (Diagnosis and Vaccination) was performed according to the prevention program, and technical transfer was done. When there is an insufficiency in some enforcement, this can be improved by repetition.

Though effort has been given to the promotion of improvement of environment and basic land readjustment together with the all times' discussion, it was delayed according to various circumstances, but would be solved in the near future.

The transfer technique of artificial insemination has succeeded, but in practice, handling of utensils, dilution of collected semen and injection of semen still need to be studied.

In such a case of breeding stocks, the knowledge and transfer of techniques, which is understood by the counterparts in the former period, is with success.

(B) LATER PERIOD

The main works of the latter period is as follows:-

- (1) Complete practice of transfer of technique of the former period.
- (2) Improvement and breeding of breed and production.
- (3) Promotion of delayed completion of sheds and establishments.

Emphasis was led on the completion of transferred techniques of the former period, together with the improvement and breeding of breed and production. On the other hand, promotion of delayed completion of sheds and establishments, was carried out.

Out of the techniques transferred in the former period, the counter parts were able to perform well, the following points:-

- (1) Water supply and disinfection sheds.
- (2) Vaccination and diagnosis according to epidemic program.

A little more effort is needed for the following points. These will be solved very soon, when experience is accumulated.

- (1) Adjustment of water supply and feed by observing at the condition of the livestock.
- (2) The number of days in collecting, dilution and injection of semen in artificial insemination.
- (3) Counter measures to daily feed and management in relation with observation of breeding and abnormality.
- (4) Handling of products.

Concerning the improved breeding of pigs and poultry, although the transfer of techniques, analysis of various data have begun, experience is poor and practical use as well as application of data is insufficient at this stage.

The transfer of technique of mating plan coefficient of relationship factor, which is the maintenance technique of pure breed, as well as selection basis has been completed. Effort is needed hereafter.

For the completion of the already delayed construction of sheds and establishments, though haste was encouraged, completion of all was impossible due to various circumstances. Because of the unfinished sheds pigs and poultry were kept in an over crowded situation and this hindered the occurrence of vice, immediate cause of sickness, decrease of performance and smoothness of production plan.

As for the establishments, though hygiene laboratory and processing plant were accomplished, for the Nutrition Laboratory, the inner parts of machines and equipments to be attached are still not completed. And so, full use could be made only after setting.

As mentioned above, the basic transfer of techniques for both the former and latter periods are completed is thought to be with great success.

Application through experience with these basics is expected hereafter.

Improvement of environment, basic land readjustment and unfinished sheds are expected to be done at the earliest possibility.

(C) MATTERS OF MAIN PROBLEM IN THE FORMER PERIOD AND LATTER PERIOD

The problem points of the former period and latter are as follows. These are expected to be settled in the near future (except for points 4 & 5).

- (1) The unfinished sheds were delayed in large scale.
- (2) Was not able to maintain the few limited number of members for each section.
- (3) Shifting of members of each section was intense.
- (4) The experts had to attend to lots of other works besides the main duties.
- (5) Annual Joint meetings could not be performed as planned.

(D) PROBLEMS HEREAFTER

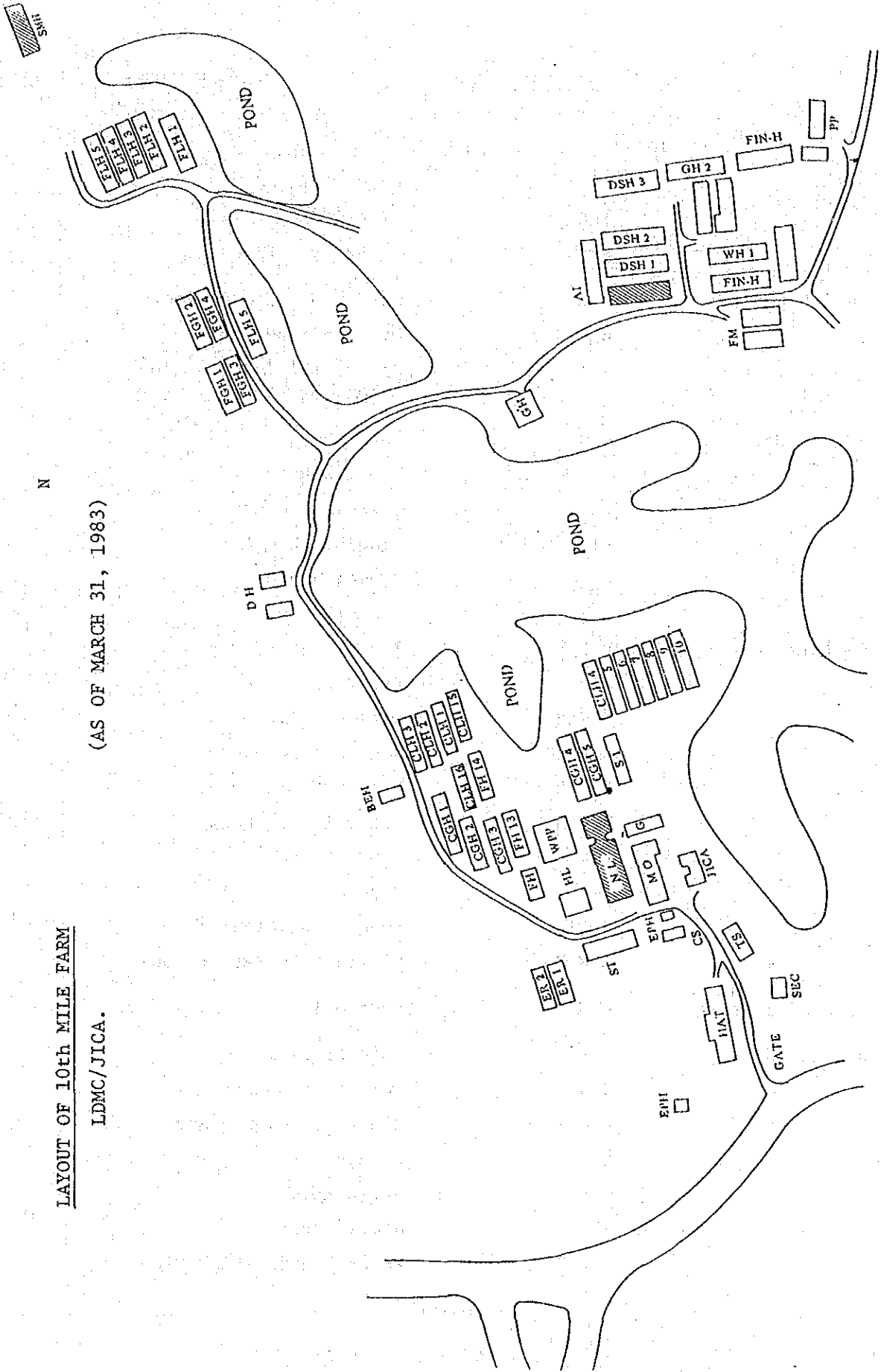
The concerned matters after the completion of the Project are mainly as follows. How these should be accomplished should be sufficiently investigated.

- (1) The delay of shed constructions.
- (2) Supply of medicines, vaccine, etc., necessary for the hygiene of livestock.
- (3) Continuation of long term maintenance for breeding stock (pigs and poultry), avoiding in-breeding
- (4) To clarify the hole of the 10th Mile Farm.
- (5) Arrangements of branch for the 10th Mile Farm.
- (6) To fix the period of service for the counterparts.
- (7) To maintain the few limited number of necessary members at each section.
- (8) Inspection of machines as well as equipments.

