



RESEARCH
PROGRAM ON
Livestock



FEEDS AND FEEDING REGIME FOR BẢN PIGS

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CONTENT



- **Introduction**
- **Feed classification**
- **Feeding regime for Bản pigs at different stages**
- **Feed preparation for Bản pigs**

INTRODUCTION

- Animal feed refer to products consumed by domestic animals in their fresh or raw form, or after processing and preserving
- Include single feedstuffs, mixed feeds, concentrates, supplementary feed, and feed additives.



FEED CLASSIFICATION

➤ High energy feed

- ❖ Have energy value of over 2,500 Kcal/kg of feed (dry matter basis), mainly supply energy for activities such as movement, breathing, digestion etc. and help to form meat, milk, semen, embryo etc.
- ❖ This group comprises:
 - Cereal grains and their by-products: corn, paddy, broken rice, rice bran, etc.
 - Roots and tubers: cassava, sweet potato, edible canna (*Canna edulis* Ker Gawl.), lesser yam (*Dioscorea esculenta* (Lour.) Burkill), etc.



FEED CLASSIFICATION

➤ High protein feed

- ❖ Have high protein content (>20% protein, dry matter basis), mainly synthesized into body protein.
- ❖ This group includes:
 - Plant-based feed: soybean, sesame, peanut, dried oils (peanut, soybean, etc.).
 - Animal-based feed: fish, fish meal, shrimp meal, meat meal, silkworm pupae powder, earthworm, termites etc.



FEED CLASSIFICATION

➤ Mineral-rich feed

- ❖ Have high mineral content, involved in bones and organs formation.
- ❖ Include: powdered don (a type mollusk) shell, crab shell, snail shell, eggshell, bone meal, etc.
- ❖ Mineral content of the diet exceeding the recommended levels can cause poisoning for pigs.



FEED CLASSIFICATION

➤ Vitamin-rich feed

- ❖ High in vitamins, enhances metabolism.
- ❖ This group includes:
 - Vegetables, grasses, leaves, roots and tubers, fruits (carrot, pumpkin, kohlrabi, etc.).
 - In addition, synthetic vitamins and mineral-vitamin premixes are available to provide both minerals and vitamins for animals.



EFFECTS OF NUTRIENT DEFICIENCIES IN PIG DIET

- ***Energy deficiency***: Slow growth, low milk production and quality, low semen volume. Newborn piglets have low birth weight.
- ***Protein deficiency***: Slow growth, poor lean meat deposition; low milk production and quality, low semen volume. Newborn piglets have low birth weight.
- ***Mineral deficiency***: Piglets have poorly developed bones and are prone to rickets. Pregnant and suckling sows are prone to paralysis. Slow growth in meat pigs.
- ***Vitamin deficiency***: High embryo mortality. Reduced vitality in newborn piglets, prone to premature death, prone to being stunted, prone to diseases related to anemia, eyes and skin, etc.

Energy, protein and mineral content of commonly available pig feed in the Northern mountainous area of Vietnam

Ingredient	Moisture (%)	ME (Kcal/kg)	Protein (%)	Minerals (%)	
				Calcium	Phosphorus
Corn	10.6	3691	10.07	0.25	0.34
Broken rice	11.8	3741	9.64	0.15	0.39
Rice bran	12.2	2847	13.67	0.19	1.88
Paddy	12.8	3073	8.03	0.25	0.31
Dried cassava	11.5	3503	3.28	0.28	0.18
Fresh cassava	72.3	3495	3.25	0.18	0.14
Fresh cassava pulp	90.0	2780	1.80	0.40	0.15
Edible canna tubers	76.0	3375	4.58	0.38	0.17
Wet edible canna powder and pulp	76.9	2268	3.90	0.26	0.09
Wet tofu pulp	85.0	2663	27.90	0.67	0.73
Soybean meal	10.6	2908	46.98	0.31	0.73
Soybean	10.3	3679	43.48	0.26	0.70
Don shell powder				33.20	
Banana stalk	94.3	1649	10.53		
Edible canna	86.5	2237	8.89	1.04	0.22
Tropical pitcher plant leaves	73.0		16.03		
Paper mulberry leaves	72.8	2176	22.35	2.35	0.40
Water spinach	89.5	2571	20.00	1.14	0.48
Camote tops	88.7	2681	20.97	1.24	0.53
Water cabbage	91.4	2279	13.95	1.05	0.47
Cocoyam	91.5	2788	14.12	1.18	0.35
Cassava leaves	80.5		20.38	2.20	0.27
Handmade rice wine vinegar	70.0	2501	13.32	0.40	0.87

