



Report

Training of trainers (TOTs) and farmers (TOFs) on cattle and pig feed technologies in Mai Son district, Son La province

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Report

Background to training

In the Northwest Highlands (NWH) of Vietnam, cattle and buffalo are mainly raised with tended grazing (74%), free grazing on communal land and forest, and added hand-feeding crop residues and by-products. The grazing system is characterized by low output and poor reproductive performance. Intensifying beef cattle production has been identified as a way of increasing the income of smallholders in remote regions (Huyen et al., 2010). In addition to diversifying income, livestock can provide resilience to climatic variations, extreme weather events, and price fluctuations in cash crops (Herro et al., 2010). Further, integrated crop-livestock systems allow an increase in the output product diversity, better regulation of biogeochemical processes (e.g., nitrogen and nutrient cycling) and a reduction of negative impacts on the environment (Herro et al., 2010). The poor linkages of the beef value chain to urban markets, a limited understanding by farmers of beef market supply dynamics by smallholders and limited exchange of information between stakeholders would be improved by intensifying beef cattle production. Therefore, cattle production systems nowadays tend to move from extensive to semi-intensive and intensive systems (Ba et al., 2014). However, previous assessments in the region identified the main feed-related challenges including winter feed shortage, poor diets, low yield of available forages (Atieno et al., 2021). Therefore, to successfully achieve this transition and ensure sustainable livestock management and productivity, better feed management strategies and increased cultivation of improved forages (e.g., Mun River, Mombasa Guinea, Mulato II, Green elephant, Ubon stylo), to meet animal nutrition demand, should be promoted.

Pig production plays an important role for the livelihood of farmers, especially for poor people in the difficult-to-access rural and mountainous areas. In mountainous areas, pig production is associated with indigenous pig breeds which are low performance but well-adapted to the local harsh

and deprived conditions, better resistant to disease than improved pig breeds (Le et al., 2016; Atieno et al., 2021). However, in recent years, crossbreds and exotic pig breeds have been introduced to farmers in mountainous regions. For example, in the Li-chan project, using the technology of artificial insemination (AI) with exotic semen for Ban pigs has been successful in Chieng Chung and Chieng Luong communes, Mai Son district, Son La province. Although there is a long traditional practice in pig production, farmers have limited knowledge on pig nutrition which greatly affects the productivity and health of the pig herd.

One of the objectives of the CGIAR initiative on Sustainable Animal Productivity for Improved Livelihoods, Nutrition and Gender Inclusion (SAPLING), is to assess, test and promoted locally suited feed intervention strategies for cattle and pigs, in Mai Son district, Son La province, located in the Northwest Highlands of Vietnam. In order to meet this objective, training of farmers (TOFs) from target farmer groups, and trainers (TOTs) including extension workers and vet officers, on pig and cattle feed and nutrition was organized in Mai Son district, Son La province from 22 - 24 August 2023.

Location and modality

Five training sessions were organized from 22 - 24 August 2023. Of which, one TOT was organized at Mai Son Agriculture Service Center and 4 TOFs were in 4 SAPLING core communes (Chieng Chung, Chieng Luong, Muong Bon and Hat Lot) in Mai Son district, Son La province. All materials were prepared for the practical sessions including feed materials (rice straw, fresh grass, biomass maize, fresh forage biomass, rice bran, maize meal, concentrated feed rich in protein) and other materials needed (urea, probiotics, nylon bags, plastic containers) (**Table 1**).

