



LI-CHÂN

TRAININGS



RESEARCH
PROGRAM ON
Livestock

Livestock-led interventions towards equitable livelihoods and improved environment in the North-West Highlands of Vietnam



CGIAR is a global partnership that unites organizations engaged in research for a food-secure future. The CGIAR Research Program on Livestock provides research-based solutions to help smallholder farmers, pastoralists and agro-pastoralists transition to sustainable, resilient livelihoods and to productive enterprises that will help feed future generations. It aims to increase the productivity and profitability of livestock agri-food systems in sustainable ways, making meat, milk and eggs more available and affordable across the developing world. The Program brings together five core partners: the International Livestock Research Institute (ILRI) with a mandate on livestock; the International Center for Tropical Agriculture (CIAT), which works on forages; the International Center for Research in the Dry Areas (ICARDA), which works on small ruminants and dryland systems; the Swedish University of Agricultural Sciences (SLU) with expertise particularly in animal health and genetics and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) which connects research into development and innovation and scaling processes.

The Program thanks all donors and organizations who globally supported its work through their contributions to the CGIAR system

© 2021



This publication is licensed for use under the Creative Commons Attribution 4.0 International Licence. To view this licence, visit <https://creativecommons.org/licenses/by/4.0>.

Unless otherwise noted, you are free to share (copy and redistribute the material in any medium or format), adapt (remix, transform, and build upon the material) for any purpose, even commercially, under the following conditions:



ATTRIBUTION. The work must be attributed, but not in any way that suggests endorsement by the publisher or the author(s).

CGIAR Research Program on Livestock. 2021. Training manual, LI-CHAN: Livestock-led interventions towards equitable livelihoods and improved environment in the North-West Highlands of Vietnam. Vietnam Priority Country Program. Hanoi, Vietnam: Alliance Bioversity- CIAT and ILRI.

Acknowledgments

The authors warmly thank the Sub-Department of Livestock Development, Animal Health and Aquaculture of Son La province, the Mai Son Agriculture division, the Mai Son Agricultural Services Centre, and the People Committee of the Communes of Chieng Chung and Chieng Luong. The authors also thank the Department of Agriculture and Rural Development, the Department of Foreign Affairs, the Department of Planning and Investment, and the Provincial People Committee of Son La for their support.

Cover illustration and design by Fernanda Rubiano

Illustration by Carolina Rubiano

Li-chăn is a project under the CGIAR Research Program on Livestock which aims at providing research-based solutions to drive smallholder farmers transition to sustainable and resilient livelihoods and to more productive small-scale enterprises that will help feed future generations. Vietnam is selected as one of four priority countries to consolidate research from different disciplines and translate it into a pilot with flexible combinations of integrated interventions from 2019 until end of 2021. Li-chăn has been co-designed by both international and national partners. It is funded by the Livestock CRP and co-implemented by the Alliance of Bioversity International and the International Center for Tropical Agriculture (CIAT), International Livestock Research Institute (ILRI), Swedish University of Agricultural Sciences (SLU), Vietnam National Institute of Animal Science (NIAS), National Institute of Veterinary Research (NIVR), Northern Mountainous Agriculture and Forestry Science Institute (NOMAFSI), Sub-Department of Husbandry, Animal Health and Aquaculture of Son La Province, Mai Son Agriculture Division, Mai Son Agriculture Service Center.

Li-chăn aims at stimulating system transformation through bundled livestock-based interventions in North-West (NW) Vietnam, covering the areas of livelihoods, environment, equity, and market access to benefit highland farming communities.

This booklet gathers the trainings materials provided to farmers during the project, on the topics of animal genetics, animal health, feeds and forages, environment protection and business opportunities.

Feeds and
Forrages
p. 17-27



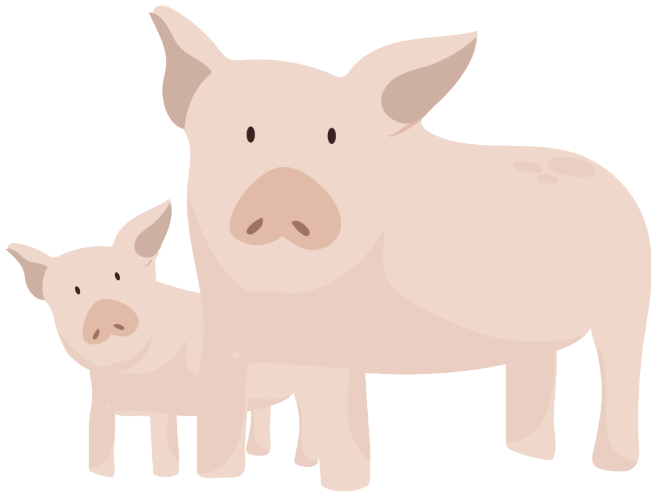


Livelihoods
p. 35-37

Livestock and
Environment
p. 17-27

Animal
Genetics
p. 7-10

Animal
Health
p. 11-15



ANIMAL GENETICS

KEY MESSAGES

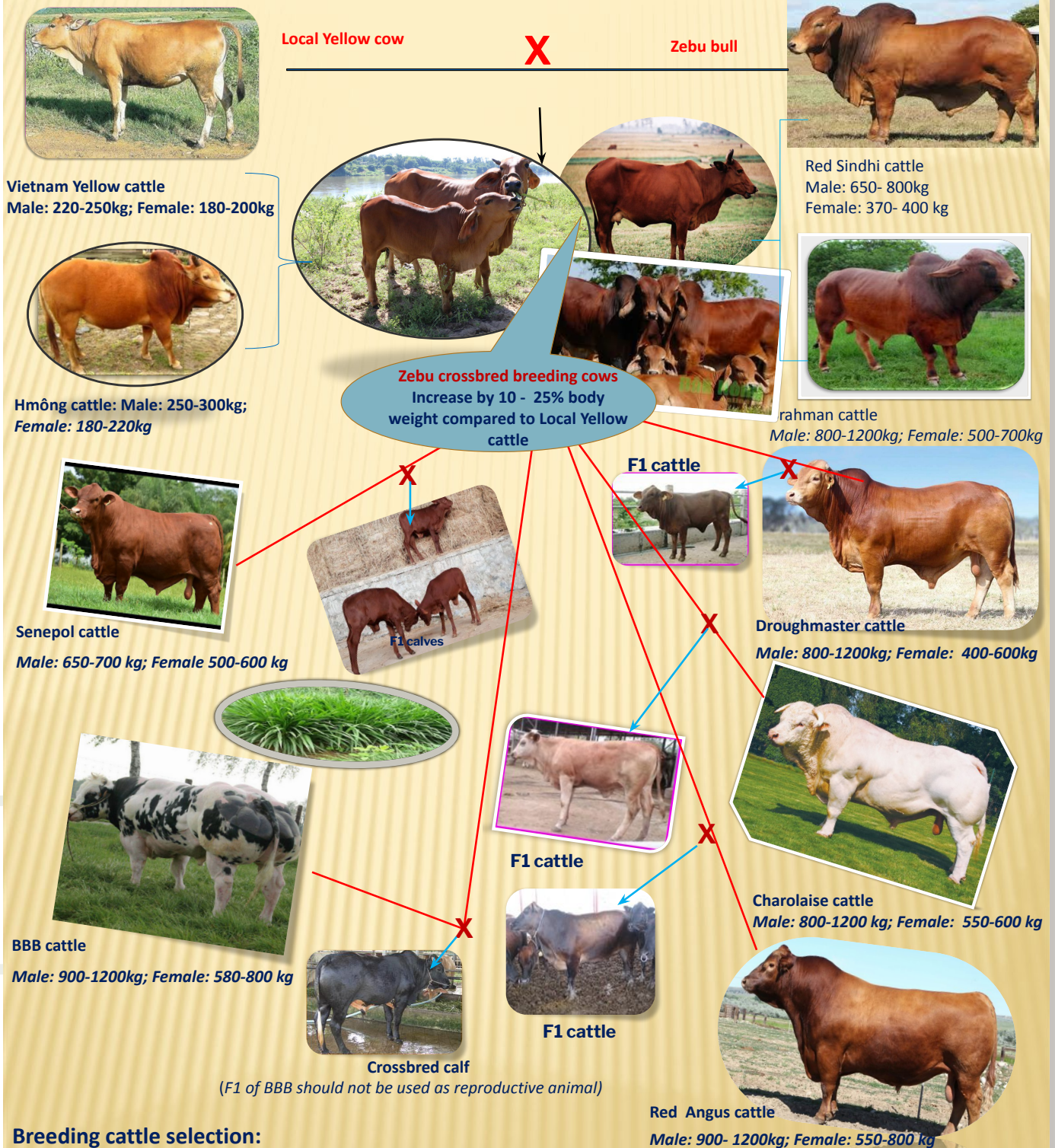
Good breed selection and breeding scheme for cattle bring higher productivity and better performance

