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PRODUCTION OF APPROPRIATE FOOD: sufficient, safe, sustainable SMALLHOLDERS' SWINE RAISING GUIDELINES

1. Introduction

Swine raising is a profitable economic activity as long as you control a number of parameters including housing, breeding, nutrition, health and technical and economic management of the animals. A good breeder should be quiet and loving animals. He must be a good observer, know well keep records of animal performance and must also be able to take decisions and strict.

2. Overviews

1. The domestic pig is probably from wild boars of Europe (*Sus scrofa*) and wild pigs from Asia (*Sus vittatus*). This is monogastric omnivorous (eats everything) that transforms a diverse range of products and consumables agricultural and wild-products or inedible by humans, in meat. It is an animal with a very rapid growth if the raising is done with improved breeds. Are enough just at 6 to 7 months for a piglet of 1.2 kg (birth) to pass to 90-100 kg. It is also a very prolific specie: 7-12 piglets any farrowing and you can have 2 parturitions per year and wean 14-18 piglets per sow per year.

2. Compared to other farm animals he has the best carcass yield (pork: 73-75%, 62-65% of broiler, sheep: 50-51%, goat: 44-45%, rabbit: 48-50% ox: 49-50%). Pigs are alive savings for farmers and important financial resolution of social problems such as education, marriage, funeral, health care, etc. It contributes to soil fertility through its droppings. An adult pig can produce 600-730 kg of organic manure per year if well managed.

3. However, some disadvantages are related to pig farming. This is among the others the direct competition with humans for food, particularly for cereals (maize) and oilseeds (soybeans), religious constraints (Muslims do not eat pork), pollution from manure if the livestock is near homes, threats to human health from zoonotic diseases (some pig parasites are likely to attack humans), high susceptibility to diseases such as African swine fever (ASF), etc.

3. Swine Housing

The pig is an animal that does not sweat and badly withstand high temperatures. However, the piglet at birth is very sensitive to cold, hence the importance of cold protection even in countries with hot climate.

3.1. Site selection

Choose areas where natural ventilation is effective (peak, slope, etc.), orient the buildings according to the East-West direction and build near a good water supply.



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3.2. Building

Wherever possible, the best buildings are usually cemented floor and open onto the sides. Never raise pigs on bare soil. Otherwise the cement floor (as is the case for almost all rural families in developing countries), a plank floor on stilts is required. The walls separating the boxes are constructed of hardwoods, concrete block, brick earth or china bamboo and should reach 1.30 m from the ground. The soil should be slightly inclined to facilitate the flow of water and urine. The sleeping surface should be covered by sheets, straw or mat. There should be a broad 1.5m gangway with a footbath at the entrance and exit of each building. We must separate the boxes as it is for fattening (5-10 piglets / Box), waiting mating box (3-5 sows by lodge), maternity one (with fixed wooden bars wall 10-15 cm above the ground to protect piglets against the crushing by the mother during lactation). Boar Lodge must be in the middle of the sows 'lodges.

Table1 : dimensions of the boxes according to the category of pigs category	
Category description	Dimensions of the box by head
Boar (male) alone in the box	5 to 6 m ²
Sow with the its piglets	12 m ²
Dimension of the boxes according to the weight	
10-20kg	1m ²
20-50kg	1,5m ²
50-100kg	2,5m ²



Fig. 1 and 2: Examples of improved pig shelters in local materials with raised pavement in planks

Among advantageous practices is also the use of the a straw bed and / or sawdust. It allows a better welfare (less tail biting among pigs, fewer injuries to the legs and hooves, etc.), more organic matter for the cultivated soil, more hygiene and cleanliness of animals, and less environmental pollution, etc.



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4. Reproduction

For reproduction, select boars with testicular well emerged and well developed penis. Sows must have normal vulva and at least 12 nipples and have to be calm. Keep one boar per 20 sows, or two for a herd of more than 20 sows. Never cross animals at puberty (age 4 to 6 months when the animals show the first signs of reproduction) because sexual maturity is not reached yet. We must wait strictly reproduction layout of age, medium, 7 to 8 months (80-100kg) for improved breeds and from 6 to 7 months (40-60kg) local for the local breeds.