Table 1. Materials prepared for the practical demonstrations

No.	Materials	Unit	Quantity
	Materials		
1	Plastic bucket 20L	Bucket	1
2	Shovel	Shovel	2
3	Gloves	Gloves	2
I	Urea-treated rice straw		
1	Nylon bag	Bag	2
2	Rice straw	kg	50
3	Urea	kg	2
II	Silage of Napier grass		
1	Nylon bag	Bag	2
2	Napier grass (chopped 3-5cm)	kg	50
3	Rice bran	kg	2
4	Salt	kg	0.25
III	Silage of Napier grass + Ubon stylo		

1	Nylon bag	Bag	2
2	Napier grass (chopped 3-5cm)	kg	40
3	Stylo legume (chopped 3-5cm)	Kg	10
4	Rice bran	kg	2
5	Salt	kg	0.25
IV	Silage of biomass maize		
1	Nylon bag	Bag	2
2	Biomass maize (chopped 3-5cm)	kg	50
3	Salt	kg	0.25
V	Fermentation of rice bran		
1	Nylon bag	Bag	2
2	Rice bran type I	kg	15
3	Probiotics*	kg	0.075
VI	Feed mixing		
1	Concentrate 46% protein for pigs	kg	5
2	Corn meal	Kg	15
3	Rice bran	kg	10
4	Cassava meal	kg	3.3

**Farmers can buy probiotic products at the feed and veterinary shop in Mai Son or Son La city. The amount of probiotic supplementation varies depending on the guidelines of the producer.*

Hands-on learning methods applied for the TOT and TOFs, by using PowerPoint presentations (only for TOT), posters, and practical demonstrations. All participants could speak and understand Vietnamese, so no translation was needed during the trainings.

Dates: 22 - 24 August 2023

Who conducted the training?

Implementation team included staff from the National Institute for Animal Sciences (NIAS), Northern Mountainous Agriculture and Forestry Research Institute (NOMAFSI), Sub-Department of Animal Health, Animal Husbandry and Aquaculture (Sub-DAH) and The Alliance of Bioversity International and CIAT. Three NIAS staff were trainers for the training courses, including Associate Prof. Dr. Tran Thi Bich Ngoc, Dr. Tran Viet Phuong and Mr. Nguyen Thien Truong Giang. NIAS staff also prepared the training materials and the protocol of the training courses list of participants. CIAT staff supported connecting

the local authorities, preparing training materials and inviting participants, etc. NOMASI staff were responsible for introducing the forage demo farms and preparing training materials.

Objectives of the training

The objective of the training was to improve the knowledge and skills of local staff and farmers on pig and cattle feed and nutrition covering the following topics:

Feed and feeding regimes for cattle (hdl.handle.net/10568/134521):

- Feed classification (forages, concentrate, mineral)
- Feed processing: silage making (with forages, biomass maize, crop residues...), urea-treated rice straw.
- Feeding regimes for cattle in different periods (lactating cow, suckling calf, weaning calf, heifer, and fattening)

Feed and feeding regimes for pigs (hdl.handle.net/10568/134553):

- Feed classification (protein feed, energy feed, mineral feed, vitamin feed)
- Feed processing: concentrate mixing, concentrate feed fermentation by probiotics.
- Feeding regimes for cattle in different periods (gilts, pregnant sow, lactating sow, grower-fattener pigs)

Training agenda

Each training session lasted one day, with the contents including theoretical, forage demo farm visits and practical sessions on feed technologies. See **Appendix 1** for the detailed agenda.

Training participants

Training of trainers (TOTs)

One TOT course was organized at Mai Son Center of Agricultural Services with 24 participants, of which 9 women (4 Kinh and 5 Thai ethnics) and 15 men (3 Kinh and 12 Thai ethnics) (**Table 2**). Participants included local staff from Sub-DAH; Mai Son Center of Agricultural Services; extension and veterinary staff at commune level from Chiềng Chung, Chiềng Lương, Hát Lót, Mường Bon, Chiềng Dong, Mường Chanh, Chiềng Kheo, Chiềng Ban, Tà Hộc, Nà Ốt, Phiêng Pần, Chiềng Chăn communes. These participants were selected by Sub-DAH and Mai Son Center of Agricultural Services with the aim that they will become local trainers for farmers in their respective jurisdictions.