Professional application of AI on cattle is a convenient way to improve low body weight of Local Yellow cow

Good breed selection, suitable breeding schemes and management for pigs bring higher benefit to farmers

Professional AI application in pig helps to avoid breed degradation of inbreeding

POPULAR CATTLE BREEDS IN VIETNAM



Breeding cattle selection:

- Well developed, firm and healthy body structure; smooth and silky hairs; briskly walking, firmly standing.
- Strong and straight legs; The front legs are straight and parallel to each other.
- The tail is large, straight, and long (to the hip) and flexible movement.
- Female: The udders and nipples are well-developed, 4 udders are balanced and evenly spaced, no additional tiny udders, the nipples are big and long, the skin is thin and elastic. The vulva has many wrinkles.
- Male: 2 testicles are big, soft and well-proportioned, the penis moves normally in the foreskin

ARTIFICIAL INSEMINATION IN CATTLE

High risk of disease transfer

Need more breeding bulls, high cost for raising bulls



Natural mating

Difficulty in transporting bulls, short- productive time life - Inefficient exploitation of breeding bulls



More semen exploitation and reservation



Artificial Insemination

Defrost semen, input in breeding equipment and conduct artificial insemination



Easy transport, avoid spreading disease



Evaluation of sperm motility

Actively create hybrids and sex of the calf according to the wish



PIG BREEDS AND BREEDING OPERATION

CROSSING 3- 4 EXOTIC PIG BREEDS



Bann boar

Adult: 45–50 kg
1st farrowing age: 13 months
No. of piglets at birth: 5.6- 9.1 piglets/ litter
Farrowing interval: 241 – 247 days
Lean meat rate: 43%



Bann sow



LANDRACE (L)

Average daily gain (ADG) ≥ 800 g/day
Lean meat rate $\geq 59\%$
Alive piglets/ sow/ year: ≥ 27



YORKSHIRE (Y)

ADG ≥ 800 g/day
Lean meat rate: $\geq 59\%$
Alive piglets/ sow/ year ≥ 27



DUROC

ADG ≥ 950 g/day
Lean meat rate $\geq 61\%$
Intramuscular fat: $\geq 3.5\%$



PIETRAIN

ADG ≥ 850 g/day
Lean meat rate $\geq 63\%$



Mong Cai pig

1st mating age : 7 – 8 months (40 – 50kg)
10 – 14 piglets/ litter; 1.2 – 2 litters/ sow/ year;
Lean meat rate: 34 – 36%

SELECTION OF BAN SOW

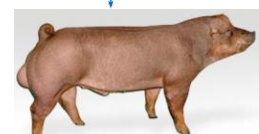


PARENT SOWS (LY and YL)

ADG ≥ 850 g/day
Lean meat rate $\geq 59\%$
Alive piglets/ sow/ year ≥ 28

COMMERCIAL CROSSBREED OF 3 BREEDS

ADG ≥ 900 g/day
Lean meat rate $\geq 61\%$
Intramuscular fat rate : $\geq 3.0\%$



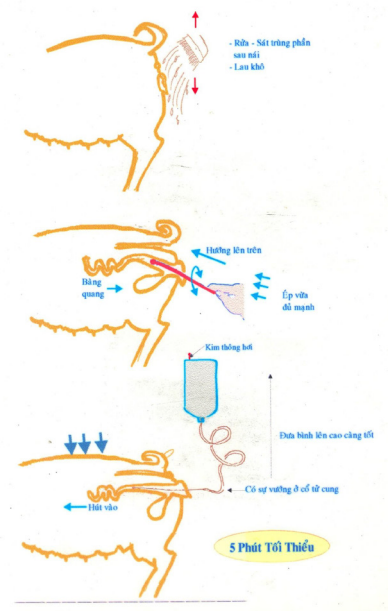
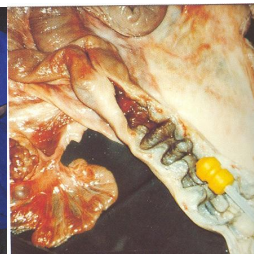
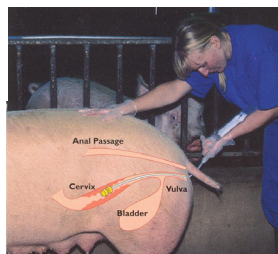
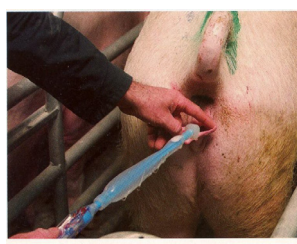
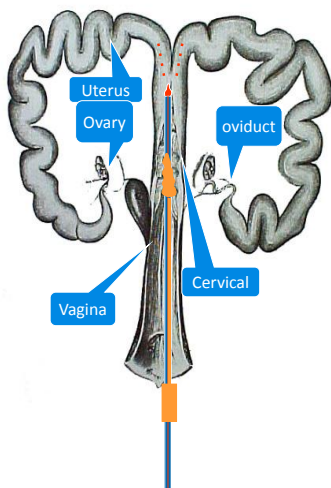
PIDU BOAR

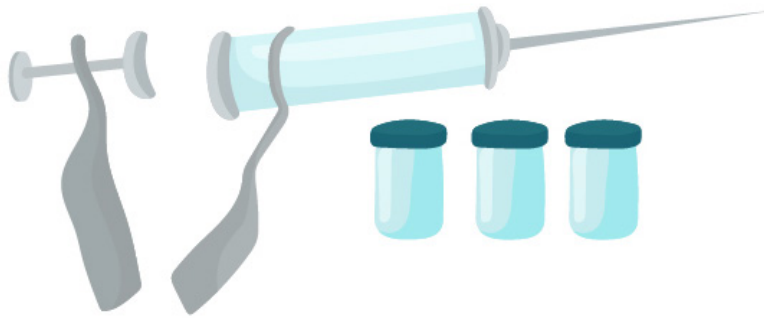
ADG ≥ 920 g/day
Lean meat rate $\geq 62\%$
Intramuscular fat: $\geq 3.0\%$