LAYOUT OF 10th MILE FARM
LDMC/JICA.

(AS OF MARCH 31, 1983)

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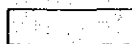


LAYOUT OF 10TH MILE FARM

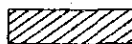
(AS OF MARCH 31, 1983)

LDMC/JICA.

Office	M O	Main Office
	JICA	JICA Office
	SEC	Security Office
Laboratory	N L	Nutrition Laboratory
	H L	Hygiene Laboratory
	A I	Artificial Insemination Laboratory for pig
Pig Sector	B H	Boar House
	D S H	Dry Sow House
	F H	Farrowing House
	FIN. H	Finisher House
	G H	Grower House
	W H	Weaner House
Poultry Sector	B E H	Broiler Experiment House
	B H	Brooding House
	C G H	Cage Growing House
	C L H	Cage Laying House
	F G H	Floor Growing House
	F L H	Floor Laying House
	F H	Floor House
	HAT	Hatchery
	P P	Processing Plant
	S M H	Single Male Mating House
Feed Mill Sector	F M	Feed Mill
Others	C S	Cold Storage
	D H	Dormitory House
	E P H	Electric Power Plant
	G	Garage
	G H	Guest House
	ST	Stove House
	W P P	Water Purification Plant



Completed



Under construction

BUILDING OF JICA PROJECT

No.	Description	Authorized Qty	Completed Qty	Under Construction Qty
1.	Domestic Housing:			
1.	JICA Office	1	1	-
2.	Main Office	1	1	-
II.	Pig Sector:			
1.	Boar House Type A	1	1	-
2.	Boar House Type B	1	-	-
3.	Weaner House	1	1	-
4.	Dry Sow House	4	3	1
5.	Grower House	2	2	1
6.	Finisher House	3	1	1
7.	Farrowing House	2	2	-
8.	Disinfection Room	1	1	-
9.	Cold Storage	1	-	1
10.	Farm Gate Entry	-	-	-
11.	Testing House	1	1	-
12.	A.I. Laboratory	1	1	-
III.	Poultry Sector:			
1.	Incubator House	1	1	-
2.	Brooder House	2	1	1
3.	Breeder House	11	6	1
4.	Grower House & Model House			
	(a) Model Grower House	9	5	-
	(b) Floor Grower House	4	4	-
	(c) Model Layer House	10	10	-
	Dispensary	-	-	-
6.	Poultry Processing Plant	1	1	-

No.	Description	Authorized Qty	Completed Qty	Under Construction Qty
III.	Poultry:			
7.	Stand-by Power Plant	1	1	-
8.	Disinfection Gate	1	1	-
9.	Farm Gate Entry	1	1	-
10.	Incinerator	3	3	-
11.	Broiler Experimental	2	1	-
12.	Dropping Storage House	1	-	-

Table 2:

Particulars	No.	Capacity
Boar House	1	25
Dry Sow House	4	200
Farrowing House	2	44
Weaner House	1	200
Grower House	2	300
Finisher House	2	300

Table 3: Number of Supplied Breeding Pigs from Japan.

Breed	1st arrival			2nd arrival			3rd arrival			Total		
			T			T			T			T
Berkshire	3	13	16	2	13	15	1		1	6	26	32
Duroc	3	17	20							3	17	20
Landrace	5	24	29	5	38	43		3	3	10	65	75
Large White				3	28	31	2	7	9	5	35	40
Total	11	54	65	10	79	89	3	10	13	24	143	167

Table 4: Comparison between new and old formula (Grower A) ration in Growth and Feed Conversion of Pig.

For- mula	No. of group	No. of pigs	Average body weight		Avg. gain of body weight	Avg. feed intake*	Feed Con- version*
			at beginning	at end			
New	4	33	9.78 kg	15.99 kg	6.21 kg	18.34	2.95
Old	4	34	9.08	14.44	5.36	18.16	3.38

Testing period is 32 days.

* There were some Feed lost on the floor, so feed conversions are not correct.

Table 5: Comparison between new and old formula (Grower B) ration in growth and feed conversion of pig.

Formula	No. of pigs	Average body weight		Avg. gain of body weight	Avg. feed & intake*	Feed Conversion*
		At beginning	at end			
New	10	16.7 kg	29.2	12.5	45.5	3.64
Old	10	17.3	28.9	11.5	45.5	3.92

Testing period is 40 days.

* There were some feed lost on the floor, so feed conversions are not correct.

Table 6: Changes of Pig Population (at the end of the month).

Item	1979		1980		1981		1982		1983
	Jan.	Jun.	Jan.	Jun.	Jan.	Jun.	Jan.	Jun.	Jan.
Boar									
Berkshire	3	3	3	4	6	7	7	10	11
Duroc	3	3	3	2	7	7	6	6	6
Landrace	5	4	4	8	10	16	11	11	11
Large White						3	3	4	6
Total	11	10	10	14	23	33	27	31	34
Sow									
Berkshir	13	12	12	12	14	27	34	32	31
Duroc	17	17	14	10	9	16	12	16	7
Landrace	24	23	19	19	25	42	44	32	36
Large White						10	15	15	19
Cross breed				4	33	37	41	37	29
Total	54	52	45	45	81	132	146	132	122
0 - 10 months old									
Gross Total	65	77	346	438	745	854	993	1065	1074

Table 7: Farrowing Results

Year	No. of Litter	No. of produced piglets	Average litter size			Mortality (%)
			at birth (include S.B)	at birth (alive)	At weaning	
1979/80	60	408	7.70	6.80	5.93	12.7
1980/81	133	978	7.96	7.35	6.29	14.4
1981/82	238	1791	8.11	7.53	5.87	22.0
1982/83*	202	1518	8.20	7.49	6.05	19.5
Total	633	4695	8.08	7.42	6.02	18.8

*Up to February, 1983.

Table 8: Interval from Weaning to First Recurrence of estrus.

Year	No. of sows	0 - 10 days	11 - 20 days (accumulation)	21 - 30 days (accumulation)
1981	183	35.0	11.5 (46.5)	12.6 (59.1)
1982	188	51.6	7.4 (59.0)	10.1 (69.1)
Total	371	43.4	9.4 (52.8)	11.3 (64.1)

Table 9: Effects of the hormone, boar contact and green feed on the interval from weaning to first recurrence of estrus.

Treatment*	No. of sows	0 - 10 days	11 - 20 days (accumulation)	21 - 30 days (accumulation)
Control	37	48.6	13.5 (62.1)	2.7 (64.8)
G	10	50.0	0 (50.0)	20.0 (70.0)
G + B	11	54.5	18.2 (72.7)	9.1 (81.8)
G + B + H	18	83.3	0 (83.3)	0 (83.3)

* G: Green feed, B: Boar contact, H: Hormone (PMS)

Table 10: Growth Rate of Piglets in 1982.

