



UNIVERSITI PUTRA MALAYSIA

***AN EVALUATION OF A COMMERCIAL PIG FARM IN SELANGOR
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AN EVALUATION OF A COMMERCIAL PIG FARM

IN SELANGOR

BY

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ABSTRACT

An abstract of the project paper presented to the Faculty of Veterinary Medicine and Animal Science in partial requirement of the course VPD 401 - Animal Industry Project.

AN EVALUATION OF A COMMERCIAL PIG FARM IN SELANGOR

by
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1989

Supervised by
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A farm evaluation was carried out on a commercial pig farm with a total sow standing population of 1287 from 7th November 1988 to 10th December 1988. The farm resources, management processes and production performance for the years 1987 and 1988 were evaluated and analysed. Costing in boar usage, piglet production and porker production were determined.

The management of farm resources and processes were generally efficient. However, the main weakness was in the breeding and farrowing performance. The farm had an average return to service of 20.6%; farrowing rate of 70.6% and NIP rate of 8.8%, which were sub-optimal compared to other local farms. A high incidence of delayed return to service was observed.

Areas needing further investigation are breeding management, underlying diseases, underusage of boar and heat detection techniques. A higher performance is recommended so as to achieve a higher farm productivity and success.

ABSTRAK

Abstrak daripada kertas projek yang dikemukakan kepada Fakulti Kedokteran Veterinar dan Sains Peternakan untuk memenuhi sebahagian daripada kursus VPD 401 - Projek Perindustrian Ternakan.

AN EVALUATION OF A COMMERCIAL PIG FARM IN SELANGOR

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Penyelia :Dr. A. Rani Bahaman

Penilaian ke atas satu ladang babi komersial dengan populasi babi betina berjumlah 1287 telah dijalankan pada 7hb. November 1988 hingga 10hb. Disember 1988. Sumber, proses pengurusan dan prestasi pengeluaran ladang telah dinilai bagi tempoh tahun 1987 dan 1988. Pengiraan kos ke atas penggunaan babi jantan, pengeluaran anak babi dan babi pedaging juga dibuat.

Pengurusan sumber ladang dan proses pengurusan didapati pada keseluruhannya adalah cekap, memuaskan dan kadangkalanya terpuji. Walau bagaimanapun, kelemahan utama dalam kecekapan pengeluaran adalah terdapat pada prestasi pembiakan dan kelahiran. Ladang kajian ini mempunyai 20.6% purata kadar kembali ke servis; 70.6% kadar kelahiran dan kadar 'NIP' yang bernilai 8.8%; nilai-nilai ini adalah berada pada tahap sub-optimum sekiranya dibandingkan dengan prestasi ladang tempatan yang lain. Ladang ini menunjukkan insidens yang tinggi dalam kadar kembali ke servis 'tertunda'.

Kawasan-kawasan kajian dalam penyiasatan ini untuk

**mengatasi masalah-masalah pengeluaran ternakan babi adalah
pengurusan pembiakan; penyakit yang mempengaruhi fertiliti babi
jantan dan betina; kekurangan penggunaan babi jantan dan teknik
mengecam kedadatangan berahi. Mengaturkan satu sasaran produksi
yang lebih meluas, berguna dan bererti merupakan satu langkah
yang dicadangkan untuk mengarah ke kemajuan.**



INTRODUCTION

Since the 1950's, the swine industry in Peninsular Malaysia has developed rapidly from a subsistence backyard farming to become a major component of the livestock industry. In 1987, it contributes approximately 30% of the total M\$650 million ex-farm value of livestock products. In 1963, Malaysia became self-sufficient in fresh pork, with per capita consumption of 29.3 kg. in 1987. Export of live pigs to Singapore has become an established trade and more than 300,000 live pigs were exported to Singapore in 1987, and a few thousand more to Hong Kong.

The major problem faced by the swine industry in Malaysia is the high cost of production. This is mainly due to high cost of feeds which is the result of over dependence on raw feed ingredients from overseas. The price of feedstuff has steadily increased in recent years. The high price in feeds coupled with unstable and fluctuating ex-farm price of live pigs, as well as over-production, have forced many inefficient farms, particularly the small holders to close down. Thus, over the last few decades, the structure of the swine industry has significantly changed, with bigger units replacing the small holdings. From 1970 to 1980, a substantial decrease in farm number, from about 18,000 units to 5,000 units, was observed. The number of farm units is postulated to decrease to around 4,000 units within the next 5 years (Ahmad Mustaffa, 1988).

The current farms are established and more efficient practising intensive production. The development of large scale

commercial farms has emphasized the importance of constant performance evaluation of the farm. This is because the success of a farm depends largely on the efficiency of production. Efficiency means the ability of the farm to produce maximum number of porkers or breeders (output) with minimum production cost (input). This could be achieved only if the farm is aware of its present production performance, and makes attempts to achieve a higher performance target. Thus, constant and precise evaluation of the farm performance should be practised.

In this study, a detailed evaluation of a local commercial pig farm was carried out with the following objectives:

- (1) to evaluate the overall farming practice;
- (2) to examine the current performance of the farm and compare with its past performance, with other local farm performance and the recommended standard performance;
- (3) to make recommendations to improve the farm performance;
- (4) to calculate: (i) the cost of boar usage,
(ii) the cost of piglet production,
(iii) the cost of porker production, and
(iv) the gross margin of the farm.

LITERATURE REVIEW

The ultimate aim of every pig farmer is to increase his profit through high farm production with minimum investment. The farmer needs to obtain high price on his farm products and high performance from his animals. In order to improve production, three major factors needs to be considered (Khoo,1987) and these are:

- (1) animal factors (health, nutrition, genetic),.
- (2) human factors (management, records, expertise, marketing, financial resources), and
- (3) environmental factors (climate, stocking density, housing, flooring, pollution control).

Some of the economic considerations which would make the difference between success and failure in pig production are: size of pig unit; site of the pig farm; design, cost and layout of buildings; quality of stock; breeding and growth performance; feed quality and cost; labour cost; management and market price of pigs (Lim, 1971).

The priorities of the veterinarian on a pig farm have changed over the past two decades. This is due to intensive method of pig production. Infrequent and emergency farm visits by veterinarian are now inappropriate. A "whole-herd" approach with monitoring of production data, analysis and interpretation of herd records as well as the whole farm practices in making diagnosis, prognosis and control are critical (Muirhead, 1979; Muirhead, 1980; Penny, 1978; Wrathall, 1977).

Techniques for identifying problems on pig farms have been described by Muirhead (1978) and are divided into three parts:

- (1) clinical observation of the animals,
- (2) assessment of available record /information, and
- (3) pertinent pathological investigation.

Good recording of performance parameters will allow early detection of problems and their appropriate remedial action (Khoo, 1987; Lee, 1971; Muirhead, 1978; Wrathall, 1977). However, in Malaysia, majority of the farmers have not realised the need to monitor productivity through proper recordings and if available, they are often inadequate records. A few commercial pig farmers have realised the importance of record keeping and currently, eight farms in the country have adopted the PigCHAMP computer program (Ahmad Mustaffa, 1988). In a survey carried out in Selangor by Choo (1987), only 8% of 688 farms kept records on animal productivity.

Pepper (1980) illustrated that record analysis might indicate the presence of a problem in a farm. It, however, does not bring about a solution unless the farmer modifies his management and production techniques. Miller (1981) emphasized the same point, that is, computers by themselves are of no value if the information in them are not utilised by the farmer.