COMMERCIAL CROSSBREED OF 4 BREEDS

ADG ≥ 900 g/day
Lean meat rate $\geq 61\%$
Intramuscular fat rate : $\geq 3.0\%$

ARTIFICIAL INSEMINATION





ANIMAL HEALTH

KEY MESSAGES

Biosecurity is the cheapest and most effective way to prevent diseases in animals

The use of veterinary drugs is necessary, but needs to be done properly to be effective Farmers need to get advice from animal health professionals or veterinarians

Prevention is better than cure



Antibiotic use in livestock



What is antibiotic

- **Antibiotics** are medicines that fight infections caused by bacteria as they can kill or inhibit the growth of bacteria

Antibiotic use



Factors reducing effectiveness of antibiotics:

- Selected antibiotic is not suitable for the bacteria that cause disease
- Wrong dose, wrong route, wrong frequency, wrong duration
- Wrong injection technique
- Combine antibiotics incorrectly

ANTIBIOTICS SHOULD BE USED BY PROFESSIONALS

Antibiotic resistance

What cause antibiotic resistance:



- Mix antibiotic into feed for disease prevention purpose
- Misusing or overusing antibiotic (E.g: wrong dose, wrong duration, using one vaccine for all diseases)

Harm of antibiotic resistance:

- Higher cost, increasing mortality and morbidity
- It is not only harmful for animal but for human health

Vaccination schedule For farm animal



No	Vaccine	Time
1	<i>Pasteurella</i>	2 times/ year: April & September
2	<i>Foot-and-mouth disease</i>	2 times/ year: April & September
3	<i>Anthrax</i>	2 times/ year: April & September

Ruminant



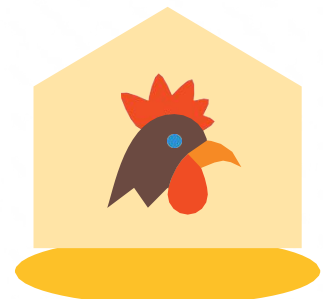
Pig



No	Vaccine	Time (days)
1	<i>Mycoplasma (1st)</i>	7
2	<i>Porcine Circovirus + Mycoplasma (2nd)</i>	15
3	<i>E.coli + Salmonella</i>	20
4	<i>Porcine reproductive and respiratory syndrome</i>	25
5	<i>Combination vaccine(CSF + Pasteurella + Salmonella)</i>	30
6	<i>Foot-and-mouth disease (1st)</i>	35
7	<i>Porcine Pleuropneumonia</i>	42
8	<i>CSF (2nd) + Foot-and-mouth disease (2nd)</i>	50

No	Vaccine	Time (days)
1	<i>Lasota + Infectious Bronchitis</i>	3
2	<i>Gumboro</i>	10
3	<i>Lasota + Infectious Bronchitis</i>	15
4	<i>Gumboro</i>	24
5	<i>Highly pathogenic avian influenza</i>	30
6	<i>Newcastle disease</i>	37
7	<i>Pasteurella</i>	42

Chicken



MEASURES SHOULD BE TAKEN REGULARLY TO IMPROVE ANIMAL HEALTH

**The use of veterinary drugs is necessary, but very complicated
Farmers need to consult and get advice from professional or veterinarian**

Ruminant

- Feed: balanced diet containing all the necessary nutrient, mineral, vitamin, free from hazardous
- Water: Provide enough, clean water
- Deworming drug: 2 times/year
- Ivermectin for parasite treatment



Photo credit: Tu Mai



Photo credit: Tu Mai

Pig

- Feed: balanced diet containing all the necessary nutrient, mineral, vitamin, free from hazardous
- Wasting food need to be cooked
- Water: provide enough, clean water
- Iron dextran: inject in 3 days age and 7 days age
- Internal and external parasite: ivermectin
- Vitamin supplement: mix in food and water regularly

Chicken

- Feed: balance diet containing all the necessary nutrient, mineral, vitamin, free from hazardous
- Water: must be clean. Trough needs to be suitable with chicken height, change water frequently
- Vitamin supplement: mix in food and water regularly
- Anticoccodials: mix in food and water



LIVESTOCK BIOSECURITY

BIOSECURITY IS THE CHEAPEST AND MOST EFFECTIVE WAY TO PREVENT DISEASE IN ANIMAL



Animal housing

- Separate with living area, have fence
- Animals should be confined



People

- Minimize visitors to the farmhouse
- Clean or disinfect boots before entering farmhouse



Feed and water

- Good quality and free from hazardous
- Water must be clean, provide enough water



Quarantine animals

- Quarantine new animal at least 14 days
- Separate sick animal
- Do not mingle animal



Other animals

- Use rat trap
- Use insecticides
- Control dog, cat to go in the farmhouse



Changing behaviour

- Changing husbandry habits is extremely difficult that requires perseverance and determination

3 steps of disinfection

1. Dry cleaning



- Removal of contaminated material
- Daily basis



2. Wet cleaning

- Cleaning by water and detergent
- Daily basis

3. Disinfection



- No disease: 1,2 times/ month
- Disease is circulating: 2 times/ week



FEEDS AND FORAGES

KEY MESSAGES

Improved forages can increase feed availability and provide additional benefits to the environment

Better animal nutrition can be achieved by understanding feed classification and applying appropriate feeding regimes

Winter feed shortage can be reduced by preserving forages and crop residues for use in the dry season

Good feeding practices also improve animal health and breeding performance

Improved Forages

Objective: Promote improved grass and legume varieties and suitable management practices

Benefits of growing improved forages

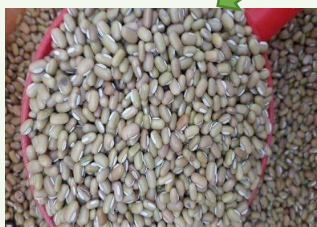
- Ensures feed availability throughout the year
- Address feed shortage in the dry season
- Environmental co-benefits – improve soil fertility, soil erosion control, weed control

Why do animals need both grasses and legumes?

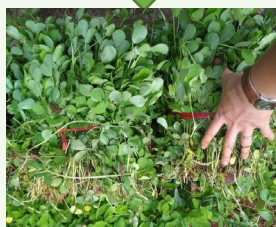
- Grasses produce more biomass than legumes, mainly fed to cattle and buffalos.
- Legumes contain higher protein levels than grasses, also provide essential minerals and vitamins. Can also be fed to small ruminants and pigs (in small amounts).