Breed of piglets	Average body weight at			
	birth	30 days	60 days	90 days
Berkshire	1.42	6.46	13.1	21.2
Duroc	1.35	5.28	10.8	14.6
Landrace	1.45	6.17	11.2	19.4
Large White	1.45	6.28	13.2	22.4
Crossbred	1.39	5.95	12.9	21.5
Total	1.42	6.14	12.4	20.8

Table 11: Growth rate of finisher in 1982/82 ($\bar{x} \pm S.D.$)

Season*	No. of pigs	Shipping		Daily Gain**
		Body weight	Age	
		kg	kg	g
Dry	15	87.0 \pm 15.2	267.1 \pm 68.7	320
Rainy	39	78.7 \pm 17.0	232.8 \pm 30.8	332
Winter	52	95.4 \pm 16.8	253.6 \pm 60.2	371
Total	106	88.1 \pm 18.2	247.8 \pm 53.7	350

* Shipping month: Dry, March & April, Rainy; July & August, Winter; December & January.

** Daily gains are calculated in the period from birth to shipping.

Table 12: Feed Conversion and Growth Rate of Finisher investigated in 1981.

No. of pigs	Testing period	Body weight		Feed intake	Daily gain	Feed Conversion
		at beginning	at end			
	days	kg	kg	kg	g	
14	74	51.9	106.9	162.9	743	2.96

Table 13: Distribution of Breeding Stock & Pork Pig.

Year	Breeding Stock			Pork Pig			Total		
			T			T			T
1980/81	154	196	350	166	57	223	320	253	573
1981/82	243	444	687	214	63	277	457	507	964
1982/83*	229	329	558	373	152	525	602	481	1083

* Provisional

Table 14: Number of Houses and Their Capacity.

House Name	Type	No.	Bird No.	Period	Capacity
				(day)	(bird/day)
Brooder	Battery Floor	3			
Grower	Cage Floor	5	2500	120	54
		14	6000		
Laying House	Cage Floor	12	6200	420	22
		6	3000		

Table 15: Introduced Day-old Chicks Number (Up to 31st March, 1983).

Arrival Date	Breed	Strain	Bird No.	
			Male	Female
30th Nov. 1978	WL	62	207	-
"	"	11	-	196
"	Crossbred	11 x 06	-	1013
21st Dec. 1978	RIR	06	248	1066
"	WC	G	82	-
27th Jul. 1979	Crossbred	G x H	96	104
29th Nov. 1979	WL	62	187	-
"	"	11	322	-
"	RIR	06	206	-
"	Crossbred	11 x 06	-	513
31st Jan. 1980	WC	G	102	-
"	WPC	H	-	509
26th Jun. 1980	WC	G	313	-
13th Nov. 1980	WL	11	313	-
2nd Jul. 1981	WL	11	210	418
"	RIR	06	210	421
2nd Apr. 1982	WC	G	200	200
"	WPR	S	100	220
"	"	S	175	300
22nd Apr. 1982	WC	G	200	200
"	WPR	S	75	330
"	"	S	-	250
Total			3246	5740

WL : White Leghorn

WC : White Cornish

RIR : Rhode Island Red

WPR : White Plymouth Rock

Table 16: Brooding Number in 10th Mile Farm (Up to 28th Feb. 1983)

Breed	Strain	Male	Female	Mixture	Total
WL	11	2172	836	1936	4944
"	62	394	-	-	394
RIR	06	1531	14911	3722	20164
WC	G (71)	897	400	-	1297
WPR	S (41)	175	550	-	725
"	S (21)	175	550	-	725
"	H	-	509	-	509
Crossbred	11 x 06	1259	16902	2145	20306
"	62 x 11.06	-	1424	-	1424
"	S.B.	1170	2270	13102	16542
"	P.B.	96	104	1950	2150
"	Shaver	100	-	-	100
"	Hubbard	232	515	106	853
Total		8210	38971	22961	70133

S.B.: Semi Broiler; it includes Broiler Semi Broiler.

P.B.: Pure Broiler

62 x 11.06 includes 62 x 06 and 06 x 11.

Table 17: Population of Adult Female in 10th Mile Farm.
(Up to 28th Feb. 1983)

Year	Breed						Total	Plan
	11	06	11 x 06	S. B.	P. B			
1979 - 80	-	-	-	-	-	2367	-	
1980 - 81	-	-	-	-	-	4741	-	
1981 - 82	168	3295	2904	217	83	6667	7192	
1982 - 83	513	3564	3233	354	344	8008	7032	

These values are estimated by closed bird number of each month.

Table 18: Yearly Produced Egg Number (Up to 28th Feb. 1983).

Year	Actual	Plan
1979 - 1980	492260	-
1980 - 1981	1047043	-
1981 - 1982	1546804	1828292
1982 - 1983	1453988	1868324

Table 19: Yearly Produced Day-old Chick Number (Up to 28th Feb. 1983)

Year \ Breed	Breed						Total	Plan
	11	06	11x06	62x11.06	S.B.	P.B		
1979 - 80	0	44329	27755	52811	10639	0	135531	-
1980 - 81	0	53281	47746	30344	20370	22952	174693	-
1981 - 82	0	36867	74521	0	188589	5229	305206	338658
1982 - 83	14887	52890	75766	0	279312	0	423855	620008
Total	14887	188367	225788	83155	498907	28181	1039285	-

P. B includes Hubbard chick.

Table 20: Flock Performance in 10th mile Farm.

Strain or Combination	Chicks No.	No. of Flock	Adult Viability	Day age at 50% of F.P.	Egg Production		Egg Weight (300)
					181 - 300	181 - 500	
G. P 06	417	1	96.2%	198 day	74.4 %	68.2 %	53.5 %
11	418	1	96.5	169	86.0	74.7	54.6
C. M 06	5480	10	91.5	192	67.3	65.3	55.7
11 x 05	9035	16	93.0	156	81.5	79.2	55.0

Broiler

Strain or Combination	Chicks No.	No. of Flock	Growing Viability	Adult Viability	Body (70 day)	Weight (300 days)	Feed Conversion	Sexual Maturity	Egg Prod SM-300	Egg weight (300)
61	561	2	92.2	84.3	-	3120	-	223	54.9	60.2
21	539	2	89.1	92.1	-	3750	-	224	58.6	59.4
C. M S.B	925	3	98.9	-	1580	-	2.17	-	-	-
		3			1370		2.26			
B.S.B	20	1	95.0	-	1890	-	2.16	-	-	-
	20	1			1570		2.40			
Pure	100	1	94.0	-	1910	-	3.01	-	-	-
Broiler	100	1	93.2	-	1800	-	3.54	-	-	-

Table 21: Flock Performance in Shirakawa National Livestock Breeding Station Japan.

Layer

Combination	Chick No. at start	No. of flock	Growing viability	Adult viability	Day ate at 5% of E.P	Egg Production		Egg weight	Body weight
						181-300	181-450		
11 x 06	578	6	98 %	95 %	145 day	90.9%	85.3%	61.3 g	1.99 g
06 x 11	200	2	99	95	160	83.6	75.9	61.7	1.99
74 x 06	149	2	100	97	152	89.2	81.8	62.4	2.05
06 x 74	97	1	99	97	156	82.2	75.2	62.2	2.01

Both Egg and Body weight are measured at 300 days old.

Broiler

Breed	Sex	Chick No. at start	Growing Viability	Body weight		Feed Consumption (1 - 63)	Feed Conversion (1 - 63)	Rate of dressed carcass
				(49 days)	(63 days)			
Foreign Breed	Male	500	97	2480 g	3440 g	6580 g	2.19	78.7
	Female	500	100	1980	2660			78.6
Produced in Hyogo Farm	Male	300	98	2400	3300	6230	2.17	78.7
	Female	300	100	1900	2510			78.3

This Broiler performance test was done from September to December, 1981.

