

## SWINE BREEDING AND PRODUCTION IN MALAYSIA

Moktir Singh Gardir Singh and Rachel Wai Jing Fong  
Pig Unit, Livestock Commodity Development Division,  
Department of Veterinary Science, Malaysia  
e-mail: [moktir@dvs.gov.my](mailto:moktir@dvs.gov.my), [rachelfong@dvs.gov.my](mailto:rachelfong@dvs.gov.my)

### ABSTRACT

*The swine industry in Malaysia is 96% self-sufficient in local pork demand, with 544 farms and close to 1.4 million standing pig population. Common pig breeds in Malaysia comprise of Duroc, Landrace and Large White. Importation of pig breeds is widely practiced by Malaysian pig stock breeders, which produce pigs to be sold to smaller farms for genetic improvement. Two and three way crosses are common practices in Malaysia, and farmers take into consideration the selection index which incorporates indexes of a few meat traits with economic value while selecting for the breeder stock. The main mode of breeding is via artificial insemination, whereas natural mating is less commonly practiced in Malaysia. Breeding parameters have improved as the pig management and waste management are given great emphasis. However, farmers are still struggling with diseases which are hard to eradicate from the farm especially in weaners as maternal immunity wanes after weaning. Sows are also prone to diseases such as Thin Sow Syndrome and Agalactia. The swine industry is moving towards adoption of Pig Farming Area (PFA) and Modern Pig Farming Systems, but is greatly limited by the non- Foot- and- Mouth- Disease (FMD) free status*

Keywords: Swine, Pig, Breeding, Artificial Insemination, Malaysia, Production

### INTRODUCTION

The swine industry in Peninsular Malaysia is a fairly developed one. The main driving force in the industry is the pork consuming population (PCP) in Malaysia, and is statistically 40% of the 28 million populations in Malaysia. In 2013, Malaysia is able to achieve a 96.31% of pork self-sufficiency as the standing pig population (SPP) is now 1,386,520 heads with a total of 542 pig farms in the country. This supplies 197,319 metric tons of pork for local consumptions last year. The average cost of production for pork was RM 6.23/kg (2013) and the ex-farm pig value amounts to RM 1991.9 million (2013) (Statistik Industri Babi, 2014).

In Malaysia, almost all pig farms are licensed for operation. The Department of Veterinary Services (DVS) encourages Modern Pig Farming (MPF) system whereby pigs are kept in closed house systems and the concept of zero discharge was introduced whereby all waste water is contained within the farm and there is no discharge of effluent from the farm into the public waterways. Well managed farms are generally the larger scale farms which are regularly audited, and have good animal husbandry practice in place and are certified under the Livestock Farm Accreditation Scheme "SALT", also having properly written Standard Operation Procedure (SOP). Generally poorly managed farms have low sow population, low levels of biosecurity and hence are less productive.



Fig. 1. Examples of Bad Farms



Fig. 2. Examples of well managed farms

### Common breeds

Pig breeds are divided into two main lines in Malaysia for cross breeding purposes namely the male line and the female line. Cross breeding produces hybrid vigor or heterosis by combining desirable traits of two or more breeds to produce a pig with more optimum traits (DVS Malaysia, 1986).

In Malaysia, the male line comprises of Duroc, Hampshire, Pietrain and to some extent the Large White. The male line is noted for its:

- (i) Carcass merits- i.e. Length, loin eye area, lean cuts
- (ii) Feed conversion ratio

The female line comprises of predominantly Landrace and Large White and they are noted for the characteristics below:

- (i) Good mothering ability
- (ii) Good temperament
- (iii) Large litter size

For commercial crosses, two- way and three-way crosses are much favored to cater to the preference of meat type of the consuming population, larger litter size and good carcass characteristics. Refer to Table 1 which shows the more common types of crosses.

Table 1 below shows the more common commercial crosses (DVS Malaysia, 1986)

Breed	Common usage for porker production	Common commercial crosses	
		2 Way	3 Way
Duroc (D)	Male line	LW x LR	D x LR/ LW
Large White (LW)	Male/Female line	LR x LW	D x LW/ LR
Landrace (LR)	Female line	D x LR	
Chester White (CW)	Male line	D x CW	P x CW/LR
Hampshire (H)	Male line		P x LW/LR
Pietrain (P)	Male line		

Several economically important traits as listed in Table 2 are the basis of farmers for pig breeding selection.