FEED PROPERTIES FOR BÀN PIGS

- Mostly self-sufficient.
- Mainly vegetables
- Corn, rice and rice bran are the only cereals
- These cereals are energy-rich but low in protein.
- Vegetables provide very little dry matter, energy and low protein
- Few protein-rich foods



GREENS COMMONLY USED AS PIG FEED IN NORTHERN VIETNAM

No.	Greens	Hải Dương (n=30)		Phú Thọ (n=30)		Hòa Bình (n=30)		Overall (n=90)
		No. of households	Ratio %	No. of households	Ratio %	No. of households	Ratio %	No. of households
1	Sweet potato	30	100	30	100	29	96,67	98,89
2	Banana	5	16,67	26	86,67	27	90,00	64,45
3	Cocoyam	16	53,33	22	73,33	15	50,00	58,89
4	Perilla leaves	8	26,67	22	73,33	5	16,67	38,89
5	Paper mulberry	-	-	10	33,33	18	60,00	31,11
6	Water spinach	19	63,33	-	-	3	10,00	24,44
7	Water primrose	20	66,67	1	3,33	-	-	23,33
8	Sapodilla	5	16,67	-	-	11	36,67	17,78
9	Water hyacinth	12	40,00	-	-	2	6,67	15,56
10	Guava (leaf, fruit)	2	6,67	-	-	11	36,67	14,45
11	Papaya fruit	2	6,67	4	13,33	6	20,00	13,33
12	Siam weed	8	26,67	-	-	-	-	8,89
13	Soh-shang leaves	2	6,67	-	-	4	13,33	6,67
14	Tape grass	-	-	-	-	6	20,00	6,67
15	Pigweeds	2	6,67	1	3,33	2	6,67	5,56
16	Fireweed	-	-	2	6,67	3	10,00	5,56
17	Taro	1	3,33	1	3,33	3	10,00	5,55
18	Dwarf copperleaves	3	10,00	-	-	1	3,33	4,44
19	Fig	1	3,33	1	3,33	2	6,67	4,44
20	Spiderworts	3	10,00	-	-	-	-	3,33
21	Chaff flower	1	3,33	1	3,33	1	3,33	3,33
22	Leaves of cabbage and kohlrabi	-	-	1	3,33	2	6,67	3,33
23	Water cabbage	1	3,33	-	-	1	3,33	2,22
24	Water fern	-	-	2	6,67	-	-	2,22
25	Skunkvine leaves	-	-	-	-	2	6,67	2,22

FEEDING REGIMES FOR BÀN PIGS

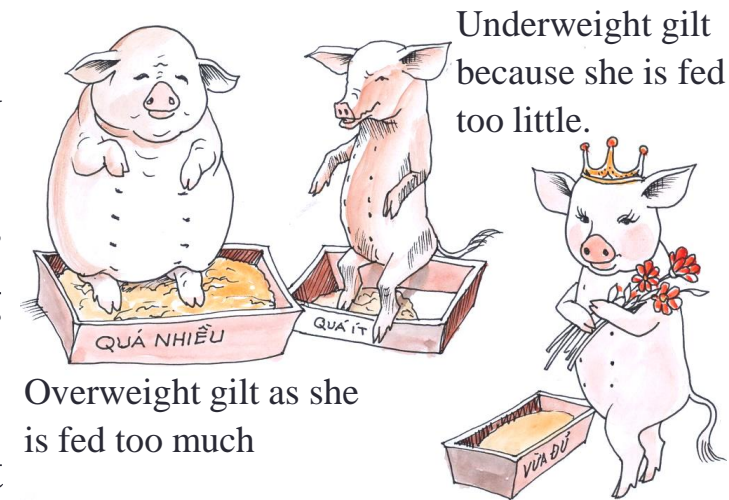
A 4-month-old Bàn gilt pigs

- Different breeds of pigs at different ages have very different nutritional requirements.
- Farmers need to understand well the nutritional needs of each breed at different stages in order to provide sufficient nutrients for pigs to grow.