Table 2. TOT participants

Ethnicity	Women		Men		Total	
	No.	%	No.	%	No.	%
Kinh	4	16.67	3	12.50	7	29.17
Thai	5	20.83	12	50.00	17	70.83
Total	9	37.5	15	62.5		



TOT at Mai Son Center of Agricultural (Photo credit: Tran Viet Phuong/NIAS)



ToT on preparation of urea-treated rice straw (Photo credit: Tran Thi Bich Ngoc/NIAS)

Training of farmers (TOFs)

Four TOF sessions were organized in 4 communes (Chieng Luong, Chieng Chung, Muong Bon and Hat Lot) in Mai Son district. A total of 90 farmers (33 women and 57 men) participated in the

TOF sessions in the 4 communes (**Table 3**). The average number of participants in each TOF session was between 21 to 25 participants. Participants were selected based on recommendations from the local authorities, and from members of farmer groups located within each commune. The criteria for selecting the participants were based on willingness, gender balance, ethnicity, age, livestock heads owned and available land area for growing forages. Most farmers who participated were from Thai ethnicity (89%), followed by H'Mong ethnicity (8%) and only 3% from Kinh ethnic group. All women participants were from Thai ethnicity, even though H'Mong women farmers were invited to the training.

Table 3. TOF participants

Commune	Ethnicity	Women		Men		Total	
		No.	%	No.	%	No.	%
Chieng Luong	Thai	10	40.00	12	48.00	22	88.00
	H'Mong	0	0.00	3	12.00	3	12.00
	Total	10	40.00	15	60	25	100
Chieng Chung	Thai	8	38.10	9	42.86	17	80.95
	H'Mong	0	0.00	4	19.05	4	19.05
	Total	8	38.10	13	61.90	21	100
Muong Bon	Kinh	0	0.00	3	13.64	3	13.64
	Thai	9	40.91	10	45.45	19	86.36
	Total	9	40.91	13	59.09	22	100
Hat Lot	Thai	6	27.27	16	72.73	22	100.00
	H'Mong	0	0.00	0	0.00	0	0.00
	Total	6	27.27	16	72.73	22	100
Chung	Kinh	0	0.00	3	3.33	3	3.33
	Thai	33	36.67	47	52.22	80	88.89
	H'Mong	0	0.00	7	7.78	7	7.78
	Total	33	36.67	57	63.33	90	100



ToF on silage making (Photo credit: Tran Thi Bich Ngoc/NIAS)



ToF on pig feed mixing (Photo credit: Tran Thi Bich Ngoc/NIAS)

Moreover, trainees also visited and evaluated forage demo farms with improved and local varieties (Green elephant, VA06, Mulato II, Mombasa Guinea, Mun River Guinea, Ubon stylo, rice bean, biomass maize).



Forage demo farm in Khoa village, Chieng Chung commune (Photo credit: Tran Thi Bich Ngoc/NIAS)



Farmers visiting demo farm to evaluate improved forages promoted by SAPLING (Photo credit: Tran Thi Bich Ngoc/NIAS)

Summary and next steps

All invited TOT participants attended the training. However, some invited farmers did not participate in the TOFs in the 4 communes: with 53.85% (14/26) in Chieng Luong, 32% (8/25) in Chieng Chung, 50% (13/13) in Muong Bon and 50% (11/22) in Hat Lot. Many non-invited farmers, who were willing to learn, participated in the TOFs including 13 farmers in Chieng Luong, 4 farmers in Chieng Chung, 9 farmers in Muong Bon, and 11 farmers in Hat Lot. No women farmers of H'Mong ethnicity participated in the TOFs, even though they were invited. The project team needs to create a conducive environment for H'Mong women farmers to join project activities such as conducting trainings near or in H'Mong villages. Most H'Mong people live in remote, difficult to access areas at the top of the mountains, and H'Mong women cannot drive motorbikes to the more accessible villages where the TOFs were conducted.