Table 2. Heritability estimates of various traits (DVS Malaysia, 1986)

Traits	Heritability (%)	Degree of heritability (arbitrary)
<b>Performance traits</b>		
➤ Litter size at birth	15	Low
➤ Post weaning rate of weight gain	29	Medium
➤ Feed per unit of weight gain	31	Medium
➤ Litter size at weaning	12	Low
➤ Litter weight at weaning	17	Low
<b>Anatomical traits</b>		
➤ Length of body	59	High
➤ Length of legs	65	High
➤ Number of vertebrae	75	High
➤ Number of nipples	15	Low
<b>Carcass traits</b>		
➤ Length	59	High
➤ Loin eye area	48	High
➤ Ham weight	58	High
➤ Shoulder weight	47	High
➤ Fat cuts	63	High
➤ Lean cuts	31	High

The potential stock is then selected after taking into consideration a selection index as below :

$$I = 270 + (100 \times ADG) - (150 \times \text{Backfat}) - (35 \times \text{Feed per gain})$$

I: Selection Index; ADG: Average Daily Gain in pounds; Backfat: Backfat thickness in inches; Feed per gain: Pound of feed for pound of weight gain

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This selection index incorporates several traits that are of economic importance and the heritability of each trait. See Table 3 as an example of using the selection index. (DVS Malaysia, 1986)

Table 3. Selection index (DVS Malaysia, 1986)

Performance	Average Daily Gain	Backfat	Feed per gain	Index
Boar A	1.8	1.5	3.2	113
Boar B	1.6	1.1	2.6	174

Based on the example above, farmers will be able to choose their breeding stock based on their selection preferences. Boar B will be chosen if the selection were to be weighted towards selection for lower back fat thickness; whereas, Boar A would have been selected if the index were to be weighted towards average daily gain. (DVS Malaysia, 1986).

Prior to the advent of Nipah virus in the country, the Department of Veterinary Service Malaysia has designated stock farm since 1926 to produce cross-bred breeder animals to cater to genetic improvement for local farmers. Now, farmers are entirely dependent on imported breeder pigs from countries around the world for genetics improvement. Table 4 shows the number of countries of pig breeders' imports into Malaysia. Local breeding companies in Malaysia import live pig breeders to produce a purebred imported stock, and sell them to commercial farms. Farmers on farm normally maintain a portion of their Large White or Landrace pure, for their farm replacements. Inbreeding is a problem in Malaysian farms and are generally managed by introducing pure bred Large White or Landrace pure bred into the population of breeding herd. (DVS Malaysia, 1991).

Table 4. Countries of pig breeders import in Malaysia from 2010 to 2013 (number of pigs) (Statistik Industri Babi, 2014)

Countries	2010 (Pigs)	Value (RM)	2011 (Pig)	Value (RM)	2012 (Pig)	Value (RM)	2013 (Pig)	Value (RM)
Canada	60	420,000.00	0	0	0	0	0	0
Denmark	0	0	0	0	60	430,080.00	0	0
France	0	0	0	0	0	0	45	2,250.00
USA	91	383,439.00	116	709,125.00	0	0	239	739,263.31
<b>Total</b>	<b>151</b>	<b>803,439.00</b>	<b>116</b>	<b>709,125.00</b>	<b>60</b>	<b>430,080.00</b>	<b>284</b>	<b>736,513.31</b>

In the year 2013, the local swine industry imported some 284 pig breeders last year to infuse new genetics into the industry. Unlike in cattle, whereby progeny testing is established to evaluate the genetic potential of the animal, the breeder pig itself is evaluated phenotypically for breeding purposes, regardless of the progeny testing or referencing to the boar or sow. Record keeping are widely practiced in pig farms in Malaysia using the herd management software such as Pig Champ which allows farmers to record vital breeding information such as animal type, birth weight, litter size, weaning weight (3- 4 months), number of weaned and adult weight (5- 6 months or 80-90kg).