Feeding regime for gilt pigs

- Sufficient nutrients should be given to gilt pigs so that their bodies are ready for mating, pregnancy and nursing piglets.
- If gilt pigs are fed too much carbohydrate food compared to their needs, they become overweight, leading to no or erratic oestrus, difficulties conceiving, high embryo mortality rate, resulting in low piglet numbers.
- If gilt pigs are not provided with sufficient nutrition, they will be underweight, thus have delayed or no oestrus, prolonging their first-service age; the gilts do not accumulate enough nutrients for their bodies during pregnancy and nursing at a later stage, resulting in earlier culls.



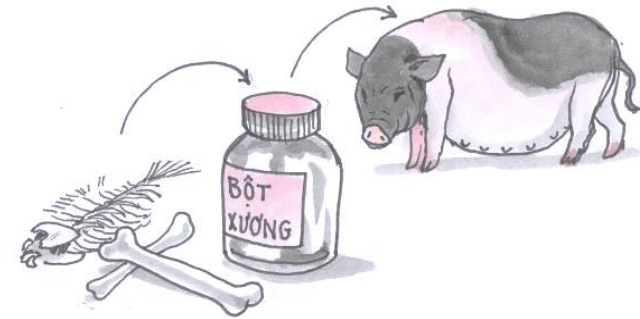
Feed ration for Bả gilt pigs

Weight of pig (kg)	Concentrates (kg/day)	Green roughages (kg/day)	Meals/day
10 - 20	0.4 – 0.8	2-3	2
21 - 30	0.8 – 1.0	3-4	2
30 - mating	1.0 -1.2	3-4	2

- Feed mixed concentrates before green roughages.
- Green roughages such as paper mulberry leaves, camote tops, banana stalks, etc., only require washing before feeding, cooking is not necessary to avoid vitamin losses.
- Human food leftovers should be cooked well before feeding to pigs.
- It is necessary to adjust the food intakes to suit each pig's conditions.
- Give pigs enough clean water to drink.

Feeding regime for pregnant sows

- Pregnant sows need adequate nutrients for good foetal growth. The gestation period is 114 days (fluctuating around 110-118 days), divided into 2 phases with different nutrition needs according to the growth of the foetus:
- Gestation phase 1 (from mating to day 84): Adequate volume and quality of food should be ensured for good foetal growth and sows to accumulate nutrients in preparation for the nursing period.
- Gestation phase 2 (from day 85 until farrow): The amount of food required for pregnant sows in phase 2 increases by about 25 - 30% compared to phase 1 to provide enough nutrition for foetal growth. Fetuses grow fast in this phase (accounting for up to 65 - 70% of the weight of newborn piglets).



Leg paralysis



Ration for pregnant sows

Weight of sow (kg)	Concentrates (kg/day)		Greens (kg/day)	Meals /day
	Phase I	Phase II		
30-40	0.5-0.6	0.7-0.8	2- 3	2
40-60	0.6-0.8	0.8-1.0	3 - 4	2
60-80	0.8-1.0	1.0-1.2	3 - 4	2

- Ensure food safety. Food that is stale, moldy or toxic, etc., can cause embryo loss, fetal mummification, miscarriage, premature birth, or weak piglets.
- Provide enough clean water
- The amount of daily feed intakes for pregnant sows depends on their physical conditions (thin, fat or normal). Thin sows must be given more concentrates and fewer roughages. Sows that are too fat should be fed fewer concentrates and more green vegetables.
- In winter, sows should be fed more to help them cope in cold conditions (0.2-0.3 kg concentrates/sow/day).
- Rice distillers' grains and vinegar are not good for sows. Consuming too much of these will induce contractions, causing miscarriage. The amount of rice vinegar used for sows should be only 1/3-1/4 of that for meat pigs.

Feeding regime for sows during suckling period

- Suckling sows should be provided with adequate nutrition to produce enough milk for their piglets.
- Feed for suckling sows should be more nutritious than for gilts and pregnant sows. It is necessary to increase both the quantity and quality of the feeds for these SOWS.