Table - 22.

A. Blood Examination Program of Poultry
(Plate Agglutination Test)

Day Old	S.P.	MG.MS.
Starter	Cull bird	Cull bird
70 day old	10 %	10 %
150 day old	All birds	10 %

B. Vaccination Program of Poultry

day old	M. D	N. D	F. P	I. C	F. C
Starter	oHVT(S.C)				
7		oF strain (eye drop)			
10			o N strain (Wing WEB)		
14		oF strain (eye drop)			
30				o(I.M)	
42					o VRL (S.C)
70		oKOMAROV strain(IM)			
90			oN strain (Wing WEB)		
100				o(I.M)	
120					o VRL (S.C)
180		oKOMAROV strain(IM) *every 5 mths			*every 6 mths

M.D. : Marek's Disease
 N.D. : New Castle Disease
 F.P. : Fowl Pox
 I.C. : Infectious Coryza
 F.C. : Fowl Cholera

C. Medication Program of Poultry

Disease Medicine Age	Coccidiosis Coccidiostat ' Sulpha (ZOALENE) 10%	Mycoplasmosis Tylocin	Salmonella Frazolidon 10%
1 - 3	0.05% in Feed	. 0.5 g into 1 l water . 3 days	10 days ↓ 0.2%
16 - 18	. 1% in . Feed . 3 days		
28 - 30		. 0.5 g into 1 l water . . 3 days	0.1%
35 - 37	.		
50 - 52	.		
60	.	. injection (Breeder)	
80 - 82	.		
90	.	. injection (Breeder)	
120 140 - 142	.	. injection (Breeder)	↓ 0.05%
Adult	.		

D. Vaccination Program of Pig.

Hog Cholera	45 days old 6 months after first vaccination. 1 year after first vaccination.
Swine Erysipelas	45 days old once a year.
Foot and Mouth Disease	once a year.
Japanese Encephalitis	Before rainy season. for only gilt.

Table - 23.

I. Blood Examination in Poultry.

Period was separated as follows:

- 1) Oct. 1978
- 2) Sep. 1979 - Sep. 1980
- 3) Oct. 1980 - Oct. 1981
- 4) Nov. 1981 - Feb. 1983

A. *Salmonella Pullorum*

No.	Checked No.	+ ve	+ ve rate
1	39	18	46.2%
2	2,062	0	0
3	728	0	0
4	21,506	799	3.7

B. *Mycoplasma Gallisepticum*

No.	Checked No.	+ ve	+ ve rate
1	39	29	74.4%
2	2,062	13	0.6
3	597	3	0.1
4	3,896	124	3.2

C. *Mycoplasma Synoviae*

No.	Checked No.	+ ve	+ ve rate
1	39	16	41.0%
2	2,062	11	0.5
3	432	30	0
4	4,293	179	4.2

II. Blood Examination in Pig.

A. Brucellosis

(a) By B. Abortus Antigen

Date	Checked No.	+ve	Suspicious	+ve Rate**
Nov. 1981	135	0	0	0
*Jan. 1982	225	35	0	15.6%
Aug. 1982	67	6	13	28.4
*Dec. 1982	52	3	2	1.6
*Feb. 1983	193	0	3	1.6

(b) By B. Suis Antigen

Date	Checked No.	+ve	Suspicious	+ve Rate**
*Apr. 1982	186	4	29	17.7%
Jun. 1982	225	27		12.0
Dec. 1982	52	6		11.5

* = +ve samples were confirmed by Tube Agglutination Test.

+ve 1 : 40

suspicious = 1 : 20

** +ve Rate include suspicious.

B. Toxoplasmosis

Date	Checked No.	+ve	Suspicious	+ve Rate
Apr. 1982	186	24	8	17.2%
Aug. 1982	63	13	2	23.8
Mar. 1983	245	60	7	27.3

+ve \geq 1 : 64

suspicious = 1 : 32

Table - 24

Result of Parasitological Examination

A. Poultry

Period	Nov. 1981 - Feb. 1983
Checked No.	1,275
+ve	317
+ve rate	24.8%
Main Parasite	Coccidiosis, Ascaridis

B. Pig

Period	Nov. 1981 - Feb. 1983
Checked No.	247
+ve	138
+ve rate	55.8%
Main Parasite	Oesophagostonum, Coccidiosis Ascaridis

Table - 25

Post Mortem Examination

A. Poultry Sector

(a)

Year	No. of Deaths		
	Starter	Grower	Adult
Apr. 1979 - Mar. 1980	1,014	524	234
Apr. 1980 - Mar. 1981	4,456	504	1,111
Apr. 1981 - Mar. 1982	1,311	784	1,183
Apr. 1982 - Feb. 1983			

(b)

	Causes		
Starter	(1) Weakness	(2) Rate bite	(3) Omphalitis
Grower	(1) Weakness	(2) Cannibalism	(3) Coccidiosis
Adult	(1) Cannibalism	(3) Egg bound	(3) Lymphoid leucosis

B. Pig Sector

(a)

Year:	No. of Deaths	
	Piglet	Adult
May 1980 - Mar. 1981	134	39
Apr. 1981 - Mar. 1982	344	61
Apr. 1982 - Jan. 1983	307	27

(b)

	Causes		
Piglet	(1) Mother Press	(2) Weakness	(3) Agabactia
Adult	(1) Septicaemia	(2) Heat Stroke	(3) Cardiac Sismatitis

Table 26: Feed Formulation in 10th Mile Farm (Pig Sector)

	Price (Ks/Kg)	Adult (%)	Grower B (%)	Grower A (%)	Starter (%)
Broken rice	/53	55	53	30.8	31.8
Maize	1/27	10	11	33	31.5
Fish meal	3/72	3.5	4.5	6	8.5
Ground nut cake	1/03	5.0	5	8.5	10.5
Sesame cake	1/00	5.5	5.3	5	5
Rice bran	/47	20	20	15	11
Supplement					
Methionine	35/40	0.05	0.05	0.15	0.15
Lysine	38/00	0.1	0.1	0.2	0.25
Vitamin AD ₃	12/00	0.1	0.1	0.2	0.2
Vitamin B	12/00	0.1	0.2	0.3	0.3
Minerals	9/00	0.15	0.1	0.15	0.1
Furazolidone	18/60	0.15	0.15	0.2	0.2
Tricalcium Phosphate	4/03	0.2	-	-	-
Eneramycin	48/00	0.15	0.1	-	-
Colistinum	26/00	-	0.2	0.2	0.2
Hygromix	39/00	-	0.2	0.1	0.1
Stafac (10)	48/00	-	-	0.2	0.2
C.P. (%)	-	14.7	15.2	17.7	19.7
T.D.N. (%)	-	70.7	70.3	70.1	70.2
Ca (%)	-	0.63	0.57	0.69	0.87
P (%)	-	0.56	0.56	0.68	0.73
Methionine & Cystine (%)	-	0.46	0.48	0.68	0.73
Lysine (%)	-	0.65	0.69	0.88	1.03
Cost per kg		0/95	1/10	1/45	1/55

Table 27 Feed Formulation in 10th Mile Farm
(Poultry Sector)