The sexual cycle of the sow (estrous cycle) will succeed all year and lasts 19 to 23 days with an average of 21 days. Heat period during which the sow accepts the male and can be impregnated, lasts about sixty (60) hours and occur every 21 days. The signs of heat are, among others, nervousness and decreased appetite, overlapping of other pigs, reddening and swelling of the vulva, light flow of a viscous fluid in the vulva, immobilization test that is the resistance to pressure carried on the back. You can also enter the boar every morning in the lodge females and observe the boar knows detect whether the sow is in heat and protrudes it

4.1. Example of some improved pig breeds available in India

Large black (fig.3): The Large Black is a long, deep-bodied pig, well known for its hardiness and suitability for extensive farming. Large Blacks are best suited for pasture-based farming due to their strong foraging and grazing ability, which efficiently converts poor quality feed into meat.

Berkshire (fig.4): This black-coated hog with white areas on the face, legs and tail, is known for its juicy, tender, and flavorful meat which is heavily marbled with fat.

Saddleback (fig.5): Saddlebacks are hardy and noted for their mothering ability. The breed is known also for its grazing ability and is very hardy

Yorkshire (6): The modern Yorkshire is very muscular, with a high proportion of lean meat and low backfat, in addition to being very sound and durable.



Fig.3



Fig.4

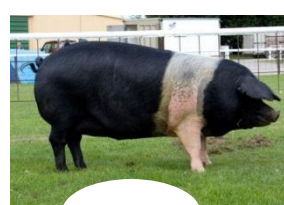


Fig.5

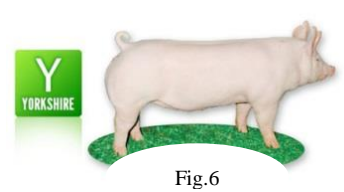


Fig.6

4.2. The mounts of sows

Mating occurs between the 12th and the 24th hour after the onset of signs of heat. Make a double mounts to 12 hour intervals, preferably in the morning and evening. A double or possibly triple mounts of sows increases the chances of success for both the conception rate and the number of piglets to be born. The flushing is that is an increasing of the amount of foods high in energy and protein and intake of vitamins A, D, E and mineral micro-elements to an empty sow, helps to increase the number of eggs produced during heat and thus the quality of fecundation. It will change



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the boar by taking in another breeding for each generation to avoid inbreeding problems such as mortality of piglets, reduction of the expected body weight, susceptibility to disease etc.

4.3. Heat returns control

Control of heat returns must be done from the 18th day until the 23th day after mating and a second time to the 42th day. If there is no heat, is that fertilization has occurred.

4.4 Gestation and farrowing

Gestation lasts 3 months, 3 weeks 3 days or 112 to 116 days with an average of 114 days. The recording of the mating is very important because it helps prepare farrowing. One week before farrowing, the maternity box must be kept very clean, wash the sow and practice the deworming. Give enough water and some green forage to avoid constipation. Administered once intramuscularly in the neck area 6 mg *oxytetracycline* per kg of body weight about 8 hours before farrowing or immediately after the completion of farrowing. With the approach of parturition, vulva widens, becomes weak and very swollen and the first milk or colostrum appears at the breast. Farrowing takes place in four (4) to ten (10) hours and ends with the expulsion of the placenta. It is recommended to attend the calving to save piglets and sows in difficulties.

4.5. Piglets care

At birth, the a piglet weighs between 0.9 and 1.5 kg, and must be well protected against the cold and too much heat. Between 1 to day 2, cut the umbilical cord to 2.3 cm in order to avoid blood loss and disinfected with iodine. This cut may not be necessary in the dry season because it dries easily. Cut, if possible canines because they are not useful to piglets and hurt others and the mother nipples during breastfeeding.

On the 3rd day, injecting iron to prevent anemia in piglets 1-2 cc thigh (ham) or behind the ear and a second time to the 15th day. If possible, mark the piglets to identify them. The 4th to 10th day, making the antibiotic treatment to prevent diarrhea and strengthen the defenses of the piglet. Castration of males must be between the 1st and 2nd week because the contention is easier and less stress. It must be done by an experienced person. Make weaning piglets to 42 days or more for inexperienced breeders.