Feed ration for lactating sows on the first week after farrowing

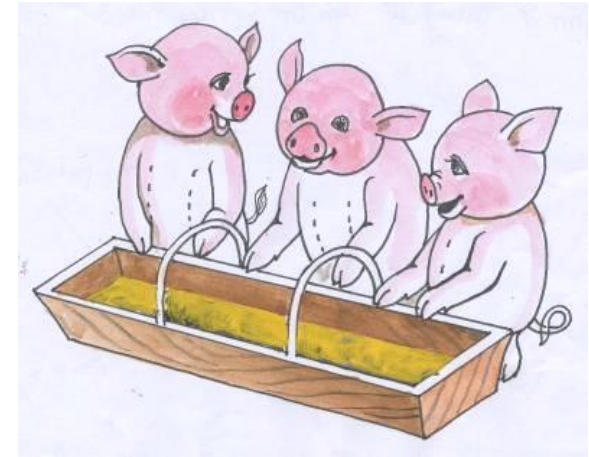
Lactating period	Ration (kg/sow/day)	
	Concentrates	Green vegetables
Nest-building	0.3 – 0.5	0
After farrowing		
Day 1	0.5	1
Day 2	1.0	1
Day 3	1.5	1
Days 4-5	2.0	2

After 5 days, ad libitum feeding, no restriction.

- Sows that produce many piglets and are thin should be fed more, and vice versa.
- Sows should be given feeds that are cooked into a gruel; concentrates should be mixed in well before feeding.
- From day 6 onwards, feed the sows ad libitum. Sows nursing 8-10 piglets are usually fed 2.5-3kg concentrates/day. Those nursing more than 10 piglets are given 3-3.5kg concentrates/day.
- Giving the sows at least 3 meals/day will help them to eat more and digest well.
- Prepare separate feeding and drinking troughs, provide enough clean drinking water for sows.
- It is recommended to feed post-farrowing sows glutinous rice gruel mixed with finely chopped young fig leaves, young elephant ear fig leaves, or cooked with wild banana flowers or banana flowers to help sows to increase their milk production.

Early weaning for piglets

- Start weaning when piglets reach 7-10 days old: roast cereal grains (rice, corn, soybean), ground into powder, sprinkle a little of the powder into the trough in the nest; as piglets smell and lick it, they will gradually get used to it.
- From 10-14 days: introduce thick rice gruel; finely ground roasted soybean can be added to increase the appetite of piglets.
- From 15-21 days: mix concentrates for piglets, including 55% popped corn + 15% fine rice bran + 30% well roasted soybean or concentrates. When giving to sows, mix into their gruel at a 30% ratio.
- After 21 days: add young vegetables to gruel and mix with 30% concentrates using the above formula. In this way, after weaning, there is no sudden change in feed for piglets that will affect weight gaining.
- After 28-30 days, piglets have gotten used to solid food and can be fed as normal.
- Packaged feeds can be used (cooking is not required) for weaning for piglets. Ensure to buy from reputable feed manufacturers.
- The purpose of early weaning of piglets is to increase litters/sow/year, reduce the chance of transmitting diseases from sows to piglets, and reduce sow depreciation after weaning so that sows can quickly return to estrus.



Feeding regime for meat pigs



- The nutritional needs of Bản meat pigs can be divided into 2 phases: from weaning to 15kg and from 15kg to selling/ harvest.
- The feed nutritional value for the first phase are higher than the second phase.
- The daily feed ration for meat pigs should be increased gradually according to their age and weight to meet their growth needs.

Feed ration for meat pigs

➤ For piglets after weaning until 15kg:

- Usually equal to 4 - 5% of body weight, e.g., a 10kg pig can eat about 0.4-0.5 kg concentrates/day)
- From day 4 after weaning, if pigs do not have diarrhea, increase the ration following the increases of the herd. Recommend ad libitum feeding so pigs can grow to their full capacity.

Weaning day	Feed ration
Day 1	Equal to 1/2 the pre-weaning ration
Day 2	Equal to 3/4 the pre-weaning ration
Day 3	Equal to the pre-weaning ration

- Feed quality requirements:

- ✓ Provide adequate nutrients for pigs to grow fast.
- ✓ Be easy to digest, use readily available ingredients such as corn, soybean, brown rice, ground broken rice, rice bran, etc., or concentrates can be mixed with available ingredients.
- ✓ Should not be stale, moldy or toxic, etc.
- ✓ Use available seasonal vegetables, tubers and fruits such as sweet potato vines, banana stalks, cocoyam leaves, paper mulberry leaves, wild vegetables, etc.