Meredith (1983) came to a conclusion that there are four basic types of criteria for evaluating the performance parameters of pig herds. These are:

- (1) Herd reference value (what the herd has previously

achieved),

- (2) Population reference value (what other herds have achieved),
- (3) Target value (what the herd should aim for), and
- (4) Tolerance value (value beyond which remedial action is required).

Meredith further emphasized the importance of setting "target levels" when evaluating performance. Such comparison provides motivation to improve the performance of the farm. However, the "target level" need to be revised and adjusted from time to time to suit the ability of farm to achieve such targets.

MATERIALS AND METHODS

The Farm.

The study was conducted on a commercial pig farm with a standing sow population of 1287. The farm is involved in porker and breeding stock production. The breeding herds are divided into four units:

unit 1 : Grand parent stock for pure breeder production,

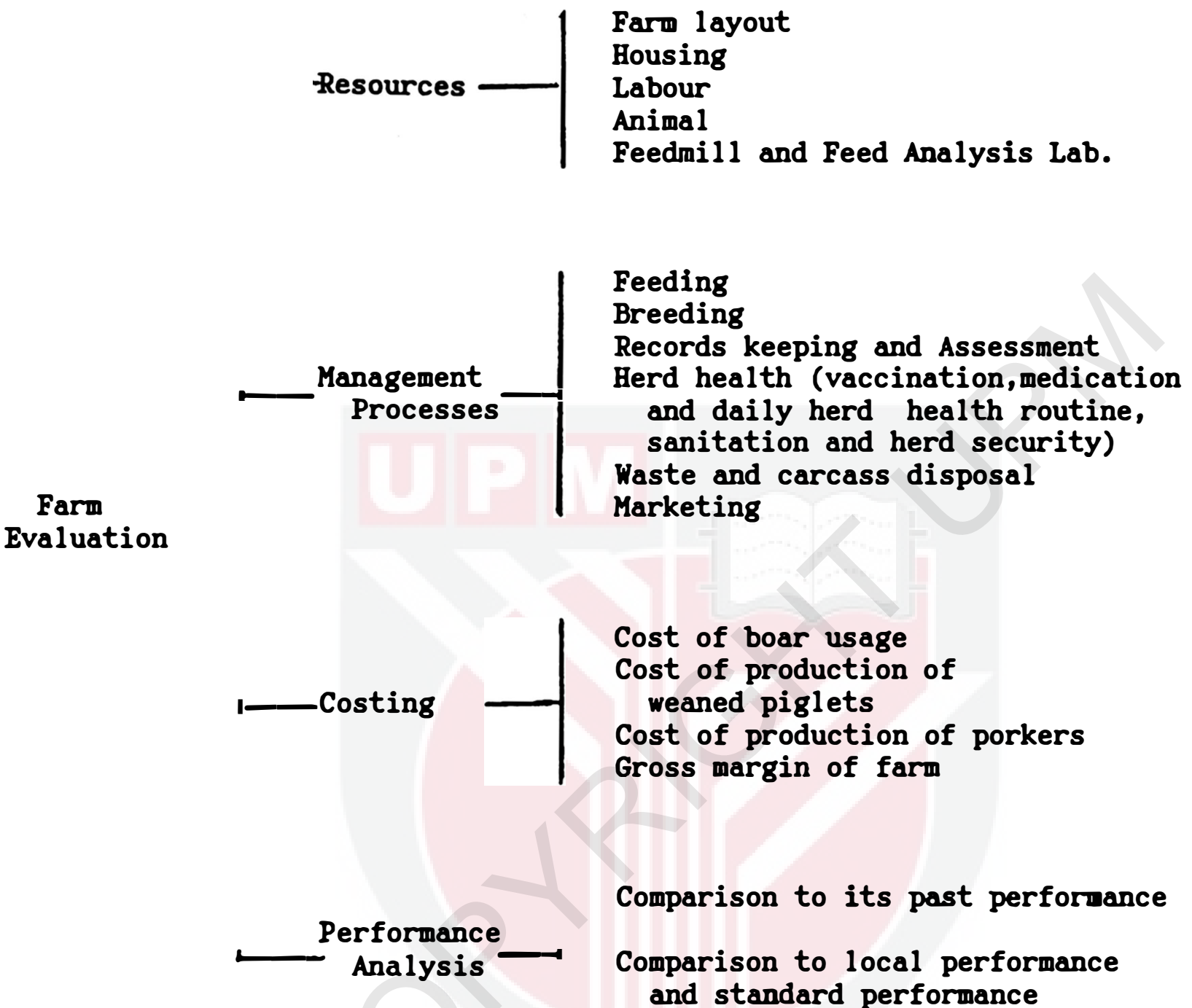
unit 2 : Grand parent stock for F₁ parent stock production,
and

units 3 and 4 : Parent stock for porker production (divided
into units 3 and 4 merely for easy administration).

Methodology of Farm Evaluation

Information concerning the whole farming system and the production process were obtained through personal observations and interviewing workers and staffs of the farm. The performance data were extracted from the PigCHAMP computer program installed for each unit for the years 1987 and 1988 as these were the only available complete data.

Evaluation of the farm is based on several aspects such as farm resources; management processes; performance analysis and costing. Detailed subdivision of each aspect evaluated is as in the following diagram:



Each of the above aspects was carefully examined and compared to the recommended standards and practices.

RESULTS AND DISCUSSION

(I) FARM RESOURCES

(1) Farm Layout

The farm is situated on a 28 acres of hilly land surrounded by vacant land. It is about two miles from the nearest town and is situated near a public road. The farm layout (Figure 1) is well planned, as there is only one entrance, a good security feature and well demarcated production zone (White area), supply zone (Black area) and buffer zone. The farm layout with built-in disease control features of the Black and White System as described by Hans Jakob (1987) plays an important role in the success of disease control of the farm. Some complimentary points related to this farm layout that are worth emphasizing are:

- (i) Entrance to production zone as well as supply zone is under controlled,
- (ii) There are disinfection points at each accessible entrance,
- (iii) There are no through roads from the Black zone to the White zone except for farm vehicles, and
- (iv) The feedmill is situated between the Black and White zones.

(2) Housing

The housing layout is satisfactory as all houses are:

- (i) ideally in East-West orientation,
- (ii) adequate distance between houses (30 - 60 feet apart),
- (iii) followed the physical pig flow (from birth to market),
- (iv) the breeding-gestation and farrowing barns are adjacent to one another (reducing animal travel distance),
- (v) the farrowing barns are far from human and pig traffic pattern (reducing the spread of disease), and
- (vi) the grower-finisher barns are located near the sale pen and feedstore.

The physical built-up of the animal houses are acceptable. They are cool and well ventilated due to the eighteen foot height of double-ridged asbestos roofing and open partition of the pens with iron bars and wire mesh.

The farrowing houses are well designed with windows which can be used efficiently to control temperature and wind flow.

The farm has evolved from a traditional rearing system of concrete flooring to either partial or complete-slatted flooring. At present, 75% of the fattening sheds, 50% of the gestation-breeding sheds and 100% of the farrowing sheds are slatted. This is good as higher stocking density, more comfortable and cleaner environment can be obtained. In the long run, this will cover the cost as better reproduction, growth performance and disease control can be obtained.

The floor space for the animals was generally adequate (Table 1) except for the growers in House C, where the actual floor space

was about half of the proposed specification.

The feeding space in the fattening pens are shown in Table 2. It is seen that there was an inadequate individual feeding space in these fattening pens as compare to the number of animals in the finishing pens (Houses D, E, F, I, and K) where restricted feeding is practised. It is important for the management to ensure an even feed intake of each pig by providing adequate feeding space.