5.Pig feeding

In tropical regions pork rarely uses more than 5 kg of dry matter per day. In conditions where even people find difficultly enough food, it is suggested to feed the pigs using the following technique:

1. Provide plenty of young green fodder (soft), vegetable waste and other locally available feed resources and complete with 1kg or 600g or 500g of a premixed food preparation containing 20%, 30 or 40 % protein
2. For animals weighing more than 15 kg, add, if possible, a dose of commercial multivitamins (with calcium and phosphorous) or 50 - 100 g per animal per day. If you have milk or dairy products, meat meal or fish, it will be give firstly to piglets and their mothers.



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3. Avoid giving cottonseed, safflower seeds and cabbage seeds to the pigs; they are dangerous. Cook products that are unknown to you (see fig.8), if you doubt about their toxicity and especially to down microbial and parasitic contaminations.
4. Breastfeeding piglets should last 30 to 45 days. Too prolonged lactation weakens the sow. During lactation, supplement the diet of the mother by about ½ kg of a preparation containing 20% protein, and other feeds.

Table 2: Example of rates recommended for some pig feeds components in different stages of growth/production

Nutrients	Breastfeeding piglets(8-25kg)	Growing pigs(25-60kg)	Fattening pigs (60-100kg)	Gestating sows (over 100kg)	Lactating sows (90-100kg)	Breeding boar
Metabolizable energy (kcal / kg)	3265,0	3265,0	3265,0	3265,0	3265,0	3265,0
Crude protein (%)	20,0	16,0	14,0	13,0	15,0	14,0
Lysine (% t.g)	1,0	0,8	0,8	0,6	0,9	0,4
Methionine (%)	0,3	0,3	0,3	0,4	0,5	0,3
Calcium (%)	0,8	1,0	0,8	1,1	1,0	1,0
Phosphorus (%)	0,6	0,6	0,5	0,5	0,7	0,4
Sodium (%)	0,2	0,2	0,2	0,2	0,2	0,1
Magnesium (%)	0,0	0,0	0,0	0,0	0,0	0,0
Eating foods "Dry" (kg / day / head)	0,9	1,8	2,5	2,5	3,3	3,0
Water consumption (L / day / head)	1,8	5,0	6,3	6,3	6,3	6,0

5. When the piglets reach the age of 3 to 4 weeks, breast milk is no longer enough. It must be supplemented with easily digestible food, such as a liquid slurry of cereals and bring them every day a shovelful of earth to piglets to balance iron deficiency or possibly to an iron injection. In the system where piglets are left free, they find the iron in the soil. Wood ash can also serve as a source of minerals. Feed for small pigs should be kept out of reach of the sow. If possible, piglets food must contain 18% protein and a small amount of fresh green fodder.

6. If using the concentrate pigs sold on the market, observe the recommended rate in% of the concentrate on the total ration (e.g. 10%, 20%, 33%, etc.).

The formulation of a feeding plan consists into calculation of the proportions in which each single raw material is mixed to the others to obtain a mixed diet. It must be made so as to have a combination of energy source 60 to 70%, a source of protein 20 to 35% and that of the vitamins and minerals of 2 to 5%. The vitamin requirements are covered by the distribution of tender green forage. When used as a basic, coarse and fresh foods like cassava, banana, taro, sweet potato, a feed supplement with a mixed formulation rich in protein is necessary. Tables 2, 3 and 4 below provide some basic data for the formulation of mixed rations for pigs.



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Table 3: Composition of some ingredients used in the formulation of the mixed ration for pigs (Data on dry matter)

sln	Ingredients	Crude Proteins (%)	DE (Kcal/kg)	Ca%	P%
1	Malt brewery	25,9	1892	0,27	0,50
2	Yam peels	12,2	-	1,17	0,13
3	Cassava peels	5,2	-	0,34	0,13
4	Fishmeal	61,3	3123	5,49	2,81
5	Blood meal	79,9	2634	0,28	0,22
6	Dried cassava leaves	25	-	1,6	0,3
7	<i>Moringa oleifera</i> leaves	26,37	-	3,13	0,31
8	Palm oil	-	8500	-	-
9	amaranth Leaves	26	-	2,5	0,563
10	Green creepers of sweet potatoes	10,8	-	1,1	0,22
11	Corn	9	3488	0,03	0,27
12	Cassava	2,0	3010	0,3	0,19
13	Sugar molasses	-	2464	0,89	0,08
14	Sweet potatoes	3,1	-	0,13	0,19
15	Weath bran	16	2512	0,14	1,17
16	Rice bran	13,5	-	0,06	1,82
17	Sorghum	11	-	0,04	0,29
18	Peanut meal	47,4	-	0,20	0,65
19	Defatted cotton meal	42	-	0,3	1,3
20	Sunflower kernel cake	23	2140	0,57	1,15
21	Palm kernel cake	18	2700	0,28	0,68
22	Soybean meal	45,8	-	0,32	0,7
23	Fresh sweet potatoes tubers	3,1	-	0,13	0,19
24	Fresh taro tubers	6,6	-	0,06	0,19

