



มูลนิธิแม่ฟ้าหลวง ในพระบรมราชูปถัมภ์
Mae Fah Luang Foundation under Royal Patronage

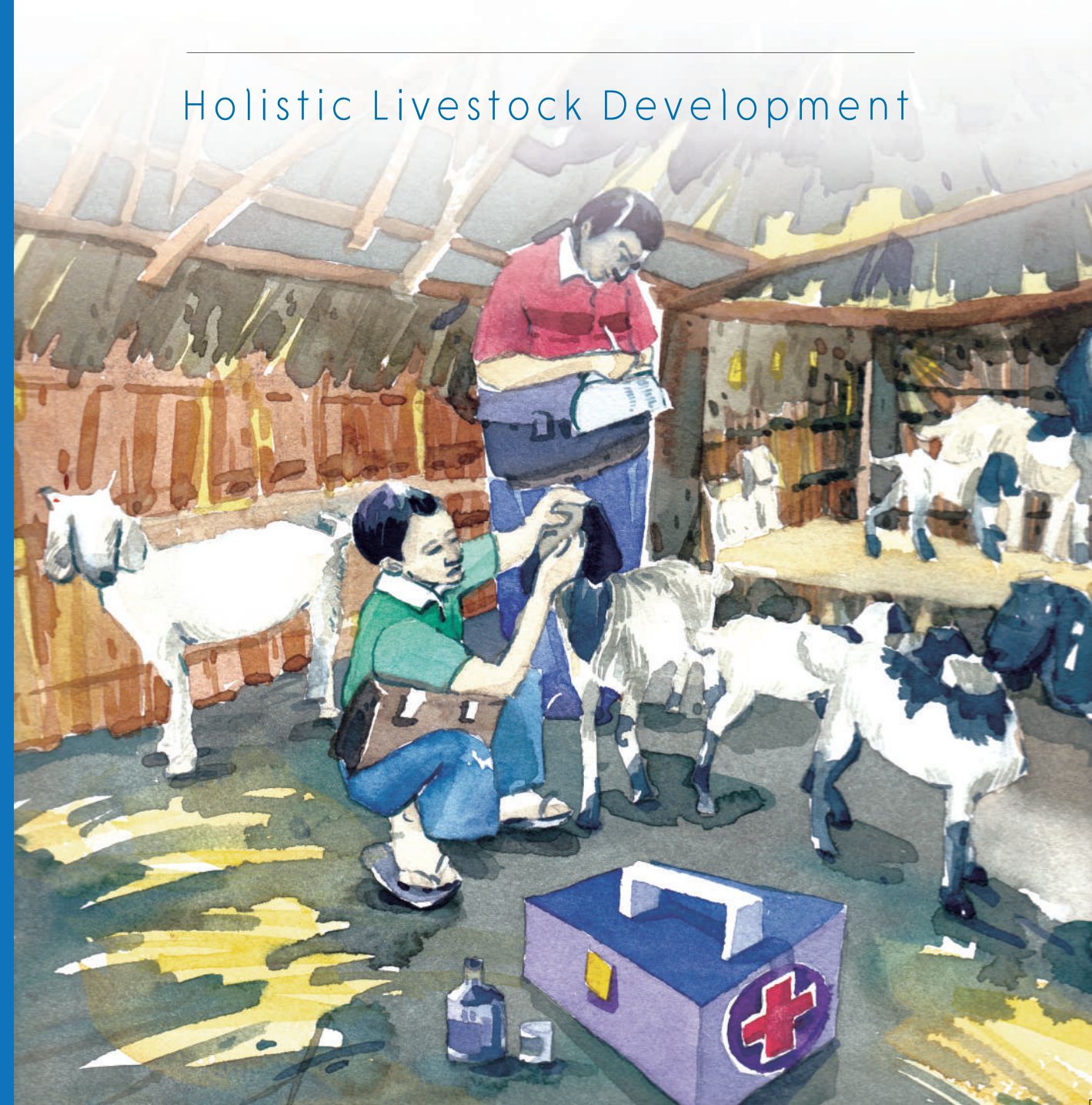
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THE MAE FAH LUANG DEVELOPMENT MANUAL

Holistic Livestock Development





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PREFACE

The Mae Fah Luang Development Manual is based on lessons learned and experience gained from implementation on the ground of Mae Fah Luang Foundation under Royal Patronage (MFLF). The MFLF humbly acknowledges the royal initiative of Her Royal Highness Princess Srinagarindra or Thai people's "Mae Fah Luang" by applying the holistic development approach promoting economic, social, cultural, and environmental aspects in many different locations, with the Doi Tung Development Project (DTDP) at Doi Tung, Mae Fah Luang District, Chiang Rai Province, as the first development project established in 1988. At present, the DTDP has been internationally recognised as one of the world's best examples of alternative development, sustainable development, and social enterprise.

Since 2002, the MFLF has applied best practices from the DTDP to other domestic and international development projects in the Republic of the Union of Myanmar, the Islamic Republic of Afghanistan, and the Republic of Indonesia. Each area has its own sets of challenges, yet the root causes are the same — poverty and lack of opportunity.