One automatic drinker was installed for 17 animals in each fattening pen. Brent (1986) and Sainsbury (1979) emphasized that there should not be more than 10 pigs per drinker. Thus, the provision of more drinkers in pens should be considered.

(3) Labour

The manpower in the farm is adequate with a ratio of one worker to about 500 pigs. For each breeding unit, one supervisor and two workers were employed to look after the breeders and piglets. The supervisors were specifically assigned to record data and detect heat.

Incentive of 60 cents per extra piglet is given to the team of workers of each unit which successfully reach the target of 8.5 pigs weaned per litter in the porker breeding unit and 8.2 in the breeder breeding unit. This motivated the workers in their daily work routine, particularly in the care of the piglets.

Only one of the four supervisors had about three years supervisory experience. The management should look into ways to create job satisfaction to attract employees to stay longer which will in return benefit the farm.

(4) Animals

The herd consists superior imported or locally bred exotic breeds of Landrace, Yorkshire, Duroc, Hampshire, Seghers Commercial Hybrid and their crosses. The presence of such a good genetic pool assures an efficient production of animals.

(5) Feedmill and Feed Analysis Laboratory

Producing mixed feed for own farm consumption would reduce the cost of production. With a nutritionist to formulate feeds and availability of a feed analyzing laboratory to run simple qualitative as well as quantitative tests, the quality of feeds is assured. However, in this farm, the facilities were not fully utilized as only the purchased raw feed ingredients were tested but not the final mixed feeds.

Besides reducing the cost of production, self-mixed feeds would provide immediate in feed therapy in a disease outbreak. The transportation of bulk feeds straight to silos by trucks would save labour and time of loading and unloading feeds as well as expenses on feed packets.

The idea of the farm management to purchase a Least-cost Feed Formulation computer program is wise as this would help in minimising the cost of feeds and time in formulating feeds.

(II) MANAGEMENT PROCESSES

(1) Feeding

The feeding regime practised in the farm is satisfactory (Table 3). Six types of feed were formulated for the different classes of animals. Pigs were fed twice daily, early morning and at 3.00 pm. The date to change feed and its amount for fatteners were clearly written on each card and was followed closely by workers. Scarcity of thin-sow syndrome and well-grown porkers body size indicated that the pigs were well-fed.

(2) Breeding

Heat detection and mating were done twice daily, at 7.30 am and 1.00 pm, before feeding time. Once an animal was detected to be in standing heat, it will be mated immediately and repeated the next morning regardless whether the first mating was done in the afternoon. The recommendations for boar usage in the farm allow one mating a day for consecutive two days and rest on the third day. Thus, in one week, a maximum of five matings are allowed.

In this farm, the age of gilts and boars for breeding should be at least ten months old for boars and eight months old for gilts. Figure 2 outlined the mating policy of each production unit. For units 1 and 2 the same boar was used to mate twice the same sow whereas in units 3 and 4, the sows were allowed to be mated with different boars on the first and second matings. Such practice as seen in units 3 and 4 could improve the litter size and conception rate (Lynch, 1984). However, it would help to mask

infertile boars.

(3) Record Keeping And Assessment

The farm was the first farm in Malaysia to adopt computerization in record keeping. This indicates the "wanted-to-advance attitude" of the management. It started in mid 1986. The farm record keeping has improved over these years and now it is able to produce accurate data to monitor performance. A personnel was trained to record data daily into a computer and generate appropriate analysis and performance graphs every month for assessment by the farm veterinarian.

The farm's criteria used to assess the performance are: (i) repeat services of not more than 30% and (ii) average pigs weaned per litter of 8.5 for the porker breeding units and 8.2 for breeder breeding units. This is inadequate. The management needs to review its assessment policy, as the less than 30% repeat service level is too low and the farm has achieved this for the past two years. They need to broaden the farm's performance targets to other parameters; such as farrowing rate and litters per sow per year.

It is observed that the supervisors failed to report the culling of boars and thus making the inventory of herd inaccurate especially in calculating the boar-sow ratio. This jeopardised the evaluation of causes of the reproductive problems in the herd.

The computer was not fully utilized as the "action list" function is not used at all in the farm programme. Although the

workers claimed to work well without it, one should not deny that such guides eliminate human errors. The reluctance of the workers to use it could be due to over-confidence, ignorance or difficulty in understanding the computer printout. Thus, the management has to convince, educate and change the attitude of the workers.

(4) Herd Health

(a) Vaccination Programme

The vaccination programme was appropriate as the farm performed diligently routine vaccination (Table 4) on the herds against swine fever, pseudorabies, and enterobacillosis.

(b) Medication And Daily Herd Health Routine

Table 5 listed the daily herd health routine done in the farrowing houses and medication on the herds. As scouring was one of the major problems in the farrowing houses (Aziz, 1984; Lau & Chin, 1982), the farm has taken strict preventive measures and medication to combat against it. Vaccination of dams against enterobacillosis before farrowing, oxytetracycline injection of dams immediately after farrowing and daily checking and dosing of oral or parenteral antibiotic to scouring piglets were practised.

Prophylactic Porect[®] (organo-phosphate compound) was administered to weaners and newly introduced animals to prevent mange.

(C) Sanitation and Herd Security

The farm imposed a very high standard of sanitation and disease preventive measures.

Workers are provided with uniform and boots which are not allowed to be brought out of the farm. Visitors are provided a laboratory coat and boots prior to entry to production zone. Butchers and breeder buyers are restricted to sale pens only which are outside the production zone. Footbaths are constructed at every entry point to production zone and also at every house. An automatic motorized vehicle disinfection booth facilitates the prevention of infectious diseases.

Regular disinfection of premises, liming of farrowing pens, corridors and flushing of drains, are part of the farm routine (Table 6).

Newly introduced breeders are quarantined in the holding pens for four weeks and are required to be certified free of brucellosis, transmissible gastroenteritis, pseudorabies, swine fever and leptospirosis.

(5) Waste and Carcass Disposal

The farm had no waste treatment facilities. The pigs' waste was discharged directly into drains which flow to a canal and then to a nearby river. On the whole, the drainage system in the farm was efficient.

Following the waste management and pollution control appeal, the farm had bought a "waste separator" machine which was going to

be installed on the farm very soon.

A concrete underground disposal tank was specially constructed for carcass disposal.

(6) Marketing

The market for the animals from this farm was assured as it exports about 90% of its porkers to Singapore and the remaining 10% are sold locally. Ten percent of the animals produced were sold as breeders where they gave good profit margin to the farm. The price of a male breeder was \$800 whilst the female was \$500 regardless of weight or age.

(III) COSTING

Calculation of cost of boar usage, piglet production and porker production was based on current feed cost.

(1) Cost of Boar Usage

Figure 3 shows the detailed calculation of boar usage per mating according to frequency of usage in a month. Since 91.2% of the boar usage in the farm is less than three times per week (Table 10), with an assumption of average usage of ten times per month, the cost of boar usage in this farm was \$7.07 per mating. If the boar was used five times per week (that is \$3.54 per mating), the farm would save \$3.53 per mating. Thus, with a total of 5,345 matings in 1988, the farm would have saved \$18,867.85 without interfering with the fertility of the herd.

(2) Cost of Producing One Weaned Piglet

Cost of producing one weaned piglet was \$38.51 (Figure 4).

(3) Cost of Producing One Porker

With the current high feed price, the cost of producing one 85 kg porker in 5.5 months, amounted to \$215.81 or \$2.54 per kg live weight (Figure 5).

(4) Gross Margin of Farm

Approximate calculation of the farm gross margin from January 1988 to September 1988 was about \$1,055,363.00 or \$117,262.56 per month.