Table 4: Example of formulation of complementary ration for pregnant sows

N°	Ingredients	Quantity (kg)	CP%	DE(Kcal/kg)	Ca%	P%
1	Corn	77	6,93	2685,76	0,023	0,2079
2	Wheat Bran	2	0,32	50,24	0,0028	0,023
3	Sugar molasses	1	0,032	24,64	0,0089	0,0008
4	Soybean meal	13	5,9	429	0,0416	0,091
5	Malt brewery meal	4	1,036	75,68	0,0108	0,02
6	Palm oil	0,5	-	42,5	-	-
7	CaCO3	0,925	-	-	0,37	-
8	Calcium hydrogen phosphate	0,89	-	-	0,285	0,16
9	Integration	0,625	-	-	-	-
10	Total	100	14,2	3307,5	0,75	0,50
11	Needs		14	3300	0,75	0,50
12	Balance		OK	OK	OK	OK



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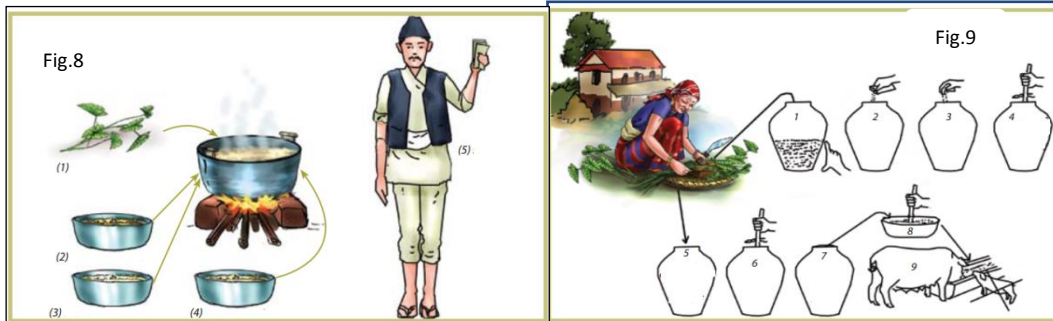


Fig.8 Example of various local products to feed the pigs (1): taro or green leafy vegetables; (2): rice or wheat bran; (3): broken rice or wheat; (4): kitchen scraps etc., like this (5): it makes money. Fig.9: use of wild food resources (taro, bananas, various green fodder, etc.) to feed adult pigs. 1: water; 2: salt; 3: yeast; 4: dosing and mixing well; 5: addition of sweet potatoes (roots and / or vines); 6: mix well; 7: Add some amount of seeds you can (but, sorghum, wheat); 8: mix correctly; 9 serve only to adult pigs (no to piglets).

Categories of pigs	Length (cm)	Width (cm)	Height (cm)
breastfeeding Piglets	15-20	20	10
Fattening Pigs	30-35	20	15-20
Gestating sows	40-50	35-40	15-20
Lactating sows	40-50	35-40	15-20
Boar	40-50	35-40	15-20

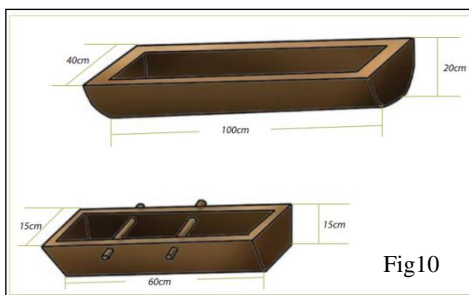


Fig.10: Construction scheme of feeders



Fig.11 : example of easily accessible trough



Example of some plants that can be used as green fodder for pigs: *Amaranthus spp* (Fig.12), *Moringa oleifera* (fig.13); *Bidens pilosa* (fig.14).