## Artificial insemination (AI)

### Boar selection

In Malaysia, the selection of young boars is done at the age of 220 days. There are a few characteristics that needed to be examined in order to ensure a fit and healthy boar. These include, the boar must be physically healthy, able mate on a dummy and have enough libido, free of genital abnormalities, have good semen quality and quantity, have morphologically good semen, have no hereditary abnormalities (genetical defects with good non-return-results). Boars are taught to mount on the dummy as young as five months old. During training of the boar, genitalia abnormalities can be examined (i.e. small testicles or penis, persisting frenulum, no or insufficient penal erection. (Ing, H.S., n.d.) Refer to Fig. 3, Fig. 4, Fig. 5, and Fig. 6 below. Freshly collected semen will be analyzed. Semen motility should also be inspected two days post collection to confirm sperm quality. Refer to Table 5 as below for parameters to sperm analysis.

Table 5. Minimum values of Fresh, unextended Boar Semen for use in artificial insemination, AI. (Palmer, H.J. *et.al.*,1943)

Semen Variables	Value
Appearance	Milky to creamy consistency
Colour	Gray-white to white in colour
Total sperm numbers	>15 x 10 <sup>9</sup> sperm/ ejaculation
Gross motility (unextended)	≥ 70%
Abnormal morphology - Cytoplasmic droplets	≥ 20% <15%



Fig. 3



Fig. 4



Fig. 5



Fig. 6

Figs. 3, 4, 5, 6. Dummy riding, genitalia examination, semen evaluation (Courtesy of Chau Yang Farming, Perak, Malaysia)

All matings of the boar are recorded, and the first 50 matings are analyzed for non- returning rate. If boar has genitalia abnormalities or poor non-returning rate, the boar is a candidate for culling. (Ing, H.S., n.d.).

**Heat detection**

Gilts develop sexual maturity by the age of seven months and 90% of weaned sows return to estrus three to 10 days after weaning. When the gilt or sow is on heat, it will “stay” for the boar, and the boar is able to climb on it. Refer to Table 6 below for heat detection signs.

Table 6. Heat detection signs (Ing, H.S., n.d.)

Heat signs	Too early	In time	Too late
<b>Vulva</b>	Heavily swollen, dark red in color, no or few slime secretion	Less swollen, less red in color and slime secretion	Not swollen anymore, normal in color and slime is sticky
<b>Reflex</b>	Female stays if the herdsman is pushing the sides, it does allow a boar to climb, but it does not stay properly for the herdsman	Female stays clearly for the herdsman and shows a remarkable moving of its ears	Female does not stay for the herdsman anymore, but still allows boar to climb
<b>Behavior</b>	Female is restless and climbs other females	Female is quiet, is climbing by other females and stays	No signs of climbing on other pigs

Sows will be inseminated within 24hours from the first positive heat detection as described above. For gilts, AI is done within 16 hours post first positive heat detection. Best time for heat inspection is after feeding whereby the boars are generally used for heat detection by letting it run up the stall passages in viewed by the sow with nose to nose contact. Herdsman will observe and detect heat in sows in the late afternoon with the presence of the boar, and once more at early morning next day without the presence of the boar. Sows that stand for herdsman today will be inseminated early morning the next day. Gilts however are doubled checked with boar both in the late afternoon and early morning the next day with the presence of the boar. Gilts will be inseminated if there is staying reflex. Refer to Diagram 1 for Insemination period, Diagram 2, 3 for insemination techniques. Fig. 7 and Fig. 8 for AI in Sows.

Diagram 1. Artificial insemination period (Ing, H.S., n.d.)