(IV) PERFORMANCE ANALYSIS

(1) Comparison of Farm Performance for 1987 and 1988

Generally, there was not much improvement on the performance seen in 1988 except the weaning performance. Improvement in the weaning performance could be due to the incentive offered to workers. The number of pigs weaned per litter has increased from 8.0 to 8.2 whilst pre-weaning mortality has decreased from 12.7% to 9.1%. The number of pigs weaned per female per year has increased from 16.4 to 16.8 .

Even though there was improvement in practising double mating from 94% to 98%, there did not seem to be much improvement in the conception rate. Instead, there was deterioration of farrowing rate from 71.9% to 69.3% and an increase of the NIP rate from 7.3% to 10.2% (Table 7).

(2) Comparison of Farms Performance to Local and Standard Performance

Table 8 shows the summary of the farm performance as compared to other local farm performance and the recommended standard performance.

The farm had been very successful in implementing double mating for each service, that was, up to 95.9%. However, the farm was observed to have a poor breeding and farrowing performance. The percentage of repeat service was very high, that was, 20.6%, whereas the average performance of 22 local farms was 17.8% and

the top performing farms in Malaysia showed only 9.4%. This indicated a very low conception rate for the sows in the farm. Thus, an investigation is warranted to determine the underlying causes.

From the service efficiency report, it was found that all four units had days return to service of more than 24 days (Table 9). Thus, delayed return to oestrus was a prominent feature amongst the sows.

The boar usage report showed that on average, none of the boars were ever used to mate up to four times a week. Majority of the boars performed one to three matings per week (Table 10).

The farrowing rate of 70.6% was also much lower than those of other farms and the recommended interference level (Table 8). The high Not-In-Pig of 8.8% from this farm also exceeded the general accepted level of 5%. Due to the low farrowing rate, the number of litters per female per year was also affected. Its value of 2.08 was lower than other farms' performance (Table 8).

The weaning performance of this farm showed that there is room for improvement as it has not achieved what other farms have achieved, that is 8.1 pigs weaned per litter and 16.6 pigs weaned per female per year.

The ultimate index to farm productivity is pigs weaned per sow per year or more accurately, pigs marketed per sow per year. Overall, there was a slight decline in the productivity of the farm being evaluated. This is seen in a lower efficiency particularly in breeding and farrowing performance. Analysis of the various parameters (Figure 7) is required to assess the

efficiency of weaner production. In this aspect, the high return rate, low farrowing rate and high NIP rate should be examined. The farm should be aware that the litters per sow per year can be improved if these parameters are improved.

Some aspects that should be seriously examined in relation to the reproductive problems identified are as follow:

(1) Mating Practice

As mentioned earlier, the daily mating was done at 7.30 am and 1.00 pm. The times of such mating could have played an important role in causing the problem. Incorrect time of mating is the most important single factor responsible for low conception rate.

There was only about 5.5 hours interval in the day for the second heat detection. Thus, animals that showed standing heat at 1.00 pm were the animals that had heat at the most for five hours. The time of mating at the onset of five hours standing heat was definitely a wrong practice as the recommended optimum mating is about 24 hours after onset of heat (Figure 8). Thus, even though double mating was practised, the first mating was usually negative.

Nielsen (1979) and Tan (1985) stressed that mating very early in oestrus may the lower conception rate and litter size. Maximum conception rates were obtained when mating was facilitated approximately 12 hours before ovulation (Dziuk, 1970).

Mating in hot afternoons is not advisable as heat stress can influence sow fertility. Sows exposed to excessive heat before

mating may fail to conceive or produce small litter (Wannick et al, 1965).

(2) Conception Problem

High rate of return to service could be due to conception failure or embryonic mortality. The interval between returns gives an indication of where whole litter loss is occurring. If return rate is within 18 to 22 days, it means total fertilization failure or the developing embryos have died before the 10-day stage. If return is between 24 to 40 days, it means embryonic loss is at 2 to 4 weeks post-conception (Kingston, 1981). Tan (1985) suggested embryonic death could be due to genetic defects, fertilization of aged ova, undue stress on sows in early pregnancy, excessive feed intake, early weaning of sow, disease and uterine infection.

One important factor the farm should look into is the health status of the herd, whether subclinical diseases affecting the herd fertility are present.

(3) Boar Fertility and Usage

The boar has greater influence on the herd reproductive efficiency than individual sows. Thus, it is important to keep service records of each boar accurately and up-to-date, so that fertility problems associated with the boar can be determined. Perhaps the farm should start analyzing the Boar Performance Report to monitor and identify infertile boars.

The herd inventory of the farm (Table 11) showed a boar-sow ratio of 1 to 19 and boar usage of 2 times per week (Table 10).

This indicates under usage of the boars. Indirectly, this increases the cost of production of piglets and affects the reproductive performance of the herd (Khoo, 1988). Underused boars showed poorer fertility because of high proportion of aged and dead spermatozoa in their ejaculates (Tan, 1985).

(4) Heat Detection Technique

The high NIP rate indicated that there was either negligence or failure in the heat detection techniques in diagnosing non-pregnant animals which come back to oestrus. Accurate and early pregnancy diagnosis is important so that non-pregnant sows can either be mated or culled to reduce feeds and better utilisation of facilities.

CONCLUSIONS AND RECOMMENDATIONS

In general, the farm excels in the physical utilization of its resources such as farm layout and housing. The adoption of high standard in feeding, record keeping and herd health plus the employment of a competent veterinarian has made the farm one of the more advanced and reputable farms in this country. The farm is now well-established and 90% of the animals produced were exported to Singapore.

In this present time of high cost of feeds, it is important for the farm to improve its productivity to ensure profits by increasing the litters per sow per year through improvement in conception and farrowing rate. For every 1% increase in conception rate there is an increase in litter size of 0.12 pigs (Rasbech, 1969).

Problems in the farm have been identified and the following recommendations are proposed:

- (1) Changing the afternoon mating time of 1.00 pm to late evening (about 4.00 pm) or, if the management insists on the same time, then practice triple mating, afternoon-morning-afternoon, since the farm at present have excess number of boars.
- (2) Give incentives to workers to achieve higher number of litters per sow per year by promoting better heat detection and mating practices.

- (3) Review, reset and broaden the farm targets. It will be advantageous if the farm adopts the present top local performance parameters as its farm targets (Table 7).
- (4) Educate the supervisors to make full use of the action list generated from PigCHAMP program.
- (5) Monitor closely the heat detection techniques and workers in carrying out their duties.
- (6) Maximized the use of boar and cull some to achieve a boar-sow ratio of 1 to 25.
- (7) Since feed analysing facilities are available, analyse the final feed products periodically to ensure that the quality is maintained.