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6. Health care in pigs raising

Good practices that help to prevent diseases in pigs are among the others the isolation of the pigsty, the distance from the dwelling, daily cleaning of the pig barn and feeders, avoid frequent visits of foreigners (including buyers of pigs); never accept to mount sows of other people with your boar; avoid contact with wild animals wandering ones such as rats, mice, dogs, etc., avoid distributing moldy food from waste bins and remnants of restaurants harvested indiscriminately.

Table 6: Example of some diseases of pigs and their contention.		
Description	Symptoms	Prevention/prophylaxis/treatment
1. Bacterial diseases		
Atrophic rhinitis (AR). Caused by <i>Bordetella bronchiseptica</i>	Sneezing, discharge from the eyes and nose, deformed snout, destruction of nasal cavity turbinates, growth and nutritional deficiency	Prevention: use of pathogen-free breeding stock; treatment with sulfonamides, such as CSP-250.
E. Coli. Also known as white or bacterial enteritis diarrhea. It is highly contagious.	Usually affects the newborns in the first week of life. Mortality can be high	Prevention through sanitation, adequate nutrition of sows and vaccination. Antibiotic treatment should be administered orally to be effective.
Edema. Also known as edema of the bowel or <i>E. coli enterotoxemia</i>	Convulsions, swollen eyes	No vaccine is effective, stop feeding for 24 hours; adding oats to the feed; add or change antibiotics
Porcine pleuropneumonia Or Haemophilus pleuropneumonia (HPP)	Affection often fatal, usually finishing pigs	Treat with antibiotics
Viral Diseases		
African Pig Pest (A.P.P)	High fever (41 ° C), total loss of appetite, purple spots on the ears, abdomen and inner thighs. Staggering.	No treatment but prevention requires: - Enhance immunity by proper diet and hygiene, isolate sick. - Destroy complement the wooden pigsty (burn locally) after the passage of this disease - Make the crawl space of 50 to 60 days for pigs in washable materials
Transmissible gastroenteritis (TGE).	Affect all ages of high pig mortality in newborn pigs. Vomiting, diarrhea and death Often referred to as "Winter-time disease"	Vaccines are available. No treatment is effective.
Pseudorabies (PRV) Caused by a herpes virus	High mortality in newborns piglets, abortion, stillbirth, etc., (crazy-itch)	Vaccines are available to the infected herd under quarantine.



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Parvovirus	Abortions, stillbirths, small number of piglets within the delivery	Vaccines exist. No curative treatment is effective.
Swine influenza (flu). A respiratory disease caused by a combination of a virus and a bacteria	Fever and cough for several days growers.	Give an antibiotic may only to prevent secondary infections.
Deficiency diseases		
Anemia mainly in piglets. pale mucous.	Rapid breathing, weakness	Iron supplementation to prevent anemia.
All nutritional deficiencies	Specific symptoms specific	Appropriate specific supplementation
Genetic diseases		
Pporcine stress syndrome (PSS), a hereditary disease caused by recessive genes.	PSS animals are generally heavy muscled, nervousness, muscle tremors, poor circulation, respiratory failure and death	Prevention of death or elimination of the disease through a rigorous selection against recessive genes
Internal and external parasites		
Internal: The large roundworm (Ascaris) is the most common internal parasite hygiene	Plague migrating roundworm increases susceptibility to pneumonia, so weak growth, thin rough coat, diarrhea and coughs, intestinal worms, to the Gaza rolling intestinal, etc.	Some common wormers are: Atgard = dichlorvos (RSS) Banminth = pyrantel tartrate (RSS) Tramisol = levamisole (food or water) = Ivermectin Ivomec (injectable). Good
External: lice (louse pork). Are bloodsuckers	economic loss in income due to reduced performance	Insecticides available as a spray, powder or granules or injectable
Itch: Caused by microscopic mites that burrow under the skin	Causes severe itching that reduce pig performance	Ivermectin is the best insecticide
Unknown Causes		
Mastitis, metritis andagalactia (MMA).	Newborns by contamination of Death during the mid-low	treatment of sows by using the hormone oxytocin "pop" to stimulate the milk ejection or with an antibiotic