Feedstuff	Starter 1 - 40	A,41 - 70	Grower B,71 - 1% of E.P	Layer After % of E.P	Broiler Starter 1 - 28	Boiler Finisher 29 -
Broken rice	35	36	25	33	40	40
Maize	29	34	40	34	19	15
Fish Meal	12.5	4.25	3	8	5	9
Peanut meal	5	5	3.35	5	15	10
Sesame Cake	5	7	5	6.15	14	10
Rice bran	12	11.5	20	4.5	5	10.7
Prawn meal	-	-	1	3	-	3
Oyster shell	-	0.5	1	5.2	0.5	1
DL-Methionine	0.2	0.2	0.2	0.1	0.2	0.2
Lysine	0.3	0.2	0.1	0.1	0.3	0.2
Vitamin AD ₃	0.05	0.1	0.1	0.1	0.05	0.1
Vitamin B	0.1	0.1	0.1	0.1	0.1	0.1
Trace Mineral	0.1	0.15	0.15	0.05	0.1	0.1
Choline Chloride	0.1	0.1	0.1	0.1	0.1	0.1
Furazolidone	0.1	0.1	0.1	-	0.1	-
Zoalene	0.05	0.05	0.05	-	0.05	-
Tricalcium P.	0.5	0.75	0.75	0.5	0.5	0.5
C.P.	19.1	15.6	14.6	17.5	21.3	21.1
T.D.N.	70.0	71.1	69.3	66.8	69.5	66.8

Table 28 Analysis Result of Feedstuff

(%)

Feedstuff	Mois	C.P.	C.Fat	C.Fib	C.Ash	N.F.E	Ca	P	Nacl Sand
Maize	13.2	11.3	4.5	1.9	2.8	66.3		0.41	
	12.5	10.4	4.6	2.2	2.2	68.1	0.03	0.28	
	14.9	8.0	3.6	1.8	1.1	70.6			
	14.4	8.0	5.4		1.7	68.8			
Broken rice	14.4	7.6	0.3	0.1	1.0	76.6			
	13.9	8.4	0.5	0.4	0.7	76.1	0.33	0.03	
	14.1	4.5	0.9	0.3	1.3	78.9			
	12.9	7.6			1.1				
Rice bran	12.4	12.0	11.2	3.3	6.2	55.0		1.10	
	11.1	11.8	11.2	4.2	6.2	55.5	0.05	1.05	
	11.1	13.3	15.4	6.6	8.6	45.0			
	12.1	13.4	17.6	5.8	8.7	42.4			
Groundnut cake	11.6	48.7	4.2	3.5	5.5	26.5	0.40	0.62	
	9.8	47.9	4.7	3.3	6.5	27.8	0.22	0.61	
	9.7	41.9	6.2	4.6	14.5	23.5			
	9.4	41.3	5.2		6.8	32.8			
Sesame cake	11.3	37.8	9.6	4.5	13.0	23.8	2.50	0.98	
	8.6	37.2	9.9	5.4	11.6	27.3	2.47	1.20	
	9.4	44.2	5.7	6.3	28.1				
	8.7	40.9	7.9	4.6	13.2	24.7			
Fish Meal of Nga Wine	19.2	59.0	3.4		20.0		4.30	2.00	
	13.9	63.0	3.1	0.3	19.7				0.91
	12.9	61.5			24.3		4.43	2.85	2.06
Fish Meal of NgaKhone Nyo	10.7	50.1	3.7	0.1	36.5				0.55
	12.2	57.7	2.7		29.1		5.80	2.30	10.6
Prawn Dust	18.6	38.5	1.4	7.7	32.2		9.30	1.31	
	16.7	39.3	2.0	3.7	31.6				
	14.6	41.6	1.3	6.6	35.5				4.32
	14.4	37.2	3.2		34.9		7.99	1.85	10.54 0.36

Mois : Moisture

C.P. : Crude Protein

N.G.E.: Nitrogen Free Extract

Ca : Calcium

Table 29 Analysis Result of Formula Feed

(%)

	Mois	C.P.	Fat	Fib	Ash	N.F.E	Ca	P	
Pig Sector:									
Starter									
Nov. 1978	14.3	27.6	4.0	2.1	10.3	41.7	2.6	0.8	
"	12.0	26.1	3.2	3.2	9.5	46.0			
Mar. 1981	10.8	17.3	4.6	2.4	5.1	-	0.5	0.7	
Dec. 1982	12.2	18.8	3.8	3.6	6.4	55.3	0.9	0.8	New
Grower (A)									
Dec. 1982	12.0	17.0	4.1	3.5	5.8	57.6	0.7	0.7	Old
"	12.6	16.8	3.3	3.4	5.0	59.0	0.7	0.7	New
Grower (B)									
Dec. 1982	13.4	14.3	2.7	3.2	4.0	62.4	0.4	0.6	New
Finisher									
Mar. 1981	12.1	14.8	3.5	1.5	3.7	-	0.4	0.5	
Dec. 1982	12.7	15.8	2.9	3.9	5.6	59.2	0.8	0.6	Old
Adult									
Nov. 1978	13.7	18.5	4.1	2.3	6.4	55.0	1.4	0.4	
"	12.0	18.8	3.6	3.2	6.4	-	1.1	0.5	
Mar. 1978	12.4	13.5	2.8	1.5	3.2	-	0.4	0.4	
Dec. 1982	13.1	13.2	2.4	3.2	3.1	65.0	0.4	0.4	Old
"	13.2	12.7	2.6	2.8	3.6	65.1	0.3	0.5	New
Poultry Sector:									
Starter									
Nov. 1978	13.7	19.2	3.8	1.6	7.0	54.7	1.70	0.56	
Nov. 1978	10.9	20.4	3.1	2.6	7.1	55.9	1.50	0.61	
May 1980	11.6	17.5	5.0	1.2	5.8	-	1.08	0.84	
Mar. 1981	10.7	20.2	4.9	2.7	8.2	-	0.80	0.92	
Dec. 1982	13.4	13.0	2.7	2.6	4.2	64.1	0.65	0.49	
Grower (A)									
Sep. 1979	13.1	16.1	4.1	2.2	10.3	54.2	2.31	0.66	
Dec. 1982	13.9	14.3	3.7	3.6	6.1	58.4	1.20	0.57	
Grower (B)									
Sep. 1979	13.2	14.8	4.0	2.2	6.6	59.2	1.10	0.53	
May 1980	11.4	14.1	5.4	2.2	6.3	-	0.93	0.80	
Mar. 1981	10.8	15.1	4.4	3.2	7.3	-	0.96	0.86	
Dec. 1982	13.8	15.0	3.6	4.6	5.3	57.7	0.49	0.70	
Layer									
Nov. 1978	12.8	19.9	3.3	2.1	10.1	51.8	2.90	0.52	
Nov. 1978	11.3	21.0	3.3	5.0	8.2	51.2	2.03	0.57	
Sep. 1979	10.7	16.4	3.6	1.2	10.9	57.2	2.55	0.69	
May 1980	11.4	18.1	3.8	2.0	9.5	-	2.43	0.81	
Mar. 1981	11.0	18.0	3.5	1.9	10.8	-	2.72	0.70	
Dec. 1982	13.0	14.6	3.2	2.5	4.4	62.3	0.65	0.57	

Table 30 Product of Formula Feed (Up to February, 1983)

(tons)

	Pig	Poultry	Total
1978 - 79	7.90	10.84	18.74
1979 - 80	106.64	121.52	228.16
1980 - 81	288.66	250.63	539.29
1981 - 82	368.11	383.49	751.60
1982 - 83	474.80	1193.83	1668.63

Table 31 Distribution of Formula Feed

(tons)

	Pig	Poultry	Total
Apr. - Jun. 1982	0.80	0.65	1.45
Jul. - Sep. 1982	1.16	56.64	57.80
Oct. - Dec. 1982	0.24	287.71	287.95
Jan. - Feb. 1983	0.04	198.21	198.25
Total	2.24	543.21	545.45

Table 32 Produced Amount of LDMC - JICA Premix

(kg)

	Starter	Grower	Layer	Total
1980 - 81	1885	664	5719	7268
1981 - 82	2942	995	5142	9079
1982 - 83	781	374	387	1542

Upt to September, 1982.