➤ For meat pigs from 15kg until harvest

- Feed rations for pig meats from 15kg until harvest: calculated as about 3-4% of body weight, e.g., a 20kg pig can eat from 0.6-0.8 kg concentrates
- If feeding concentrates, rations should be equal to 60% of pigs' intake, i.e., 1.8-2.4% x body weight. E.g., a 20kg pig needs 0.36-0.48 kg concentrates/day.
- Traditional feeds: green vegetables, tubers, fruits, banana stalk, rice vinegar, etc.



- **Balancing nutrients in the diet, especially protein (in other words, amino acids) is a crucial factor in limiting fat levels when pigs are harvested.**

Nutritional value of mixed feeds for pigs at different stages

Indicator						
	Weaning piglets	Meat pigs		Breeding pigs		
		Piglets after weaning	Harvest	Pregnant sows	Lactating sows	Boars in service
Metabolizable energy, in Kcal/kg, not lower than	3200	3100	2950	2850	3000	2950
Protein content, as % of weight, not lower than	18.0	16.0	14.0	13.0	15.0	15.0
Total lysine content, as % of weight, not lower than	1.10	1.00	0.80	0.50	0.80	0.80
Calcium content, as % of weight	0.80-1.10	0.60-0.95	0.50-0.90	0.75-1.05	0.75-1.05	0.75-1.00
Total phosphorus content, as % of weight, not lower than	0.65	0.60	0.50	0.60	0.60	0.60
Sodium content, as % of weight, not lower than	0.50	0.50	1.00	1.00	1.00	0.50

Some formulas of concentrates for Bản pigs

Ingredients (kg)	Piglets after weaning	15kg-harvest	Pregnant sows	Lactating sows	Working boars
Corn	56	54	51	53	50
Soybean	25.5	18	14.5	22	21.5
Rice bran	18	27.5	34	24.5	28
Salt	0.5	0.5	0.5	0.5	0.5
Total	100	100	100	100	100
Nutritional value					
Dry matter (%)	89.36	89.49	89.66	89.49	89.57
ME (Kcal/kg)	3093	2949	2856	3000	2954
CP	16.08	13.96	13.00	15.11	15.01
Ca	0.20	0.19	0.18	0.19	0.19
P	0.48	0.53	0.57	0.52	0.54
Lys	0.91	0.74	0.67	0.84	0.83

All of the above formulas lack Ca, thus it is necessary to add limestone powder/ shell powder/ bone meal, etc.

Some formulas of concentrates for Bản pigs

	POST-WEANING PIGLETS		MEAT PIGS 15 KG-HARVEST		PREGN ANT SOWS	LACTA TING SOWS
	Formula	Formula	Formula	Formul		
	1	2	1	a 2		
Concentra ted 46% protein	20	20	15	15	12	18
Corn/ broken rice	40	50	45	40	45	45
Rice bran	30	25	30	30	30	30
Cassava	10	5	10	15	13	7
Total	100	100	100	100	100	100

Some methods of preparing feeds



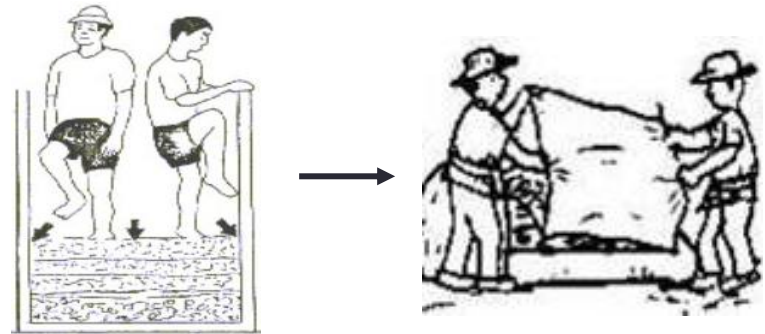
Sweet potato vine ensilage



Vines are collected, old parts and scorched leaves are removed. Finely chop to 3-5cm → air dry until 100kg fresh vines become 55-66kg dried → immediate ensilage in 1-2 days

Add 6-7kg cassava meal (or bran or corn meal) to 100kg peanut stalk and leaves and 0.5kg salt

- Mix ingredients following the ratio, turn well in pit/ bag → put in pit/ bag in 15-20cm thick layers, press firmly
- Can weigh sweet potato vines and place in pit/ bag in 15-20cm thick layers, evenly sprinkle bran and salt at the above ratio → press firmly → do layer by layer until full.