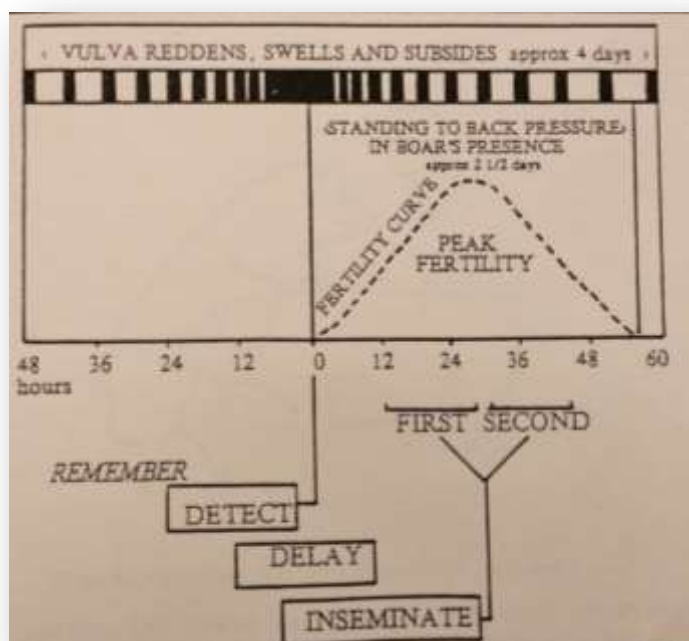




Diagram 2. Artificial Insemination techniques techniques

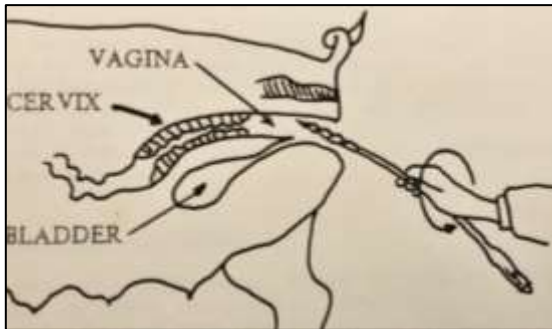


Diagram 2: A sterile AI catheter is inserted into the vulva at 45° from the horizontal plane until it reaches the cervix. The personal will have an obstructed feeling on the tip of the catheter. At this point, twist the catheter close-wise to imitate the nature of the corkscrew penile tip of the boar for penetration pass the cervix. (Ing, H.S., n.d.)

Diagram 3. Artificial Insemination

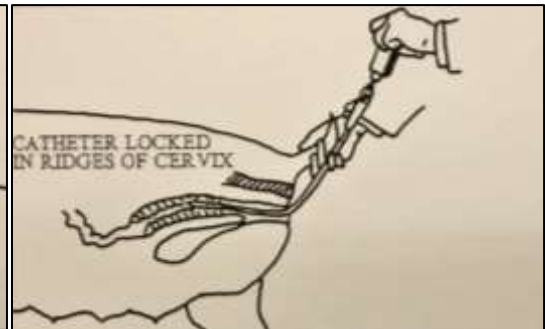


Diagram 3: The AI catheter is adjusted to the level of the tail and raised up on an upward angle for gravity drainage of semen into the uterus. The AI catheter can then be anchored on the buddy holder. Minimize any disturbances on the sow/gilt, and encourage for natural draining of the semen. (Ing, H.S., n.d.)

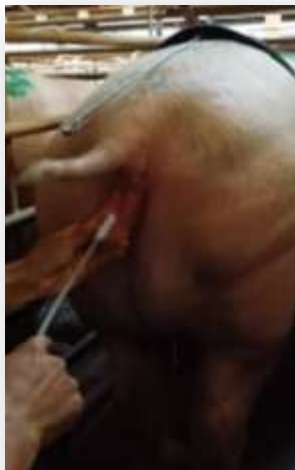


Fig. 7



Fig. 8

Figs. 7, 8. Artificial Insemination in Sows (Courtesy of Chau Yang Farming, Perak, Malaysia)

**Breeding parameter**

The average sow performance and the average farm production performance in Malaysia are shown below in Table 7 and Table 8.

Table 7. Average Sow performance in Malaysia (P.Sungnak, 2011)

<b>Average sow performance</b>	
Total litter size	10.4
Average number of piglets born alive	9.84
Litter size at weaning	9.13
Piglet mortality rate	8.92%
Farrowing Index	2.4
Pigs weaned per sow per year	18.08

Table 8. Table of average farm production performance (P.Sungnak, 2011)

<b>Average farm production performance (2011)</b>	
Average market weight	100-110 kg
Average age at market	195 days (6.5 months)
Breed of pigs used	Duroc, Yorkshire, Large White
Repeat service	21.47%
Weaning to first service interval	8.51 days
Sow bred by 7 days	82.51%
Average pig/ litter	10.39
Average parity of sows	4.69
Farrowing rate	71.35%
Litters/mated female/ year	2.02
Average pigs weaned/ litter	9.13
Pre-weaning mortality	8.92
Average weaning weight (kg)	7.24kg
Pigs weaned/ mated female/ year	18.08
Replacement	39.55%
Culling rate	25.54%
Dressing Percentage	75%
Extraction Rate	1.65
Feed Conversion Ratio	3.08
Average Daily Gain (From Wean to Market)	680.9 g/day