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FIGURE 1 : FARM LAYOUT

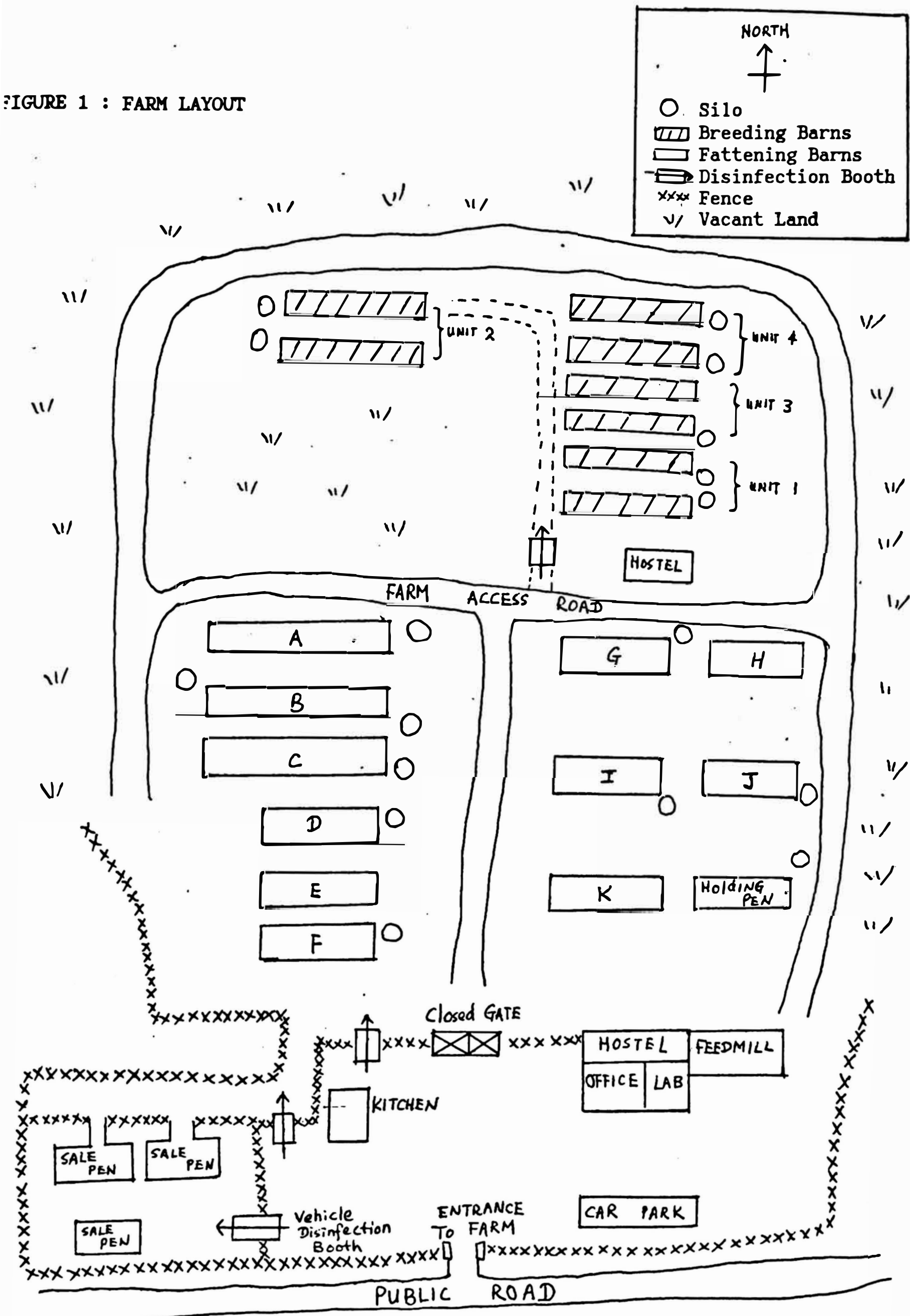
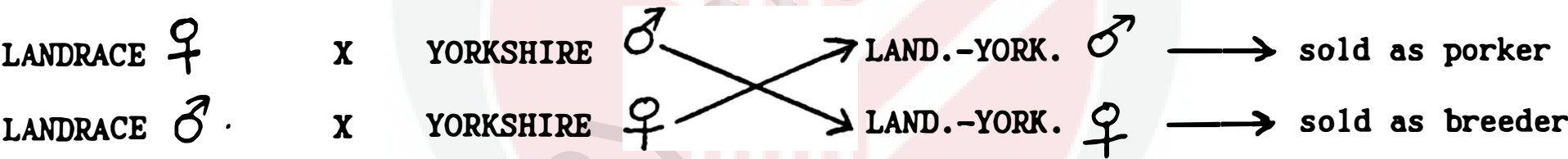


FIGURE 2 : BREEDING POLICY FOR EACH PRODUCTION UNIT
=====

UNIT 1 (PURE BREED BREEDER PRODUCTION UNIT)



UNIT 2 (CROSSBRED BREEDER PRODUCTION UNIT)



UNIT 3 & (PORKER PRODUCTION UNIT)

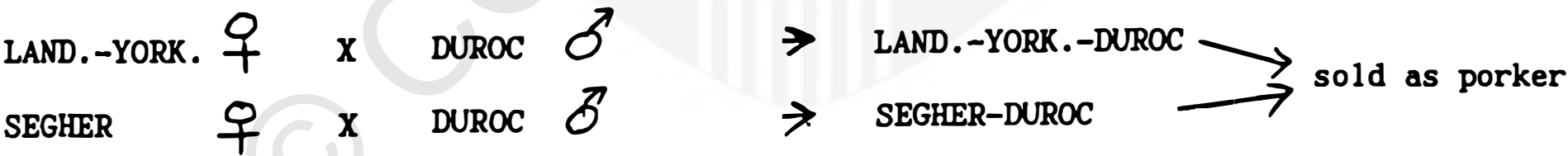


FIGURE 3 : COST OF BOAR USAGE PER MATING
=====

	(\$)
Boar usage period : 36 months	-----
1) Each day consumes 2.5kg feed @ \$0.54 /kg	
Total feed consumption (2.5x\$0.54x30x36)	1458.00
2) Cost of boar	800.00
3) Labour cost per boar per month : \$ 3	
Total labour cost (\$ 3 x 36)	108.00
4) Monthly depreciation of boar pen : \$ 5	
Total depreciation (\$ 5 x36)	180.00

TOTAL MAINTENANCE COST	2546.00
	=====.

Assume 15 matings per month per boar,
total matings per boar : 15 x 36 = 540

$$\begin{aligned} &\$ 2546.00 \\ \text{Thus, cost per mating} &= \frac{\text{-----}}{540} \\ &= \$ 4.71 \end{aligned}$$

COST OF PER MATING IN RELATION TO FREQUENCY OF BOAR
USAGE IN A MONTH :

	Frequency of boar usage per month								
	2	4	6	8	10	12	14	16	18
	-----		-----		-----		-----	-----	-----
COST PER MATING (\$)	35.36	17.68	11.79	8.84	7.07	5.89	5.05	4.42	3.93

FIGURE 4 : COST OF PRODUCTION OF ONE WEANED PIGLET

=====

	(\$)
Ave. breeding life span of sow : 36 months	
(1) Cost of gilt	350.00
(2) Feed consumption @ \$1.36 / day	
Total feed cost (\$ 1.36x30x36)	1468.80
(3) Farrowing index in farm : 2.1	
In 3 years produces 6.3 litters,	
Thus, total cost of services (\$7.07x2x6.3)	89.08
(4) Labour cost per sow per month : \$2	
Total labour cost (\$2x36)	72.00
(5) Depreciation of gestation stall per sow / month : \$2	
Total depreciation cost (\$2x36)	72.00
(6) Labour cost in farrowing pen / sow / month : \$6	
Period in farrowing pen : 1 month / litter	
Total labour cost (\$6x6.3)	37.80
(7) Depreciation of farrowing pen : \$10 / month	
Total depreciation cost (\$10x6.3)	63.00
TOTAL MAINTENANCE COST IN 36 MONTHS	2152.68
(8) Salvage value of cull sow	150.00
NET MAINTENANCE COST OF SOW	2002.68
Ave. no. of weaners / litter : 8.2	
Total no. of weaners / sow = 8.2 x6.3	
= 52	