During the TOFs, knowledge and skills on animal nutrition and feed technologies for cattle and pigs was conveyed to the farmers. A training method of learning by doing was used in both TOT and TOFs. Before the practical demonstrations, we introduced the theoretical framework of the training through posters with short and sharp information and interesting pictures. For the TOT, PowerPoint presentations were used to provide detailed explanations of different feed technologies. With this method, trainees participated in hands-on practical sessions including preparation on silage and urea-treated rice straw, feed mixing and feed fermentation. Almost all trainees attentively listened to the theory and enthusiastically participated in the practical sessions. Some of them took notes and videos of the lectures and practicals. Farmers asked many questions to the technical team related to beef cattle and pig production. This training approach was interactive and allowed participants to actively participate and freely ask questions and seek clarifications, thereby increasing the level of understanding and memory of trainees.

We observed that knowledge on silage making, and feed fermentation is still limited in the study area. Thus, training is necessary to improve the skills of farmers in forage processing and preservation. To take advantage of available forage materials in the demo farms, demonstration activities on silage and feed fermentation with different formulas corresponding to each type of forage were conducted. Farmers in the 4 communes enthusiastically participated in demonstration activities of forage silage, urea-treated rice straw, feed mixing and feed fermentation cattle and pigs, in which both men and women participated. However, in Hat Lot village, only men participated in the practical demonstrations. Farmers were interested to know the best storage time for the silage and fermented feed and the right quantity of additives supplemented.

For subsequent training exercises, provincial extension staff should be invited to participate in the TOT to equip them with knowledge and skills and disseminate the project's interventions to all districts in Son La province. In addition, at least 1 extension staff at the district level (Center of Agricultural Services) and 1 extension staff at the commune level from the TOT course should support subsequent TOFs organized in their respective districts and communes.

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Photos Optional: Some photos in the TOT and TOF courses



TOF in Chieng Luong commune (Photo credit: Tran Thi Bich Ngoc/NIAS)



TOF in Chieng Chung commune (Photo credit: Tran Thi Bich Ngoc/NIAS)



TOF in Muong Bon commune (Photo credit: Tran Viet Phuong/NIAS)



TOF in Hat Lot commune (Photo credit: Nguyen Thien Truong Giang/NIAS)



ToF on feed fermentation (Photo credit: Tran Thi Bich Ngoc/NIAS)

Annex 1: Training agenda

Date	Place	Morning	Afternoon	Responsible
August 22 nd	Mai Son Center of Agricultural Services	8:00-8:15 - Welcoming participants & Introduction	12:00-13:30 - Lunch	<p>NIAS staff: Tran Thi Bich Ngoc Tran Viet Phuong Nguyen Thien Truong Giang</p> <p>CIAT staff: Mary Atieno Dao Thi Thu Hang</p> <p>NOMAFSI: Do Trong Hieu Nguyen Tien Sinh</p>
		8:15-9:45 - Feed and feeding for cattle	13:30-14:00 - Forage silage with rice bran (corn) (cattle)	
		9:45-10:15 - Feed and feeding for pigs	14:00-14:30 - Urea treated rice straw (cattle)	
		10:15-10:25 - Break	14:30-15:00 - Fermentation of rice bran & Feed mixing (pigs)	
		10:25-10:35 - Improved forage varieties	15:00-15:10 -Break	
		10:35-12:00 - Visit demo farm	15:10-16:00 - Evaluation and question	
August 23 rd	Chieng Chung commune	8:00-8:15 - Welcoming participants & Introduction	12:00-13:30 - Lunch	<p>NIAS staff: Tran Thi Bich Ngoc</p> <p>CIAT staff: Mary Atieno</p> <p>NOMAFSI: Do Trong Hieu</p> <p>Sub-DAH: Ngo Quang Tien</p>
		8:15-9:45 - Feed and feeding for cattle	13:30-14:00 - Forage silage with rice bran (corn) (cattle)	
		9:45-10:15 - Feed and feeding for pigs	14:00-14:30 - Urea treated rice straw (cattle)	
		10:15-10:25 - Break	14:30-15:00 - Fermentation of rice bran & Feed mixing (pigs)	
		10:25-10:35 - Improved forage varieties	15:00-15:10 -Break	
		10:35-12:00 - Visit demo farm	15:10-16:00 - Evaluation and question	