How to plant forages



Seeds



Seedlings



Root tillers

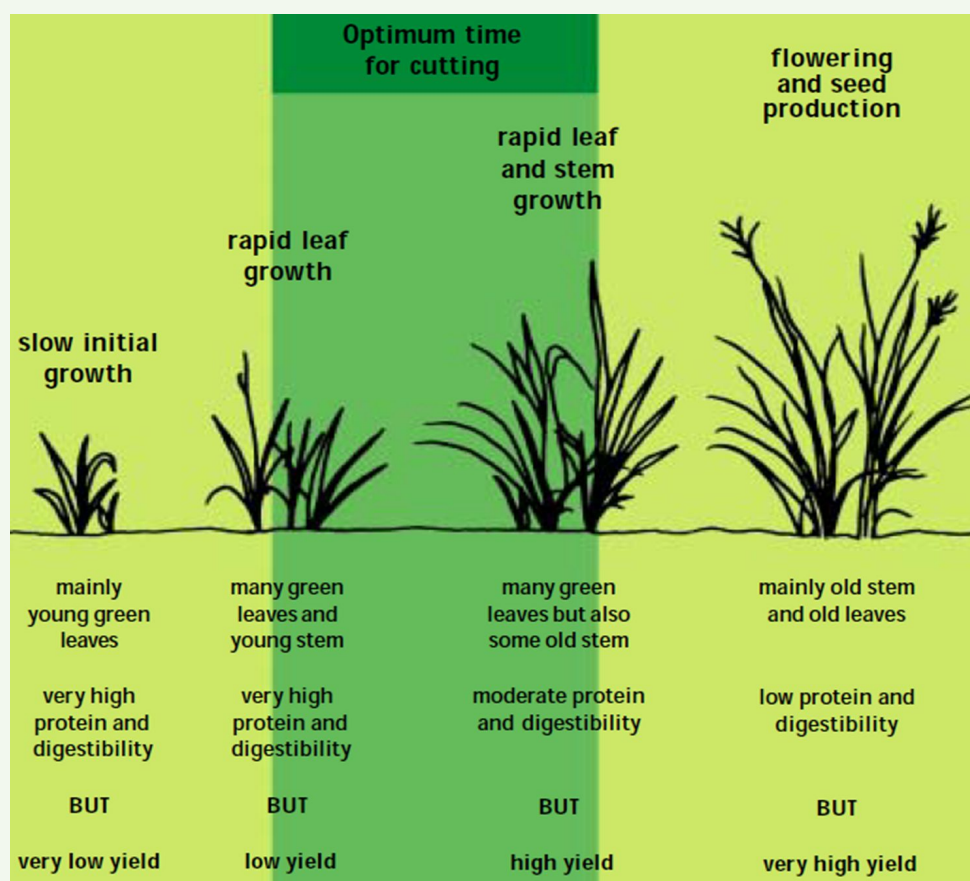


Stem cuttings

Photo credits: Bùi Văn Tùng & Phan Huy Chương (NOMAFSI)

How often should forages be cut?

- Depends on growth stage, yield quality and farmer's need at a given time
- Decision based on the best forage for animal nutrition is often a compromise between yield and forage quality.



Source: Stür & Horne, 2001.

Selected varieties and suitable ways of growing forages

	Variety	Cut-and-carry plots	Grazed plots	Contour hedgerows	Improved fallows	Cover crops in annual crops	Cover crops under trees	Ground cover
Grasses	Mulato II	✓✓	✓	✓				✓
	Mombasa guinea	✓✓	✓	✓				✓
	Ubon paspalum	✓	✓✓	✓✓				
	Green Napier	✓✓		✓✓				
Legumes	Ubon stylo	✓✓	✓	✓	✓✓	✓✓	✓	✓
	Pinto peanut		✓✓		✓		✓✓	✓✓
	Rice bean	✓				✓✓	✓✓	

✓✓-recommended; ✓-possible; no mark-not recommended

Suitable ways of growing forages

Cut-and-carry plot (e.g. Mulato II)

- Small plots that provide easy access to cut feed
- Allows farmers to easily collect manure



Grazed plot (e.g. Ubon paspalum)

- Designated grazing areas (often fenced) with grasses or grass-legume mixtures
- Suitable where grazing land is available



Contour hedgerows (e.g. Mombasa)

- Forages grown along the contour in sloping lands, along fence lines or between fields
- Also helps to reduce erosion



Improved fallow (e.g. Ubon stylo)

- Forage legumes grown on fallow land
- Restores soil fertility and suppress weeds



Cover crop with annual crops (e.g. rice bean with maize)

- Legumes grown with annual crops such as maize or cassava
- Improves soil fertility, reduce erosion, suppress weeds



Cover crop under trees/Ground cover (e.g. Pinto peanut)

- Legumes grown under trees such as fruit trees, coffee
- Suitable for short, spreading grasses and legumes
- Improves soil fertility, reduce erosion, suppress weeds



Photo credits: Bùi Văn Tùng & Phan Huy Chương (NOMAFSI);
Source: Stür & Horne, 2001

Forage grasses



1. Mulato II

- Vigorous semi-upright grass with high biomass
- Can produce between 14 - 17 tons/ha dry matter per year
- Cut to about 5 cm above ground level every 40-45 days in the wet season and 60-70 days in the dry season
- Suitable for acid soils, medium and low fertility, drought, high temperatures and high relative humidity
- Resistant to diseases and pests (spittlebugs)



2. Mombasa Guinea

- Tall grass, leafier than Napier.
- Can produce between 20 - 40 tons/ha dry matter per year.
- Cut every 40-45 days in the wet season and 60-70 days in the cool season.
- Moderate tolerance to drought (< 4 or 5 months), cold and acid soils.
- Suited to agroforestry due to shade tolerance.
- Acid soils require addition of lime.



3. Ubon Paspalum

- Short to medium high grass. Average height of 1-1.5m
- Can produce 10 - 30 tons/dry matter per hectare per year
- Cut every 40-45 days in the wet season; 60-70 days in the cool season.
- Tolerant to waterlogging, flooding, cold temperature, acidic and low fertile soils, moderate shade tolerant
- Not drought tolerant
- Tolerant to low grazing and regular cutting.



4. Green elephant

- Tall grass - 2.5 to 4m high.
- Soft stem as compared to other Napier varieties
- Fast growing – 2-3 months from planting to harvest (first cutting)
- Can produce between 320-350 tons/1ha
- Cutting height -> 10 - 30 cm

Source & Photo credits : Tropical Forages Selection Tool; Bùi Văn Tùng & Phan Huy Chương (NOMAFSI)

Forage legumes

5. Ubon Stylo



- Perennial legume, grows into a small shrub.
- Can produce between 13 - 18 tons/ha dry matter/year.
- High protein content of between 14 – 20%
- No nitrogen fertilizer needed. Phosphorus fertilizer (10–20 kg/ha recommended for infertile soils.
- Not readily eaten by cattle early in the growing season but becomes relatively more palatable later in the dry/cool season.
- Can also be fed to small ruminants and pigs.
- Adapted to acid infertile soils, drought tolerant
- Capable of fixing nitrogen which improves soil fertility

6. Rice bean



- Multi-purpose legume grown for food, feed, cover crop, green manure
- Seeds vary in colour - greenish-yellow, black, yellow, brown.
- Average biomass - 5-12 tons/ha dry matter
- Seed yield of 0.4-0.8 tons/ha in intercropping system
- Resistant to many pests and diseases, drought tolerant
- Matures in 120-150 days after sowing but may need more time at higher altitudes
- Capable of fixing nitrogen which improves soil fertility

7. Pinto Peanut (*Arachis pinto*)



- Stoloniferous perennial creeping legume, best suited for permanent pasture
- Can produce 8 - 12 tons/ha dry matter per year
- High protein content - 17% to 20%
- Besides cattle/buffalo, can also be fed to small ruminants, pigs, poultry
- Grows well in warm rainy season
- Multi-purpose crop – livestock feed, soil fertility improvement and conservation, cover crop under trees, ornamental ground cover
- Adapts well to acidic soils, tolerant to shade, moderate waterlogging, drought, heavy grazing and periodic flooding.
- Resistant to the major groundnut diseases, rust and leaf-spot and root-knot nematodes

Photo credits: Bùi Văn Tùng & Phan Huy Chương (NOMAFSI)