- **How to feed: after 10 days of ensilage, sows can be fed 2-3kg/day, meat pigs can be fed 1-2kg/day**

Sweet potato ensilage

Ingredient preparation: Remove spoiled or rotten tubers, slice and chop finely.

Formula: For each 100 kg:

- 89.5 kg finely chopped tubers + 10 kg corn meal or rice bran + 0.5 kg salt
- 85 kg finely chopped tubers + 15 kg fresh vines + 0.5 kg salt
- 70 kg finely chopped tubers + 30 kg fresh vines + 0.5 kg salt
- 55 kg finely chopped tubers + 45 kg fresh vines + 0.5 kg salt

Ensilage method: Same as for vines.

How to feed: after 10 days of ensilage, sows can be fed 2-3kg/day, meat pigs can be fed 1-2kg/day.

Cassava leaf and root ensilage

How to ensilage cassava leaves and roots:

- Ingredient preparation: Remove rotten roots, slice and chop roots finely; chop leaves to 3-5 cm.
- Formula: For each 100 kg:
 - 89.5 kg finely chopped cassava roots + 10 kg fresh leaves + 0.5 kg salt
 - 79.5 kg finely chopped cassava roots + 20 kg fresh leaves + 0.5 kg salt
 - 69.5 kg finely chopped cassava roots + 30 kg fresh leaves + 0.5 kg salt
- Method: Same as for sweet potato vines.

How to feed:

- Sows can be fed 1.5-2.5kg/day, meat pigs can be fed 0.5-1.5kg/day.

Banana stalk ensilage



How to ensilage banana stalks:

- Ingredient preparation: finely chopped banana stalks.
- Formula: For each 100 kg:
 - 89.5 kg banana stalks + 10 kg corn meal or rice bran + 0.5 kg salt
 - Method: Same as for sweet potato vines.

How to feed:

- Sows can be fed 1.5-2.5kg/day, meat pigs can be fed 0.5-1.5kg/day.

Feed ensilage using fermentation

Ingredients: Probiotics, rice bran or corn meal or cassava meal, clean water

- Tools: barrels or plastic bags

Making:

- Weigh 100 kg ingredients comprising corn meal, rice bran or cassava meal
- First, mix 0.5 kg probiotics + 10 kg powdered corn/bran/cassava evenly
- Then, mix evenly this mixture with the remaining ingredients
- Add 100 liter of clean water to the mixture, stir well and let sit for 3-4 hours
- Put into plastic bags or sacks, keep them open 5-6 hours, then tie them tightly closed and keep at warm or cool places
- After 2-3 days when there is a mild aroma, ready to feed

How to feed

- For piglets after weaning: Mix 1kg concentrates + 5 kg fermented feed, feed 0.7-1.1 kg/piglet
- For pigs more than 15kg/pig: mix 1 kg concentrates + 6 kg fermented feed, feed 1.2-1.7kg/pig
- For sows: mix 1 kg concentrates + 7 kg fermented feed, then feed additional 80-90% mixed concentrates



Notes when making silage

Use 2 layers of bags if making ensilage in plastic bags (the outer layer is sack and inner is plastic). After ensilage for 1-2 days, if the bag is inflated, open it to let air out and tie the bag tightly closed, store in a dry place, avoid rats and insects as they may bite open the bag.

To ensure quality, ensilage feeds must be kept in maximum anaerobic conditions (firmly pressed, tightly sealed, no bag puncture or torn); check the bag regularly, if it is torn or punctured due to rats or some causes, replace with another bag immediately to prevent silage spoiling.

Make sure to mix the ingredients evenly with additives, hence creating a premise for anaerobic microorganisms to operate. Each time after taking silage out, ensure that the bag is tightly sealed to avoid excess air. It is recommended to use up one bag before moving on to another.

THANK YOU FOR YOUR ATTENTION!