## **Management of sows, boars, weaners, growers, finishers**

### ***Management of dry sows***

After weaning, the sows will be relocated to either an individual dry sow stalls or in a group sow pen of four to five dry sows for re-mating depending on the facilities in the farm. Normally, herdsman will check both the recently weaned sows and the mated sows twice a day for signs of return to heat. Heat detection is done twice a day, once early in the morning and another time in the late afternoon after feeding. Sows are expected to return to heat between seven and 10 days post weaning. Some better managed farms use boar for heat detection. Frequent manual heat detection is important in Malaysia, as farmers do not use any other pregnancy detectors to ascertain pregnancy status of the mated females. (DVS Malaysia, 1991) Returning of heat of the mated sow will necessitate a second mating within 24 hours. Hand mating or artificial insemination is a common practice in Malaysia, whilst group mating without assistance is not a common practice.

### ***Management of a gestating sow***

After the sow is mated, it will be monitored closely for 30 days for any signs of re-cycling. The animal is assumed to be pregnant if there is no re-cycling of heat. The pregnant sow will continue to be in the same stall until one week before expected farrowing date where it will be relocated to a farrowing crate. Flushing is not a common practice and likewise feed reduction during the first 30days post-mating is also not being practiced by farmers in Malaysia (DVS Malaysia, 1991). A gestating sow is commonly fed a standard 1.8 kg to 2.6 kg feed daily throughout gestation without manual adjustments of feed according to body weight.

### ***Management of a lactating sow***

Lactating sows are given extra but a fixed amount of feed (3.0kg to 5.0 kg), regardless of the number of piglets she is nursing. But feed intake is normally 4.0kg to 4.5kg due to loss of appetite and sometimes due to heat stress. (DVS Malaysia, 1991).

### ***Management of suckling piglets***

Suckling period will take place from day one till before day 35. Most farmers do not provide assistance at time of farrowing as assistance during farrowing was found to be related to higher incidence of post-partum pyometra. At day old, iron supplement of 20mg is given to the piglet parenterally. Second injection of iron is not practiced (DVS Malaysia, 1991). Teeth clipping and tail docking of the piglets are also carried out on the day of birth. If ear notching is practiced, it is also carried out at the same time. The piglets are kept warm during the first one or two weeks and some farms till the piglets weaned. Heating is provided by brooding boxes or by an overhanging heating electric lamp. Creep feed is introduced when piglets are 10-14 day of age in the farrowing pen. During the 1 to 2 weeks of age, piglets are also being castrated. Weaning often practices before fiveweeks of age, to enable the sow to mated again for maximum productivity. Swine fever vaccinations is given either before or after weaning (at about 21 to 35 days).

### ***Management of weaners***

In Malaysia, piglets are weaned at ages from day 21 up to day 35 from birth. Commonly sow and weaners are removed from the farrowing crate for the disinfection of the farrowing crate. Weaners will be placed in either close house or open house system. In Malaysia, there are only 37 close house farms (6% of total pig farms in Peninsular Malaysia). So pig farms are mostly operating as open house systems. The average weaning weight is approximately 6-7kg and but farmers generally do not weight those weaners and grouping of weaners is done base on size by visual inspection into different pens with 20-50 weaners per pen (DVS Malaysia, 1991). Creep feeding is normally continued for another week before changing entire to starter feed abruptly.

### ***Management of the growers and finishers***

This period of grower till finisher describes the period from Day 60 to market age (Day 180), whereby the live weight is around 110kg. When the pig reaches around 50kg, feed restrictions are imposed to prevent production of excessively fat pigs. (DVS Malaysia, 1991).

### ***Management of gilts***

Gilts sexually mature at the age of 7 to 8 months. Prior to this age, farmers will be selecting replacement gilts from their porker herd (typically two-way crosses of 75 to 85kg gilts) (DVS Malaysia, 1991). These selected gilts will then be separated from their original gilt pens to a pen dedicated for breeding purposes. Twice a day heat testing will be done, and their first service is usually when they weigh at 100kg (DVS Malaysia, 1991). Some farmers do practice flushing while others do not.