Table 33: Distributed Amount of LDMC-JICA Premix without LDMC Farm

(kg)

	Starter	Grower	Layer	Total
1980 - 81	275	203	556	1034
1981-- 82	632	27	628	1287
1982 - 83	231	39	207	477

Up to September, 1982.

Table 34: Feed Supplement Stocks

(At 28th February, 1983)

Supplements	Amounts
Vitamin AD ₃	200 kg
Vitamin B	320
DL-Methionine	-
Lysine	-
Tricalcium Phosphate	1000
Zoalen	140
Choline Chloride	-
Furazolidone	-
Colistin	1240
Stafic	20
Ennamycin	200
Mineral	-
Hygromix	-

Table 35: Number of Trainees and Subject of Training Course in 10th Mile Farm.

Name of Training Course	Training Subjects	Mother Dept. of Trainees	Nos.	Period
Basic Farm Manager Training Course No. 1	Pig & Poultry Husbandry, Breeding Hygiene, Genetics, Feed-Formulation, Farm Economics, Accounts, Auditing, Procurement, Stores, Distribution and Marketing.	Livestock Development & Marketing Corporation	60	11.11.1980- 31.1.1981
Basic Farm Manager Training Course No. 2	- do - Animal Health	- do -	67	16.2.1981- 30.5.1981
Basic Farm Manager Training Course No. 3	- do -	- do -	63	1.9.1981 - 23.11.81
Basic Farm Manager Training Course No. 4	- do -	- do -	63	1.2.1982 - 6.6.1982
Basic Farm Manager Training Course No. 5	- do -	- do -	62	20.7.1982- 23.11.1982

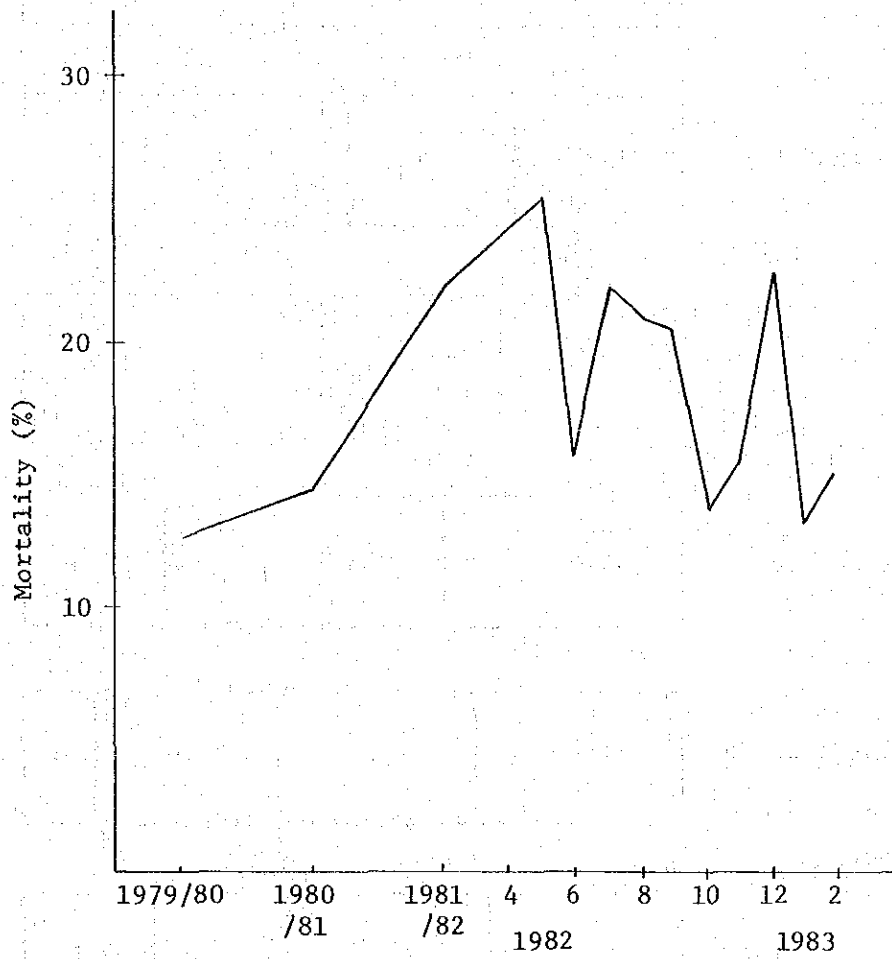


Figure 1: Change of mortality of piglets.

	Mother press	Weakness	Agalactia	Others
Total	30.7 %	30.3 %	19.7 %	19.3 %
Berkshire	25.7	25.7	30.1	18.6
Duroc	27.6	27.6	19.0	25.9
Landrace	36.6	34.1	7.9	21.3
Large white	31.2	30.1	28.0	10.8
Crossbred	30.7	30.3	19.7	10.3

Figure 2: Ratio of each cause of piglet lost
(May 1981 ~ Feb. 1983)