Thus, cost of production of one weaned piglet = $\frac{\$2002.68}{52}$

= \$38.51

FIGURE 5 : COST OF PRODUCTION OF ONE PORKER
=====

	(\$)
1) Cost of weaned piglet	38.51
2) Feed cost :	
(i) prestarter mash : 5 kg @ \$0.70 /kg	\$3.50
(ii) starter mash : 30 kg @ \$0.54 / KG	\$16.20
(iii) grower mash : 85 kg @ \$0.62 / kg	\$52.70
(iv) finisher mash : 160 kg @ \$0.54 /kg	\$86.40
TOTAL FEED CONSUMED :280 kg at the cost of	158.80
3) Labour cost per porker : \$1 /monnth	
Labour cost in 5.5 months	5.50
4) Depreciation of pen per porker : \$2 / month	
Depreciation cost in 5.5 month	11.00
5) Medication & vaccination cost per porker	2.00
TOTAL COST PER PORKER	215.81

Ave. market weight at 5.5 month is 85 kg,

\$ 215.81

therefore, cost of per kg live weight = $\frac{\text{-----}}{85}$

= \$ 2.54

FIGURE 6 : CALCULATION OF GROSS MARGIN OF FARM FROM JAN. 1988 TO SEPT. 1988

TOTAL INCOME

=====

CLASSES OF ANIMAL SOLD	TOTAL HEAD SOLD	AVE.EX-FARM PRICE (\$)	TOTAL SALE (\$)

* Porker	11002	3.06/kg	2861620.20
Breeder	124	800/head	99200.00
culled	622	500/head	311000.00
	52	100/head	5200.00
	248	200/head	49600.00
			3,326,620.20
			=====

OPERATING COST

=====

	(\$)	(%)
**Feed cost	1881257.20	82.8%
Wages (\$16000/mth)	144000.00	6.3%
Electricity (\$4000/mth)	36000.00	1.6%
Vaccine, drugs (\$10000/mth)	90000.00	4.0%
Replacement cost: Boar	20000.00	0.9%
Sow	100000.00	4.4%
	-----	-----
	2,271,257.20	100%
	=====	=====

GROSS MARGIN = TOTAL INCOME - OPERATING COST

= \$ 3,326,620.20 - \$ 2,271,257.20

= \$ 1,055,363.00

i.e. Gross margin / month = \$ 117,262.56

*Ave. weight per head porker marketed is 85 kg

** Feed cost :

- prestarter mash : \$ 0.70 / kg
- starter mash : \$ 0.54 /kg
- groewer mash : \$ 0.62 / kg
- finisher mash : \$ 0.54 / kg
- gestation mash : \$ 0.56 / kg
- lactation mash : \$ 0.62 / kg

FIGURE 7 : ANALYSIS REQUIRED TO ASSESS EFFICIENCY OF WEANER PRODUCTION
=====

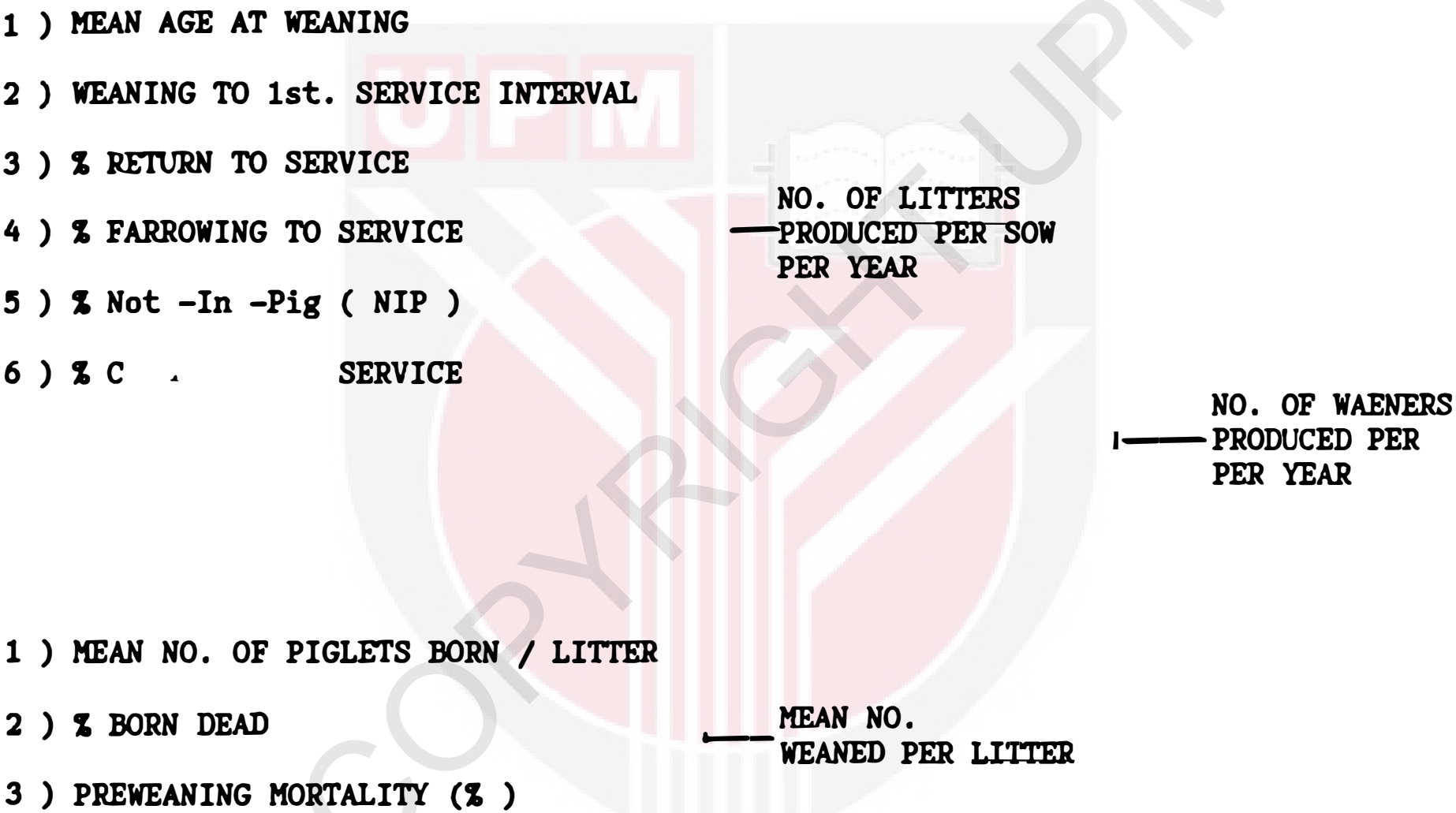
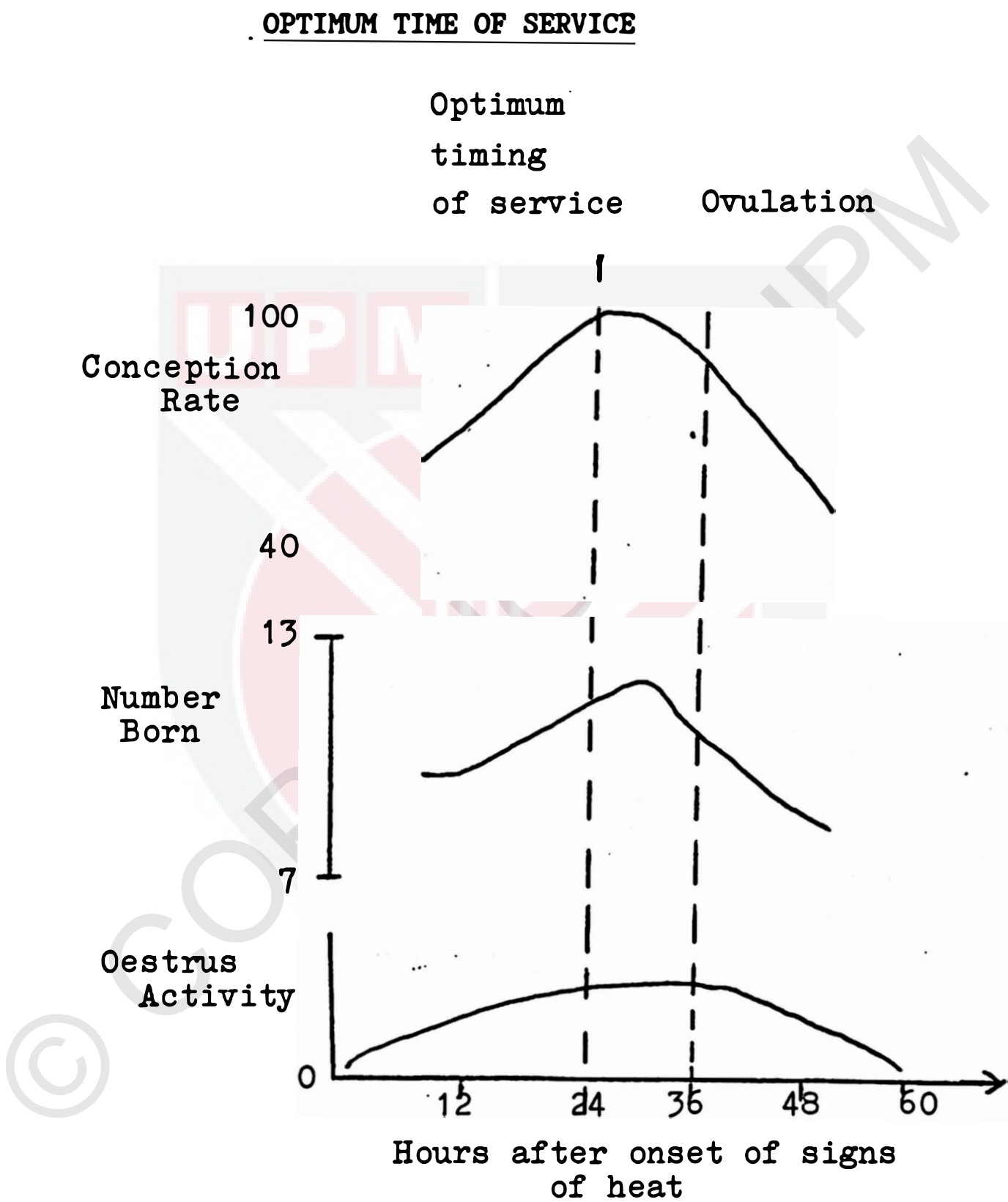