August 23 th	Muong Bon commune	8:00-8:15 - Welcoming participants & Introduction	12:00-13:30 - Lunch	<p>NIAS staff: Tran Viet Phuong Nguyen Thien Truong Giang</p> <p>CIAT staff: Dao Thi Thu Hang</p> <p>NOMAFSI: Nguyen Tien Sinh</p>
		8:15-9:45 - Feed and feeding for cattle	13:30-14:00 - Forage silage with rice bran (corn) (cattle)	
		9:45-10:15 - Feed and feeding for pigs	14:00-14:30 - Urea treated rice straw (cattle)	
		10:15-10:25 - Break	14:30-15:00 - Fermentation of rice bran & Feed mixing (pigs)	
		10:25-10:35 - Improved forage varieties	15:00-15:10 -Break	
		10:35-12:00 - Visit demo farm	15:10-16:00 - Evaluation and question	
August 24 th	Chieng Luong commune	8:00-8:15 - Welcoming participants & Introduction	12:00-13:30 - Lunch	<p>NIAS staff: Tran Thi Bich Ngoc</p> <p>CIAT staff: Mary Atieno</p> <p>NOMAFSI: Do Trong Hieu</p> <p>Sub-DAH: Ngo Quang Tien</p>
		8:15-9:45 - Feed and feeding for cattle	13:30-14:00 - Forage silage with rice bran (corn) (cattle)	
		9:45-10:15 - Feed and feeding for pigs	14:00-14:30 - Urea treated rice straw (cattle)	
		10:15-10:25 - Break	14:30-15:00 - Fermentation of rice bran & Feed mixing (pigs)	
		10:25-10:35 - Improved forage varieties	15:00-15:10 -Break	
		10:35-12:00 - Visit demo farm	15:10-16:00 - Evaluation and question	
August 24 th	Hat Lot commune	8:00-8:15 - Welcoming participants & Introduction	12:00-13:30 - Lunch	<p>NIAS staff: Tran Viet Phuong Nguyen Thien Truong Giang</p>

				CIAT staff: Dao Thi Thu Hang NOMAFSI: Nguyen Tien Sinh
		8:15-9:45 - Feed and feeding for cattle	13:30-14:00 - Forage silage with rice bran (corn) (cattle)	
		9:45-10:15 - Feed and feeding for pigs	14:00-14:30 - Urea treated rice straw (cattle)	
		10:15-10:25 - Break	14:30-15:00 - Fermentation of rice bran & Feed mixing (pigs)	
		10:25-10:35 - Improved forage varieties	15:00-15:10 -Break	
		10:35-12:00 - Visit demo farm	15:10-16:00 - Evaluation and question	



The CGIAR Research Initiative on Sustainable Animal Productivity for Livelihoods, Nutrition and Gender inclusion (SAPLING) is working in seven countries focusing on livestock value chains to package and scale out tried-and-tested, as well as new, innovations in livestock health, genetics, feed and market systems. SAPLING aims to demonstrate that improvements in livestock productivity can offer a triple win: generating improved livelihoods and nutritional outcomes; contributing to women’s empowerment; and, reducing impacts on climate and the environment. Its seven focus countries are Ethiopia, Kenya, Mali, Nepal, Tanzania, Uganda and Vietnam.

It forms part of CGIAR’s new Research Portfolio, delivering science and innovation to transform food, land, and water systems in a climate crisis.