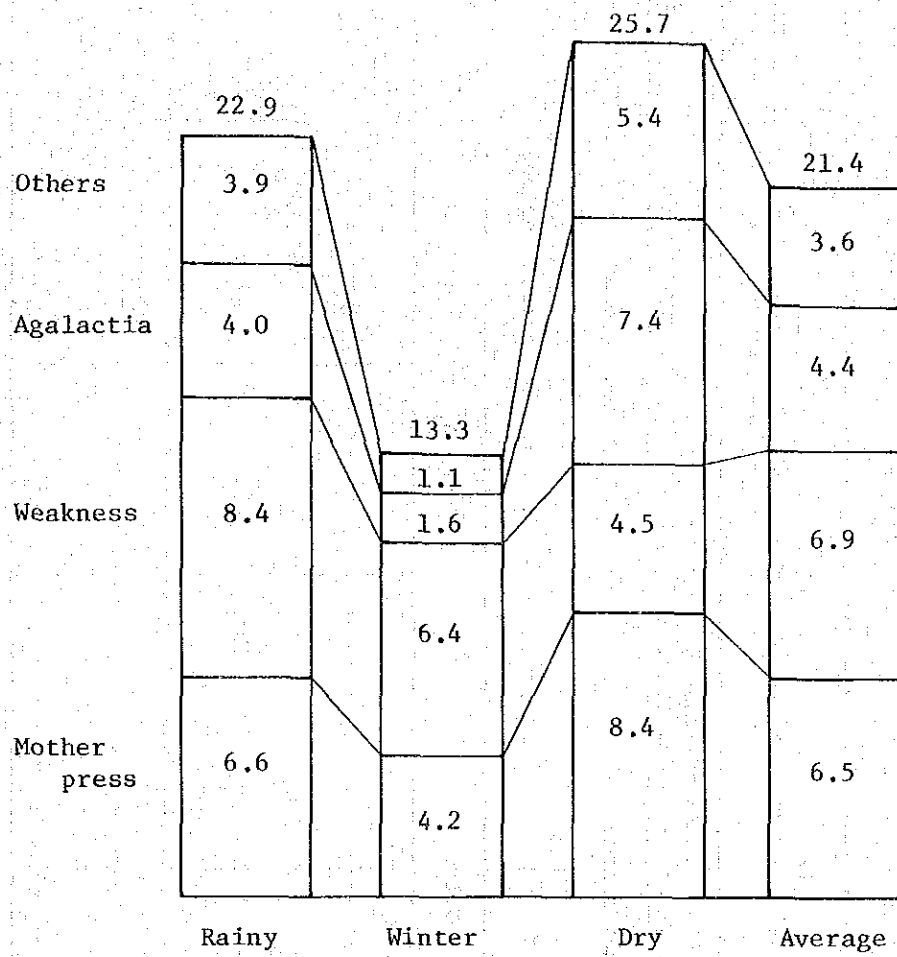


Figure: Seasonal Change of mortality concerning causes (May 1981 ~ Feb. 1983)

Figure 4: Present Feeding Management in 10th Mile Farm

Days Old	14	42	70	150	360	500
Housing	MARUTO Heating Brooder	MARUTO Self Heating Brooder	MARUTO Cage Grower	Cage Laying House		
	Floor hover Brooder		Floor Grower	Floor Laying House		
Layer						
Broiler Breeder						
			Body weight control period			
Feed Type	Starter		Grower A	Grower B	Layer Feed	
Artificial Lighting						
Debeaking	*5 days old			*120 days old for correction		
				The day that egg production reached to 10%		

Figure 5: Measurement Program in 10th Mile Farm.

Days old	42	56	70	84	98	112	126	140	154	168	180	210	240	270	300	360	420	480	
Body weight																			
Layer		S	S	S	S	S	S	A											I pure line only
Broiler Breeder		S	S	S	S	S	S	S	S	A									I
		(I)																	
Egg weight																			
Egg number																			
Daily Feed Consumption																			

In case of pure line, it will be changed to Individual Method.

S: Sampling Method A: All bird Method I: Individual Method.

F: F F F F F F F F F F
 (I) (I) (I) (I) (I) (I) (I) (I) (I) (I)
 In case of pure line, it will be changed to individual method.

F: Measure the total egg weight continuously for 3 days.

I: Individual egg weight during five days.

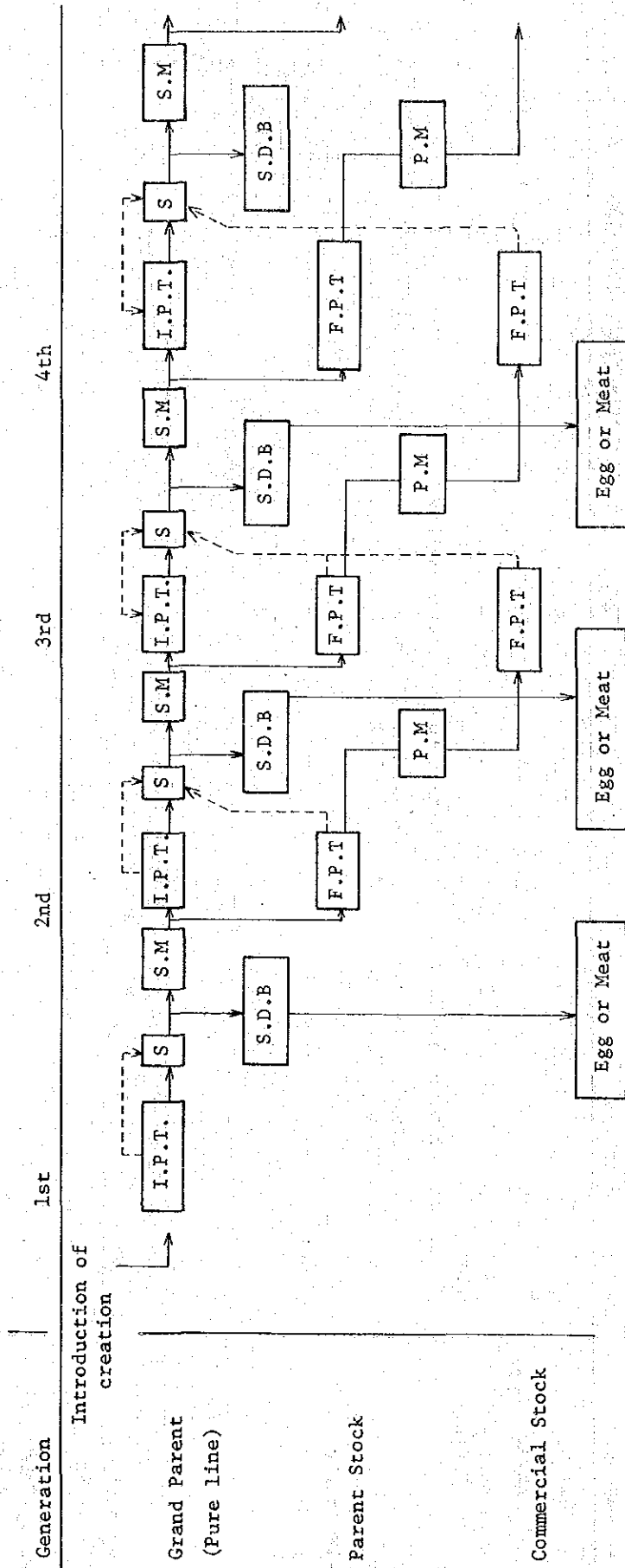
1st egg

Individual egg number from 1st egg to 300 days old is used for selection on pure line.!

culling

Daily feed consumption of flock is measured for the daily management.

Figure 6 The Relationship between Records and Breeding



I.P.T. : Individual Performance Test
 F.P.T. : Flock Performance Test
 S.D.B. : Selected down birds
 S : Selection
 S.M. : Single Male Mating System
 P.M. : Plural Male Mating System

Figure 7: Expected Mating System

Layer

2 way cross	3 way cross
06 x 11	06 x 11.74
06 x 74	06 x 74.11
11 x 74	11 x 06.74
74 x 06	11 x 74.06
74 x 11	74 x 06.11
	74 x 11.06

Semibroiler

2 way cross:

WC (71 strain) or WPR (41 or 21 strain) males are mated to pure line females of laying type.

3, 4 way cross:

These males are mated to laying type crossbred shown above

Broiler Semibroiler

Following crossbred will be expected besides present one.