### ***Management of boars***

The ratio of boar to sow is generally 1 to 70. Farms generally keep more than optimal numbers of boars. This is because more often than not, the favorite boars are used more often than the less favored ones. Replacement boars are generally imported from overseas or locally at around 20-40 kg liveweight. Replacement boar selections are generally via visual inspection and lesser emphasis is placed on the performance record of the boar. When the boar reaches a sexually mature stage at 7 months of age, it will be trained to mount of the dummy. When the boar is 9 to 12 months old (or at least 120 kg liveweight), it will be used once or twice weekly for semen collection. All boars on farm are placed in individual pens usually with 40 to 60 square feet. Most farms do not provide exercise paddock or yard for the boars to exercise (DVS Malaysia, 1991).

### **Washing practices and waste management**

Washing pens to clean pig wastes is the main aim of getting rid of pig wastes, as deep litter system is not being practiced in Malaysia. On average 40L of water will be used for every SPP on farm per day. This brings importance to good waste management as there is a raise of public concern to environmental pollution caused by pig farms in the face of urban encroachment. Some farms adopted Toyo Bioreactor to treat waste. This enables them to reuse the water for pen cleaning. The solids are being used as compost in the palm oil plantation. Effective Microorganism (EM) is also adopted into the system to improve waste management. Biogas is also being used whereby pig waste is digested and the by-products of the process generate electricity which can be used on farm. The Department of Veterinary Services (DVS) Malaysia facilitates public health monitoring by carrying out annual Biochemical Oxygen Demand (BOD) water testing to monitor the pollution level of effluent discharged from the pig farms (DVS Malaysia, 1991).

### **Common diseases in Malaysia**

Pig farmers struggle with several common diseases, which are associated with the particular stages of pig's life. To date there is no epidemic disease outbreak like Nipah 1998 incident reported.

At pre-weaners stage, the most common disease in Malaysia is pre-weaning diarrhea. Primary predisposing factor can be attributed to poor management, making piglets more susceptible as they are being exposed to large numbers of pathogenic microorganisms and stress factors which lowers the immune system of piglets. (Too, 1997). The net result of diarrhea leads to dehydration and acidosis leading to death in piglets. Pre-weaning mortality in piglet in Malaysia is still approximately 8%. Table 9 below depicts the identifying features of different aetiology of pre-weaning diarrhea.

Table 9. Features of pre-weaning diarrhea in piglets

Aetiology of preweaning diarrhea in piglets	Features of diarrhoea			
	Day	Features	Diagnosis	Treatment and control
<b>Enteric colibacillosis (E.coli- ETEC)</b>	Starts 2-3 hours after birth, peaks on Day 3	Watery diarrhea  Variable Colour : (Clear, whitish, shades of brown)  Litters of younger parity sows	- Alkaline pH of faeces (secretory diarrhea)  - ELISA on diarrhoea  - Faeces culture and Isolation of clinically infected piglets for enterotoxigenic E.coli  - Serology for serotyping	Rx: Supportive  Control:  - Hygiene improvement of farrowing pens (dry, warm for piglets, raised pens, disinfected)  - Quarantine and batch farrowing, 1week of emptying before next batch of sows move in  - Vaccination (killed whole cell bacterins or purified frimbial)IM/SQ, Dose 1 (4-6 weeks before farrowing), Dose 2 (1-2 weeks before farrowing).
<b>Porcine Rotavirus</b>	1 week <age<5 weeks, peaks at 1-3 weeks	- watery to pasty  - colour: yellow with white material  - Endemic, but most are subclinical, gilt litters are most commonly affected. Diarrhea only last for 2-3 days	- > 7days of age diarrhoea  - acidic pH of diarrhea (malabsorption)  -ELISA of faeces for group specific antigen	Control:  - Acclimatizaing pregnant gilts and sows with diarrhea from suckling piglets to build immunity  - Chemical disinfection to reduce viral load (highly resistant): formaldehyde (3.7%, chloramine T 67% or chlorox.