Figure : 8



Sperm : viable for 24 hours
Ova : viable for 5 hours
Ovulation : 36 - 40 hours after onset of heat

English et al. (1977)

TABLE 1 :FLOOR SPACE FOR THE VARIOUS GROUPS OF PIG

	TYPE OF FLOORING	TOTAL ANIMALS PER PEN	FLOOR SPACE PER ANIMAL (m)	PROPOSED FLOOR SPACE (m)
A. FATTENING BARN				
(1) Finisher Pen				
House A, B	concrete	17	1.08	1.38
House D, E, F	1/2 slatted	16	0.93	0.74
House I, K	3/4 slatted	10	0.97	0.74
(2) Grower Pen				
House C	concrete	17	*0.53	1.15
House J	3/4 slatted	17	0.57	0.46-0.56
(3) Weaner Pen				
House G, H	fully slatted	17	0.34	0.28-0.37
B. BREEDING-GESTATION BARN				
(1) Gestation Stall		1	1.1	1.44
(2) Gilt Pen		4	1.8	2.16
(3) Boar Pen		1	4.4	5.40
C. FARROWING BARN				
(1) Farrowing pen			5.4	4.32
(2) Farrowing crate			1.2	1.4

*Inadequate

TABLE 2 : FEEDING SPACE AND DRINKER* FOR PIGS IN FATTENING BARN

		NO. OF IND. FEEDING SPACE	PIGS PER PEN	FEEDING SPACE PER PIG OR PER IRON BAR (cm)	** PROPOSED FEEDING SPACE PER PIG (cm)
TYPES OF FEEDER					
FINISHER PEN					
House A, B	Feed trough without iron bar		17	23	25 -30
House D, E, F	Feed trough with iron bar	11	16	25	25 - 30
House I, K	Feed trough with iron bar	7	10	18	25 -30
GROWER PEN					
House C	Feed trough with iron bar	13	17	14	15 - 20
WEANER PEN					
House G, H	Tubular feeder		17	5.63	7.5

* One automatic drinker is installed in each pen

** Brent (1986)

-35	Prestarter	Ad -lib
-70	Starter	Ad -lib
-120	Grower	Ad -lib
-market	Finisher	2.0 - 2.2
	Gestation mash	2.0 -2.5
	Gestation mash	2.5 -3.0
	Gestation mash	1.8 -2.0
	Gestation mash & Lactation mash	

below :

Gest. mash (2kg) → ←
 ↓
 7th day

→ ←
 ↓
 100th day

Lact. mash (2-2.2kg) → ←
 ↓
 115th day (Farrowing)

Lact. m (3-3.5kg) or ad-lib
 ↓
 140th day (Weaning)

Piglet	10 -35	Prestarter	Ad -lib
Weaner	36 -70	Starter	Ad -lib
Grower	71 -120	Grower	Ad -lib
Finisher	120 -market	Finisher	2.0 - 2.2
Young Boar		Gestation mash	2.0 -2.5
Mature Boar		Gestation mash	2.5 -3.0
Gilt		Gestation mash	1.8 -2.0

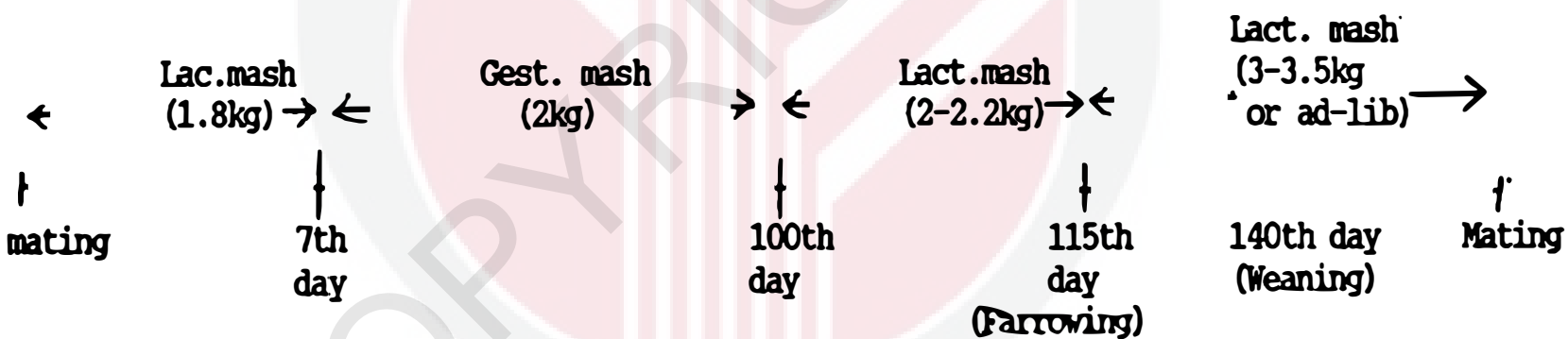


TABLE 4 : VACCINATION PROGRAM IN THE FARM

VACCINE	GROUPS OF PIG	TIME OF VACCINATION
Swine Fever	Grower - finisher Young gilt Dry sow	6 weeks old Before mating (6 month) After weaning
Pseudorabies	Gilt Sow	7 months old 1 month before farrowing
Enterobacillosis	Gilt Sow	Before mating 2 weeks - 1 month before farrowing