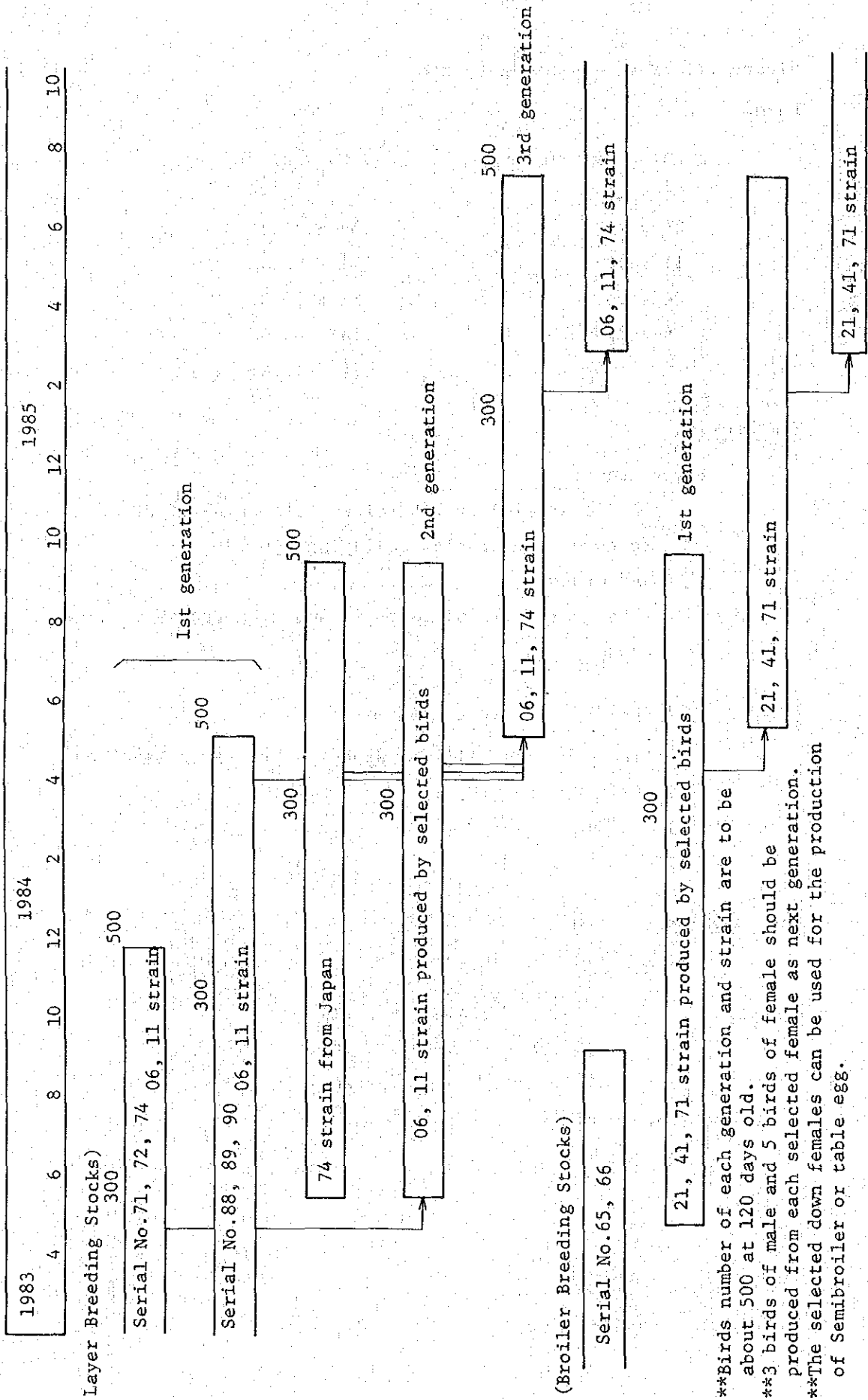
71 x 21.06	71 x 41.06
71 x 21.11	71 x 41.11
71 x 21.74	71 x 41.74

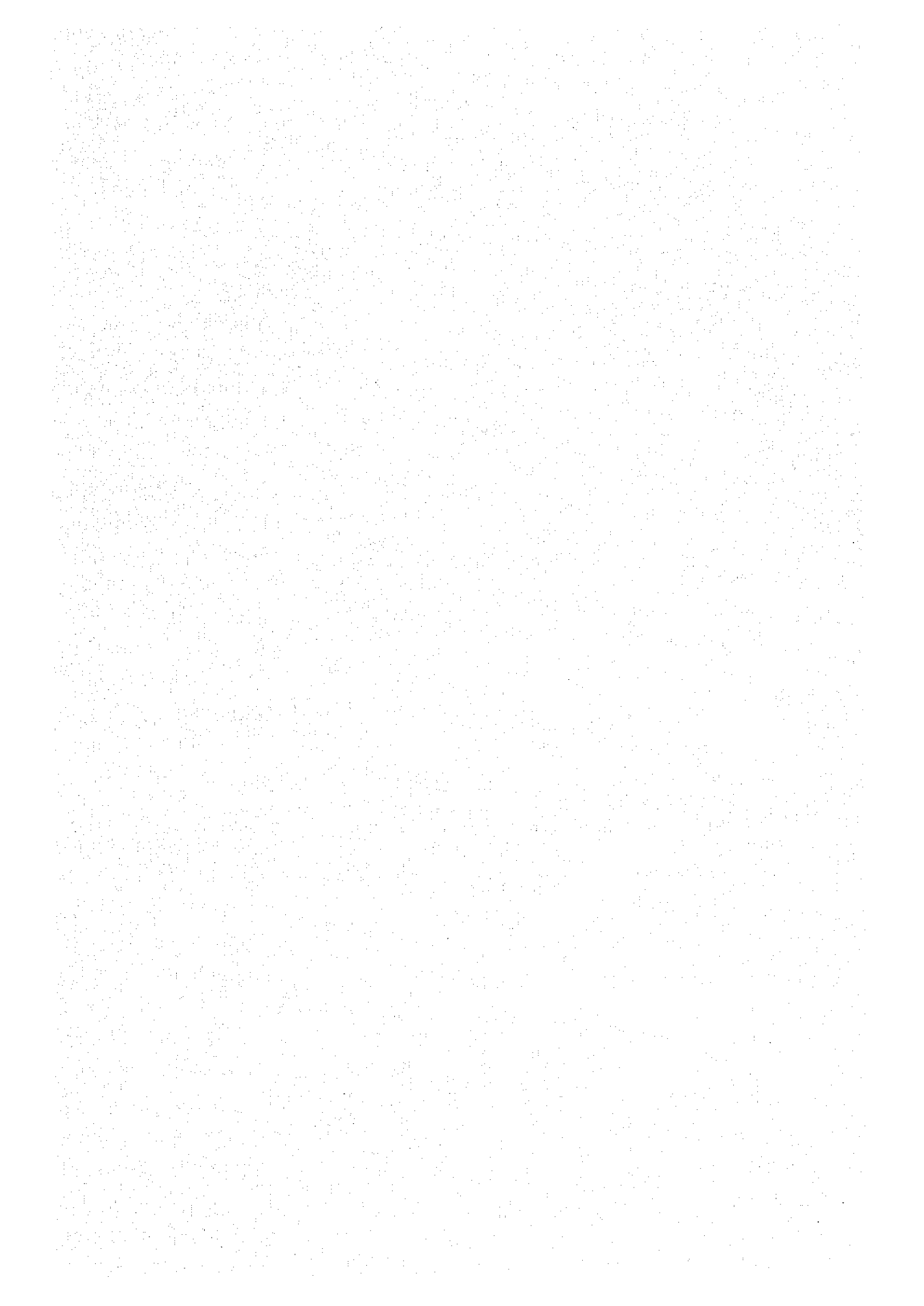
Pure Broiler

71 x 4121

Remarks:	05	strain . . .	RIR
	11, 74	. . .	WL
	71	. . .	WC
	41 21	. . .	WPR

Figure 8 Breeding Plan of Pure Line in 10th Mile Farm





JICA