Source: [Tropical Forages Selection Tool](#)

CATTLE FEEDS

FEED CLASIFICATION



Forage

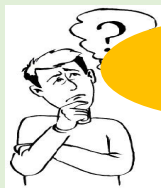


Concentrate



Mineral

SILAGE TECHNIQUE



Materials



Preparing pit/nylon bag



Wilting



Chopping into 3-5cm



Spread 25cm layer by layer, sprinkle with salt + bran, compaction



Cover the pit/tie nylon bag

100kg forage + 3-5 kg rice bran/corn + 0.5 kg salt; Feeding after 14-21 days silage, with 30-50% silage feed of diet

Feeding after 14-21 days, with 30-50% URS of diet

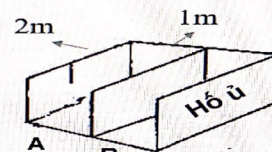
UREA TREATED RICE STRAW (URS)



100 kg Rom



4 kg Urê



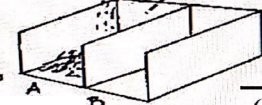
(1)



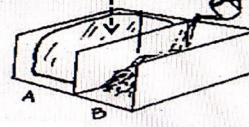
(2)



(3)



(5)



FEEDING REGIMES FOR BEEF CATTLE

FEEDING REGIMES FOR LACTATION COWS

Why is it important to supplement concentrate feed for lactation cows?



- Increase milk yield of cows
- Calves grow fast
- Cows return to estrus earlier
- ➔ Calving interval is shorter

Body weight of cow (kg)	Intake of concentrate (kg/ngày)
150 - 200	1,2 - 1,7
200 - 250	1,7 - 2,0
250 - 300	2,0 - 2,5
300 - 350	2,5 - 2,9

- Low milk yield
- Calves grow slow
- Skinny cows and delay estrus
- ➔ Elongation calving interval

Conc-e
ntrate
supple-
ment



□ Concentrate supplement for cows until 3 months after calving

□ Fed 2 times/day, feeding concentrate before forage.

FEEDING REGIMES FOR SUKLING CALF

Why is it important to supplement feed and early wean for calves?

- Help calves to eat early feed.
- Make up for lack of nutrition from milk.
- Stimulates the digestive system.
- Healthy, fast growing calves.
- Cows return to estrus earlier



FEEDING REGIMES FOR WEANING CALF (7-12 MONTHS) AND HEIFERS (13-24 MONTHS)

Month	Concentrate (kg/day)	Green Forage (kg/day)	
7-12	1,0	15-20	
13-18	1,5	20-25	
19-24	2,0	25-30	

FEEDING REGIMES FOR FATTENING CATTLE

□ Why fattening cattle?

- ✓ Increase growth performance and meat quality, with higher price.
- ✓ Utilise feed resources and increase income.

□ How to feed fattening cattle?

- ✓ Forage (70%); Concentrate (30%)



BW (kg)	Green forage (kg)	Silage (kg)	URS (kg)	Conc. (kg)
150	4,8	4,8	1,4	1,35
200	6,3	6,3	1,9	1,8
250	7,9	7,9	2,3	2,25
300	9,5	9,5	2,8	2,7

FEED AND FEEDING REGIMES FOR BAN PIGS

FEED CLASIFICATION



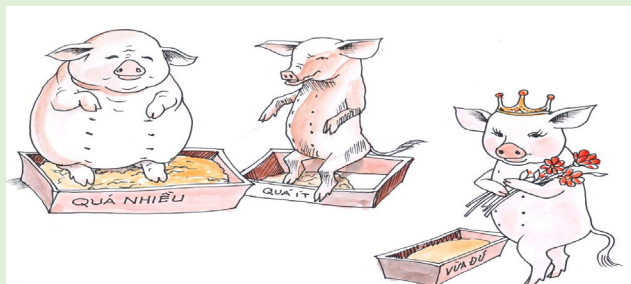
FEEDING REGIMES FOR BAN PIGS AT DIFFERENT PERIODS

FEEDING REGIMES FOR GILTS

BW (kg)	Concentrate (kg/day)
10-20	0.4-0.8
21-30	0.8-1.0
30-PG	1.0-1.2

✓2-4kg vegetables/day

✓2 meals/day



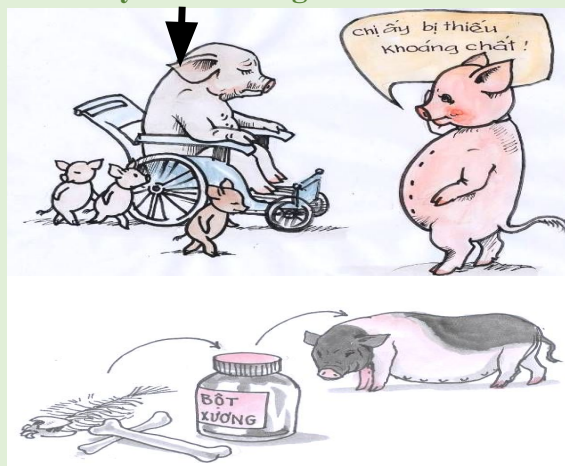
FEEDING REGIMES FOR PREGNANT SOWS

BW (kg)	Concentrate (kg)	
	Phase 1	Phase 2
30-40	0.6	0.8
40-60	0.8	1.0
60-80	1.0	1.2

✓2-4kg vegetables/day

✓2 meals/day

Paralysis of the legs



FEED AND FEEDING REGIMES FOR BAN PIGS

FEEDING REGIMES FOR LACTATION SOW

Consumption of concentrate (kg)	
One day before farrowing	0.3 – 0.5
Day 1-4 after farrowing	0.5-2.0
After 5 days farrowing, <i>ad libitum</i>	



- Early feed from 7-10 days of age
- Early weening → Increase parities/year, earlier return to estrus

After weaning fed 4-5% of body weight



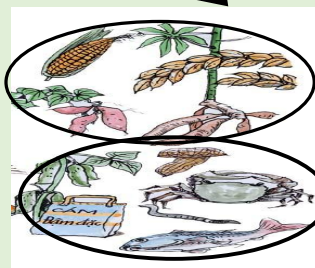
- ✓ 2-4kg vegetables/day
- ✓ 2 meals/day



From 15kg to slaughter:
fed 3-4% of body weight

FEEDING REGIMES FOR FATTENING PIGS

Increase the percentage of lean meat?