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<p><b>Coccidiosis</b> (<i>Isospora suis</i>)</p>	<p>7days&lt;age&lt;14days</p> <p>Older pigs are carries</p>	<p>-Diarrhoea is fluid or pasty</p> <p>-Colour: Yellow to white</p> <p>Diarrhoea lasting for 4-6 days</p>	<p>-Oocysts (<i>Isospora suis</i>) demonstrated in faeces between 7-14 days of age, collected 2-3days after diarrhea</p> <p>- Post mortem to identify endogenous forms by histological examinations on jejunum and ileum (impression smears)</p>	<p>Amprolium 10-20mg/kg PO at Day 4-5</p> <p>Baycox (toltrazuril) PO Day4</p> <p>-disinfection with bleach 50%/ steam/ ammonia compounds of farrowing house prior to moving of gilts and sows into it.</p>
<p><b>Coronaviral gastroenteritis (transmissible gastroenteritis, TGE)</b></p>	<p>&lt; 3weeks, but can affect pigs of all stages, mortality s 100% in piglets &lt;1 week old</p>	<p>Watery, small curds of undigested milk, malodourous</p> <p>-profuse diarrhea, occasional vomiting, high mortality in pigs under 2 weeks</p> <p>- Lactating sows very sick and inappetant and agalactia</p>	<p>-diarrhoea in all ages of pigs predominantly suckling pigs</p> <p>-serology- antibody detection with ELISA</p> <p>-viral isolation in faeces</p>	<p>-Rx: supportive</p> <p>Control:</p> <p>-Acclimatization of farrowing sow and gilts 2 weeks prior to farrowing</p> <p>-Quarantine incoming herd at least 4 weeks with serological testing</p> <p>-Increase biosecurity</p>

At weaners stage, post-weaning Porcine Multisystemic Wasting Syndrome (PMWS) which causes wasting in weaners from six weeks and onwards. Porcine Circo-Virus-2 (PCV-2) is being associated as the primary cause of the disease. Weaners will gradually lose weight and become emaciated and their hairs become rough and skin appears pale and sometimes jaundice. (Too, 1997) Other concurrent viral infection may co-exist (eg. Porcine Reproductive and Respiratory Syndrome, PRRS or Porcine Parvovirus, PPV). Post weaning mortality will increase to 6-10% instead of the average 3% mortality rate in weaners. Diagnosis is based on histological PCV2 lesions on tissues (lungs, tonsil, spleen, liver and kidney tissues). Grossly, the lungs will be rubbery, spleen and lymph nodes enlarged, kidneys will be swollen with white spots on the surface and carcass will be emaciated and jaundiced.

Another common disease amongst weaners is Classical Swine Fever (CSF) also known as Hog Cholera. CSF is an acute disease, highly contagious amongst weaners, characterized by rapid spread, fever, high morbidity and mortality. The incidence of CSF reduced in Malaysia due to the increased awareness amongst pig farmers and adoption of vaccination programs using an attenuated cell culture (Japanese GPE-strain) vaccine produce by Veterinary Research Institute (VRI) since 1975. (Too, 1997). Farmers are also able to control the incidents of CSF by a complete cessation of swill feeding, replacing it with the Modern Farming intensive systems whereby pigs are fed formulated rations. Importing pig population from herds of known health status and tightening biosecurity levels on farm also greatly reduced the risk of introducing CSF to the herd. CSF is still not

eradicated from Malaysia, and occurrence of CSF can often be attributed to the breakdown of vaccination programs. Maternal antibodies react with vaccines at the first dose during weaning and second dose at three or five months which is able to provide lasting immunity is not a common practice in Malaysia.