TABLE : 5 MEDICATION PROGRAM / HERD HEALTH ROUTINE IN THE FARM

GROUPS OF PIG	MEDICATION / ROUTINE	ADMINISTRATION TIME	ROUTE OF ADMINISTRATION
Piglet	Iron solution	2nd. day of life	IM
	Cripping of needle teeth	1st. day of life	
	Cutting of navel & docking	1st. day of life	
	Castration	10 days old	
	* Oral & parenteral antibiotic	Whenever diarrhoea observed	Oral / IM
Sow	250 [®] (chlortetracycline sulpha drug penicillin)	Lactation feed	In feed
	Oxtra [®] (oxytetracycline HCL)	Immediately after farrowing	IM
Weaner	Porect [®] (OP compound)	Before entering weaner pen	Pour on
Newly introduced breeder	Porect [®]	Quarantine	Pour on

*

Oral antibiotics use in farm :

Trimosul[®] (Tmp, sulphadiazine, CHPC)
 Mecadox[®] (Carbadox)

Parenteral antibiotics use in farm :

Compitol[®] (Sulfamonomethoxine)
 Coldim[®] (Colistine, Dimetridazole)
 Spasmentral[®] (Benzetimide)
 Genta F[®] (Gentamycin, Flumequine)

TABLE 6 : SANITATION MEASURES IN THE FARM

	FREQUENCY / TIMING	CHEMICAL USED
Disinfection of premises	2 - 3 Times / week	Lindores [@] (Iodophor)
Lining of farrowing pen	After farrowing	Soda
Lining of corridor	Whenever necessary	
Footbath	Always available	Antec / Lysol
Vehicles disinfection	Each entry and leaving of farm	Antec / Lysol
Flushing of drain	Whenever necessary	

TABLE 7 : THE FARM PERFORMANCE FOR 1987 AND 1988

	1987 (1 JAN - 31 DEC)	1988 (1 JAN - 31 OCT)
BREEDING PERFORMANCE		
Total no. of services	3018	2670
(1) Percent repeat service	20.8	20.5
(2) Conception rate	79.2	79.5
(3) Percent multiple mating	94.0	98.0
(4) Percent sow bred by 7 days	78.3	75.6
(5) Weaning to 1st. service interval interval	8.4	8.8
FARROWING PERFORMANCE		
No. of sow farrowed	2137	1931
(1) Farrowing interval	159	162
(2) Farrowing rate	71.9	69.3
Not-in-pig (NIP)	7.3	10.2
(3) Ave. total pigs / litter	9.6	9.7
(4) Ave. pigs born alive / litter	9.0	9.0
(5) Ave. stillborn pigs /litter	0.5	0.6
% stillborn pigs	5.3	6.1
(6) Ave. mummies per litter	0.1	0.1
% mummies per litter	0.7	0.6
(7) litters /mated female /year	2.11	2.10
(8) Litters / female / year	2.10	2.10
WEANING PERFORMANCE		
No. of litters weaned	2089	1890
(1) Pigs weaned / litter	8.0	8.2
(2) Preweaning mortality	12.7	9.1
(3) Pigs weaned / mated female /year	16.4	16.9
(4) Pigs weaned / female /year	16.4	16.8

TABLE 8 : COMPARISON OF THE PERFORMANCE OF THE FARM TO LOCAL

AND RECOMMENDED STANDARD PERFORMANCE

	Farm Performance (1987-1988)	**Local Performance (22 farms)	***Top Local Performance (4 farms)	STD. PERFORMANCE Targets	Interference Level
BREEDING PERFORMANCE					
(1) Percent repeat service	* 20.6	17.8	9.4	6	12
(2) Conception rate	79.4	82.2	90.6	95	91
(3) Percent multiple mating	# 95.9	50.4	26.3		
(4) Percent sow bred by 7 days	77.0				
(5) Weaning to 1st. service interval	8.6	11.1	8.8	7	9
FARROWING PERFORMANCE					
(1) Farrowing interval	160	161	156		
(2) Farrowing rate	*70.6	77.6	87.4	89	80
Not-in-pig (NIP)	*8.8	4.6	3.2		
(3) Ave. total pigs / litter	9.6				
(4) Ave. pigs born alive / litter	9.0	9.1	9.5	10.9	10
(5) Ave. stillborn pigs /litter	0.5	0.6	0.4		
% stillborn pigs	5.7			5	8
Ave. mummies per litter	0.1				
% mummies per litter	0.6			0.5	1
(7) litters /mated female /year	*2.09	2.15	2.38		
(8) Litters / female / year	*2.08	2.13	2.37	2.25	2
WEANING PERFORMANCE					
(1) Pigs weaned / litter	*8.1	8.4	8.7	9.6	9
(2) Preweaning mortality	9.1	13.7	8.9	8-12	12-18
(3) Pigs weaned / mated female /year	16.6	17	21.1		
(4) Pigs weaned / female /year	16.6	16.8	21		

Excellent performance

* Poor performance

** Khoo (1988) :Ave. performance of 22 farms in Malaysia

*** Khoo (1988) : Ave. performance of top 4 farms in Malaysia ranked by
pigs weaned /mated female /year

**** Muirhead (1976)

TABLE 9 :THE SERVICE EFFICIENCY FOR THE 4 UNITS

(1 Nov.87 - 31 Oct. 88)

	UNIT 1	UNIT 2	UNIT 3	UNIT 4
Ave. days to service	37.3	45.2	44.4	37.2
% Days to reservice < 24 days	43.6%	29.0%	37.1%	44.5%
% Days to reservice > 24 days	56.3%	71.1%	63.0%	55.5%

TABLE 10 : BOAR USAGE FOR THE 4 UNITS

(1 JAN 88 - 31 OCT 88)

	UNIT 1		UNIT 2		UNIT 3		UNIT 4		TOTAL	
	No. of boars	%	No. of boars	%	No. of boars	%	No. of boars	%	No. of boars	%
Ave. mating frequency per week										
1 time	3	14.3%	4	23.5%	2	12.5%	2	13.3%	11	15.9%
1-<2 times	8	38.1%	9	52.9%	5	31.3%	5	33.3%	27	39.1%
2-<3 times	9	42.9%	4	23.5%	4	25.0%	8	53.3%	25	36.2%
3-<4 times	1	4.8	0		5	31.3%	0		6	8.7%
4-<5 times	0		0		0		0		0	
5 times	0		0		0		0		0	
TOTAL	21	100%	17	100%	16	100%	15	100%	69	100%

Note : Only frequency of boar usage for boars that are
still present in farm by 31 Oct. 88 are taken into account.

TABLE 11 : HERD END INVENTORY FOR BOARS AND SOWS AT
31 OCT. 1988 FOR EACH UNIT IN FARM

UNIT	No.of boars	No. of sows	Boar-sow ratio
1	21	353	1 : 17
	17	210	1 : 12
	16	327	1 : 20
	15	297	1 : 20
total	69	1287	1 : 19