Balance
protein/energy in diet

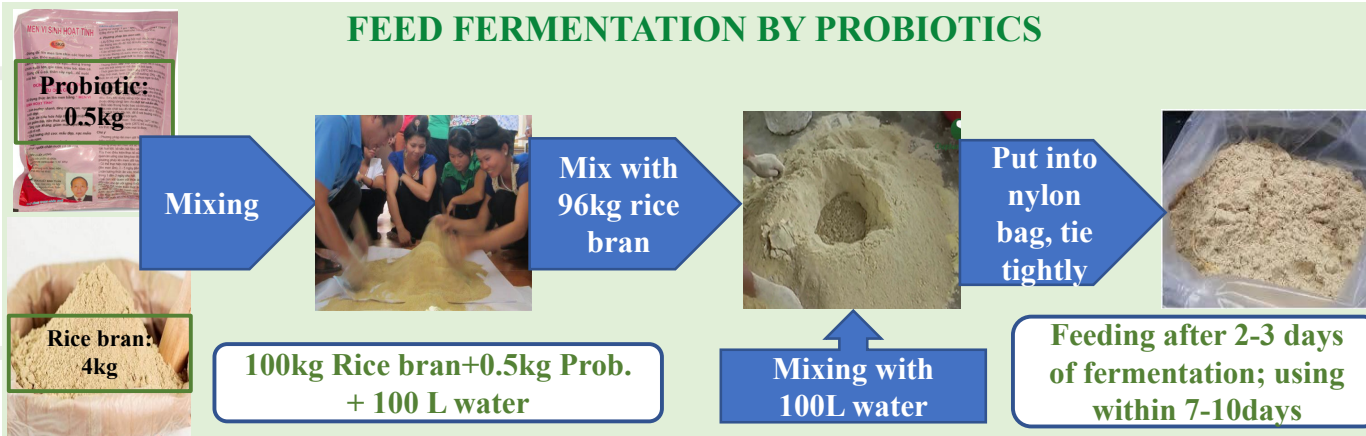


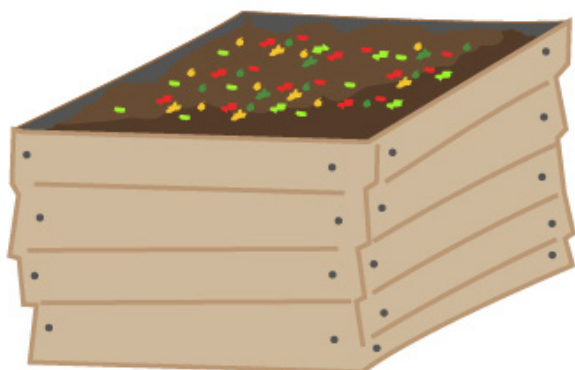
Enough water



Suitable slaughtering
body weight & time

FEED FERMENTATION BY PROBIOTICS





LIVESTOCK AND ENVIRONMENT

KEY MESSAGES

Keeping a permanent soil cover improve soil fertility and protect the soil against erosion

This can be done with cover crops, crop residues, animal manure or compost

Applying compost to plant would be better than fresh manure and chemical fertilizer

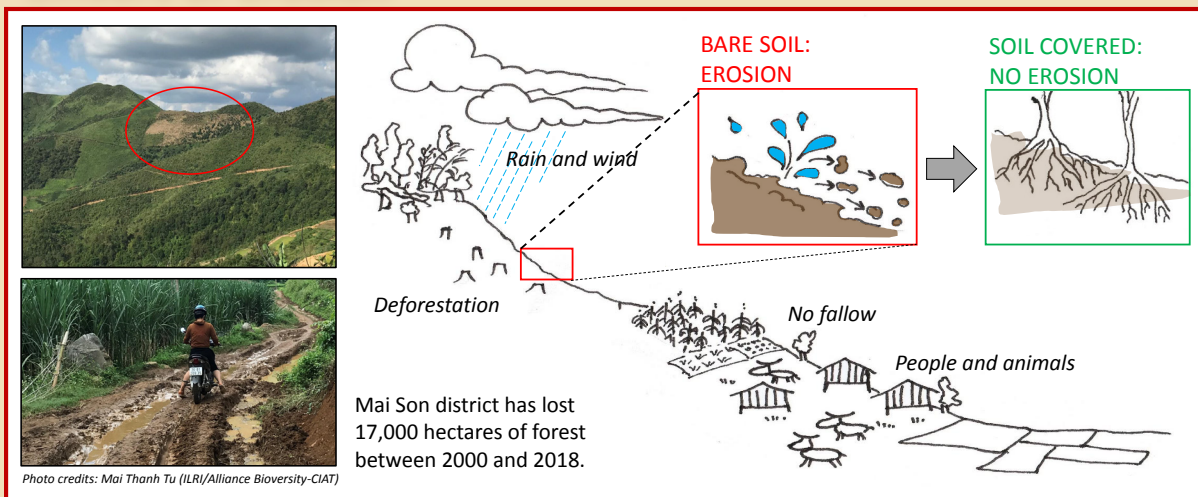
Legumes are special: they can act as natural fertilizers because they bring new nitrogen from the air

Forages can be planted in contour lines or intercropped to protect the soil

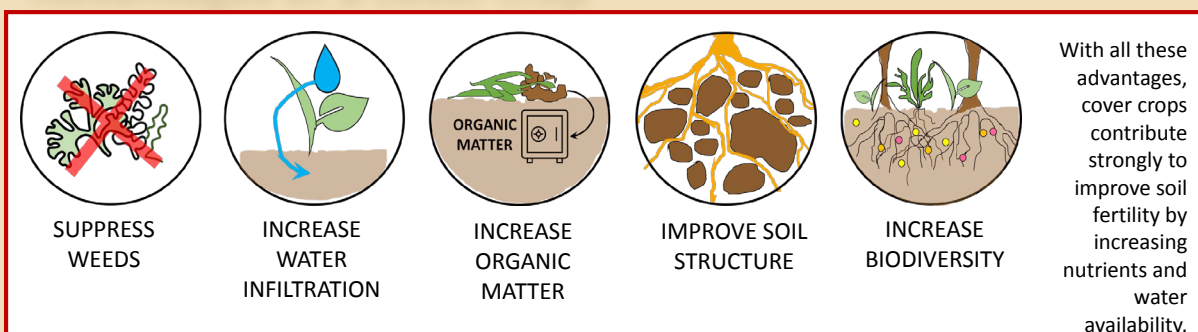
When the biomass is recycled within the farm, there are less wastes and better crop and animal production

EROSION CONTROL

Drivers of erosion



Advantages of a cover crop



Options to control erosion

CONTOUR HEDGEROWS

Contour lines help maintain the soil on slopes. It can be done using forage grasses or tree legumes for example.



Photo credit: <https://www.vetiver.com.vn>

INTERCROPPING AND ROTATIONS

To ensure a permanent soil cover, cover crops can be planted in rotation or between crop lines. Shade-tolerant forages can be planted in fruit tree plantations. Roadsides can also be planted with forages.



MULCHING AND MANURING

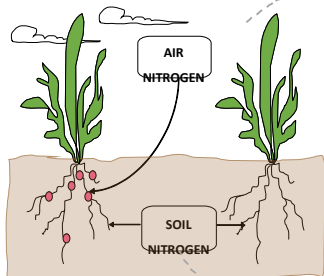
Crop residues can be distributed on the fields to protect the soil. When crop residues are fed to livestock, the animal manure can be used instead, if possible after composting. This will increase soil organic matter content, and improve soil structure.



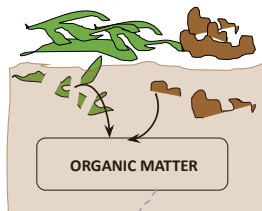
SOIL FERTILITY

Legumes

Plants grow with *nitrogen*, a key nutrient that they find in the soil. When there is no more nitrogen in the soil, plants do not grow well and die. Legumes can also take nitrogen from the air, thanks to their nodules.



Organic manure and compost

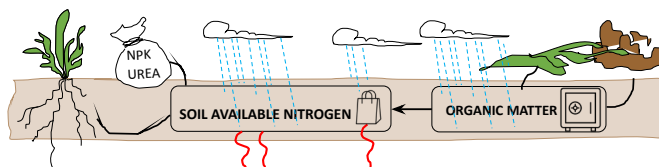


When crop residues, animal manure or compost are applied on the soil surface, they decompose slowly and form the soil organic matter. From there, nitrogen is released and available for plants. The soil is more fertile.