At the grower to finisher stage, Porcine Respiratory Disease Complex (PRDC) affects growers more as this is tightly associated with the longer incubation period of the disease after which they get infected in the farrowing crate. This PRDC is commonly seen in growers to finishers and the aetiology revolves around *Mycoplasma hyopneumonia*, *M. haemolytica*, *Pasteurella multocida*, *Bordetella bronchispetica*, *Actinobacillus pleuropneumonia* (APP), Porcine Reproductive and Respiratory Syndrome virus (PRRS). PRDC predisposes these growers to secondary infections which reduce growth performance. Clinical signs are commonly coughing (either wet and productive or dry and persistent coughs) and sneezing with nasal discharge and gradual reduction of weight. This is still a persistent scenario even in a vaccinated herd. The severity of the disease is often only evident at post mortem. *Mycoplasma* sp. associated cases can be distinguished by persistent dry cough with non-uniform herd size. The cranio-ventral lung lobes are normally atelectic with marked airways lymphoid hyperplasia. Serology for antibody titers is able to give an idea of herd infection which will almost always be positive as it is an endemic disease in most herds. For diagnosis, Fluorescence antibody test (FAT) and Immunochemistry (IHC) can be applied to lung tissue, whilst Polymerase chain reaction (PCR) and bacterial culture can be done on airway swab. (Too, 1997) In the case of *Pasteurella multocida*, wet coughs and sneezing will be appreciated. Upon post mortem, grayish fibrinous pneumonia is commonly seen carniaventrally on the lung lobes and variable pleurisy and adhesions in that area. Culture of *Pasteurella multocida* can give an idea of infection, but *Pasteurella multocida* can also be a secondary pathogen. (Too, 1997) APP has two forms, the acute and chronic forms. In acute cases, growers will have high morbidity and high mortality. Common clinical signs in acute cases are high temperatures, dyspnoeic, mouth breathing and perhaps bloody foam from nose. Whereas in chronic cases, growers will have a chronic cough and be ill thirfted. APP can be distinguished from the other PRDC aetiologies by observing the lesions at post mortems and by culture lung lesions to isolate the agent. Most commonly, firm and necrotic pneumonia will be seen on the diaphragmatic lung lobes. Pleural adhesion can be seen in chronic cases. For prevention, carriers should be identified and removed from the herd. This can be done by serology testing by Enzyme-linked Immunosorbent assay (ELISA) and Complement Fixation Test (CFT) tests.

At the farrowing stage, Mastitis-Metritis-Agalactia (MMA) seems common amongst Malaysian pig farms, typically occurring 12 hours to 3 days after parturition. Predisposing factors are unhygienic farrowing crate causing coliform infection in the mammary glands, decreased water availability, high nutrient density rations, drastic dietary changes in late gestation, high dietary protein and energy content with inadequate fiber content, overfeeding, underfeeding, vitamin E and selenium deficiencies. Typical clinical signs in sows are depression followed by inappetance, restlessness and constipation. Sow will be always on sternum, not allowing piglets to suckle. On inspection, udder appears slightly enlarged. Initially piglets will be noisy, crying in front of the sow's head, running around sow and exploring udder for milk, but later, the piglets will lose interest in the udder, and will start drinking water or urine from the floor. Piglets will be weak and emaciated with concurrent diseases and will more prone to be crushed by the sow. Commonly used treatment is oxytocin (30-50units) intramuscularly repeated every three to four hours. Coliform mastitis cases are given broad spectrum antibiotics and Flunixin meglumine (Prostaglandin synthetase inhibitor) is used in mammary odema cases. Excitement of the sow is minimized as much as possible as the release of adrenaline from the excitement phase will block the effect of oxytocin. Tranquilizer is to be used only on hyper-excitable gilts whereby the hypogalactia is caused by the adrenaline induced inhibition of milk letdown.

In Malaysia, Thin Sow Syndrome is also a common phenomenon which typically occurs in young sows in the first lactation. These sows fail to gain weight after the litter is weaned. Predisposing factors are poor nutrition, heat stress, poor ventilation due to poor farrowing facilities, causing the loss of appetite of lactating sows. These

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sows will look emaciated during lactation and after weaning. This loss of body condition affects the ability to return to oestrus after weaning, and an extended weaning-to-service interval. (Too, 1997) In the event of successful mating of these thin sows, the farrowed litter will be smaller.

## CONCLUSION

Swine Farming in Malaysia has improved in the recent years with the improvement of technology and experience in swine breeding and management. However, this industry faces social pressures and environmental pollution issues. With the improvement of breeding parameters and management, although the numbers of farms have decreased but the production of pork to meet local consumer demand has been maintained. Future efforts are to be taken by DVS Malaysia to promote the practice of Modern Pig Farming (MPF) in Malaysia for better managed and more environmentally friendly pig farms in order to be able to sustain the pig industry in Malaysia.

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