Soil organic matter

Soil organic matter is like a storage for nutrients in the soil.

Mineral fertilizers can also be applied to have more soil nitrogen, but they are lost easily with rain, and should be applied at the right moment.



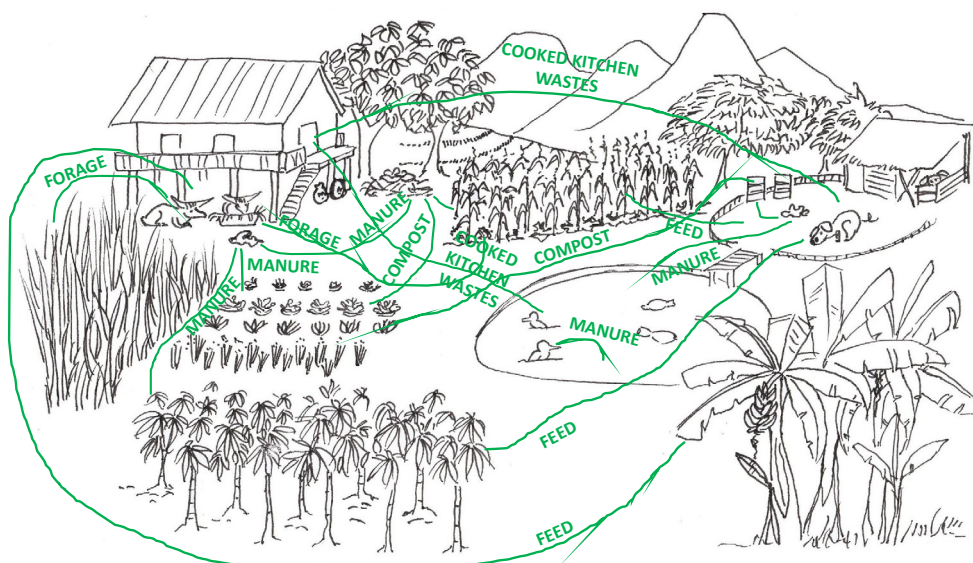
To increase the quantity of soil organic matter in the soil, there should be

- more inputs: use legumes, mulch, collect manure (animals in pens for longer periods)
- less losses: control erosion by maintaining a soil cover (trees, cover crops, forages, ...)



Photo credits: Mai Thanh Tu (ILRI/CIAT)

Recycling



Biomass can be recycled between crop and livestock. Diverse farms offer specially a lot of options. Good use of manure and compost increases soil fertility. Growing forages and collecting crop residues increases animal production.

COMPOSTING TECHNIQUES

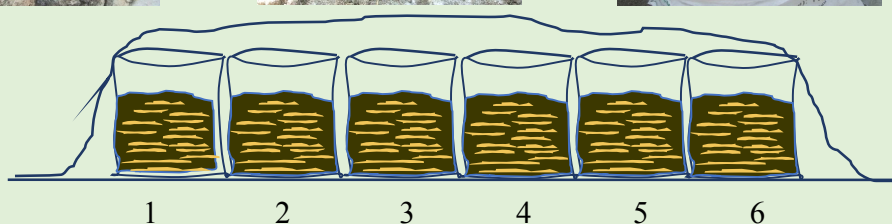
MATERIALS FOR MANURE COMPOSTING

	Cattle composting	Pig composting
Cattle manure	1000	
Pig manure		1000
Rice husk	50	80
Rice straw	250	200
Rice bran	5	5
Total (kg)	1305	1285

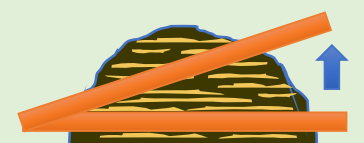
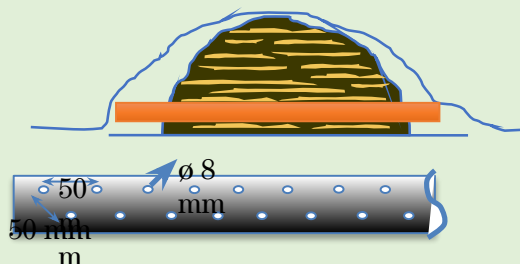
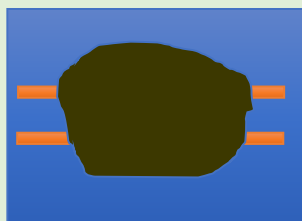
COMPOSTING OF PIG MANURE (1)



- Mix all materials and put into sacks.
- Place all sacks next to each other, then cover nylon



COMPOSTING OF PIG MANURE (2)



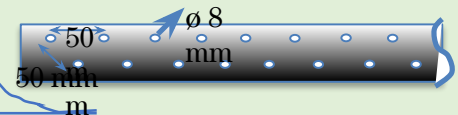
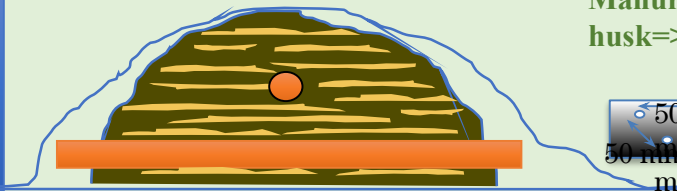
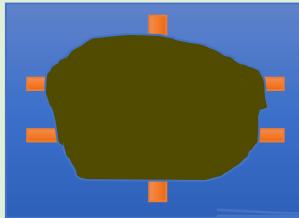
Compost layer by layer:
Manure=>Rice bran=>Rice
husk=>Rice straw=>Manure...



COMPOSTING TECHNIQUES

COMPOSTING OF CATTLE MANURE

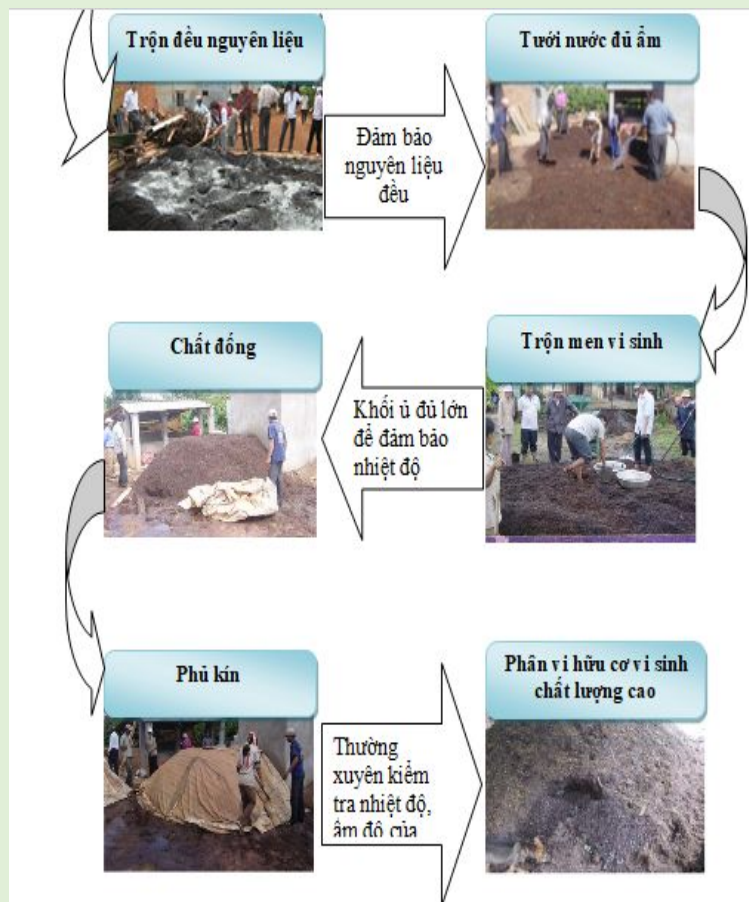
Compost layer by layer:
Manure=>Rice bran=>Rice
husk=>Rice straw=>Manure...

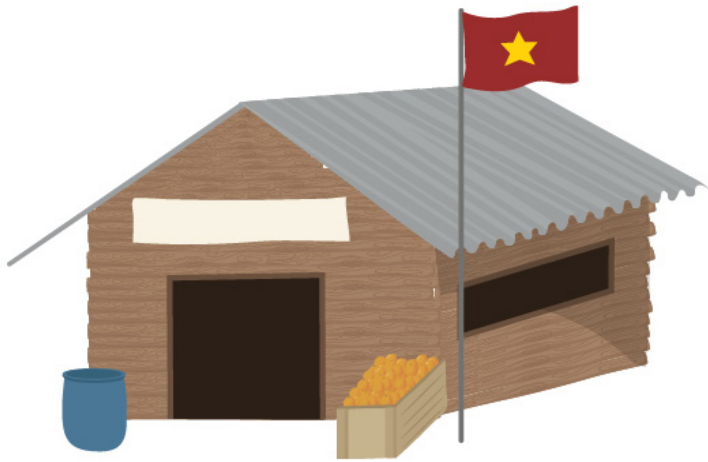


COMPOSTING OF AGRICULTURAL BY-PRODUCTS

MATERIALS

- ☐ Coffee pods: 1000kg
- ☐ Manure (pigs or cattle): 200kg
- ☐ Phosphate fertilizer: 50kg
- ☐ Urea: 10kg
- ☐ Sugar: 2kg
- ☐ Trichoderma: 2 kg
- ☐ **Activation of probiotics:** conduct 2 to 3 hours before incubation; dissolve 2 kg of probiotics, 2 kg of sugar and 0.2 kg of urea in a 50L water tank; stir until dissolved, and then stir every 1 hour.
- ☐ **Mix the coffee pods** with the rest of the materials, mixing and watering until fully moistened (60%).
- ☐ **Irrigate and mix the probiotics on the compost pile.**
- ☐ **The compost pile**, 1.2m high, 2-2.5m wide, ensures that the pile retains heat.
- ☐ The compost can be used after 1-3 months depending on temperature.





LIVELIHOODS

KEY MESSAGES

Common interest groups (CIGs) push up collective actions for sustainable economic development

The enthusiasm and management capacities of the management board are the main factors for the success of a CIG

Good production and business plans are the starting point for effective operation of CIGs

LIVESTOCK COMMON INTEREST GROUPS (CIGs)

Definition of CIGs

- Including households living in a local community with knowledge, enthusiasm, and passion for socio-economic activities;
- Voluntarily participating for profit and non-profit purposes; being willing to be the core to promote activities for advancing social security, improving production efficiency, and developing sustainable livelihoods

Benefits of CIGs

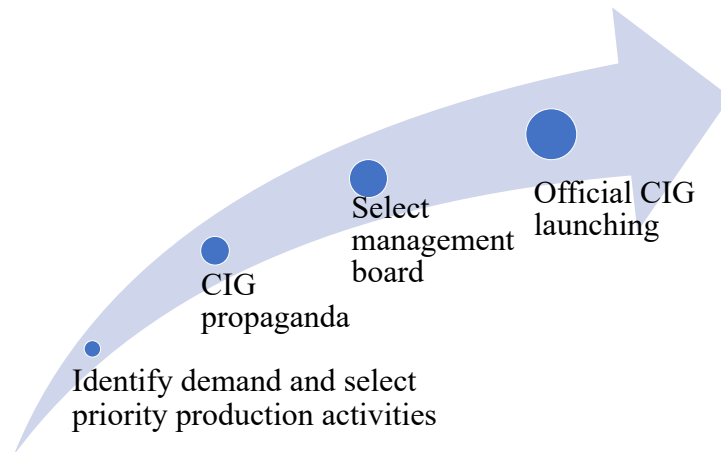
- Better access to production and business resources
- Improve production and business efficiency
- Capacity building for farmers
- Improve community relations and saving capacity
- Attract investors, better access to loans, and increase bargaining power
- Minimise marketing risks via contract-farming...



Main activities of CIGs

- Organize group meetings
- Information sharing (including linking with other groups)
- Receive technical trainings
- Organize collective purchase and sales in large volumes
- Develop marketing networks and conduct market assessment
- Support members as needed
- Capital management and capital turnover for group activities
- Explore opportunities for technical and product development
- Invest in financially affordable activities

STEPS OF CIG FORMATION



Management board of CIGs

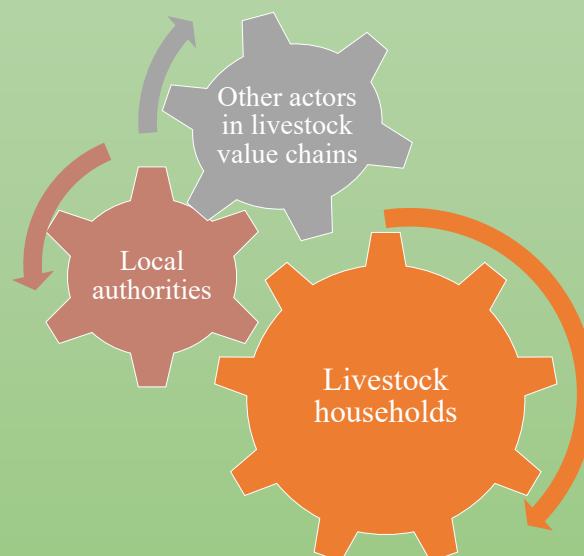
Group leader

Deputy leader

Secretariat

Accountant

Components of CIGs

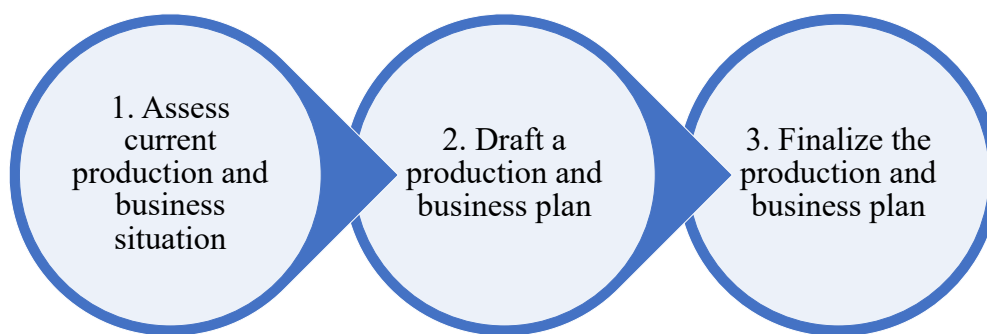


DEVELOPMENT OF PRODUCTION AND BUSINESS PLAN FOR CIGs

Definition of production and business plan

Refer to directions, tasks, targets, and material and financial resources needed for the implementation of development goals set out in a short period (3 months, 6 months or 12 months)

Steps of development of production and business plan



Principles of development of production and business plan