Fully aware of differences in local context, natural capital, and the overall potential of each area, the MFLF aims to eradicate poverty and create licit livelihood through the application of development principles and process which have been proven to bring security and prosperity into many local communities in different areas, not simply relying on a one-size-fit-all model. Some examples include livelihood promotion throughout the entire value chain of macadamia nut and coffee in the DTDP, livelihood promotion throughout the entire value chain of cashew nut and banana of Nan Reforestation Project in Nan Province of Thailand, and a sustainable alternative livelihood development project with a focus on promotion of the entire value chain of sheep in Afghanistan.

This Mae Fah Luang Development Manual is a compilation of "development principles and process" that can be applied everywhere, with consideration of geo-socioeconomic differences. To provide complete understanding of the implementation on the ground, the Manual also includes a variety of technical development activities such as sheep tending, cultivation of sugar palm, seeding and planting of wild plants. The Mae Fah Luang Development Manual: Holistic Livestock Development is part of a series of the Mae Fah Luang Development Manual comprising nine manuals: Building the Development Practitioner Team in the Target Areas; Irrigation Management; Cultivate Land, Cultivate People; Forest Surveying; Seeding and Planting of Sugar Palm; Seeding and Planting of Rattan; Seeding and Planting of Ficus Tree; Seeding and Planting of Wild Plants; Holistic Livestock Development.

The content in the Mae Fah Luang Development Manual series is an analysis and compilation of knowledge and know-how, extracted from field development practitioners who are highly experienced in applying the royal initiative of Her Royal Highness Princess Srinagarindra into practice at the community level. The series aims to explain the rationale behind every step in development work to provide audience with a clear understanding of 'why' and 'what for' of development principles and process, allowing audience to put them into practice later.

Those who have taken part in preparing the series follow the King Rama IX's principles on the two essential duties of a teacher, or in this case, a knowledge transferor: 1) teach or transfer the information without any prejudice nor one's own beliefs; 2) teach or relay complete knowledge without fearing that learners may become more knowledgeable (Kanok Wongtrangan, interview, 12 June 2010). However, the best learning approach is to meticulously and prudently put readers' understanding gained from this manual into practice, and give room for positive and negative outcomes to be lessons for continual improvement. Last but not least, when the manual cannot offer solution to the problems you are facing, take time to review geo-socioeconomic realities of the locale, and proceed in a reasonable manner based on the benefits of local communities and common interest of the public.

The Production Team

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THE MAE FAH LUANG APPROACH TO POVERTY ALLEVIATION AND QUALITY OF LIFE IMPROVEMENT

The Mae Fah Luang Foundation under Royal Patronage (MFLF) 's area-based development approach is a holistic development of local communities' livelihood, including the development of entire watershed area for efficient and sustainable management of natual resources, particularly water and forest resources. The first step to development is to learn from the local community, put ourselves in their shoes, and assess the situation from the community's point of view. At the same time, the approach requires thorough desk review and field study of geo-socioeconomic situation such as the local community's natural capital, land usage, and a baseline survey of every household. The field study should be conducted together with the local community and relevant government agencies. This approach shall help identify the root causes of the problems within the local community and the community's overall potential and capital, which could be further promoted into secure and sustainable livelihood. Furthermore, this "walk together, eat together, observe together" process also puts all stakeholders on the same page and ensures that they tackle the right problems. As a result, the local community will develop greater trust in the development project and gain the sense of ownership in the development.

The MFLF aims to improve local communities' life quality in terms of economic, social, cultural, and environmental aspects. From the beginning of development, local communities or direct beneficiaries are encouraged to exchange ideas and work closely

together with the MFLF to ignite “explosion from within”, that is to say local communities become aware of causes and consequences of the problems, and want to solve the problems by themselves, which is a key factor towards sustainable development.

In terms of economic development activities or job and livelihood creation, the MFLF starts with household expense reduction, that is, King Rama IX's royal initiative on “grow everything you eat and eat everything you grow”. Thereafter come income enhancement activities which include reviewing the overall potential of the locale, local communities' skill sets, and the market demand. At the same time, investment, transport, and product diversification for value addition are also taken into account together with short-term, mid-term, and long-term income creation to ensure the project's feasibility and practicality, followed by the creation of work plan, timeline, allocation of resources, knowledge, and budget. Then livelihood promotion activities within local communities can be commenced.

1.1 Survival, Sufficiency, and Sustainability Model

The MFLF believes in human potential and aims to improve life quality of local communities towards economic, social, cultural, and environmental security and sustainability. The MFLF also enhances human resources to be able to “think and act with due consideration”. This refers to individuals who are always ready to embrace changes and new learning, make a living with social and environmental awareness that prudently sustains and utilizes natural resources. These individuals are self-reliant and able to carry on development of their own communities by themselves. Thus, sustainable development takes time and needs to be proceeded step by step — which is one of King Rama IX's work principles and royal initiatives. The MFLF applies the principle into the MFLF's 3Ss Development Model, in which the development towards sustainability is divided into three stages: Survival; Sufficiency; Sustainability.

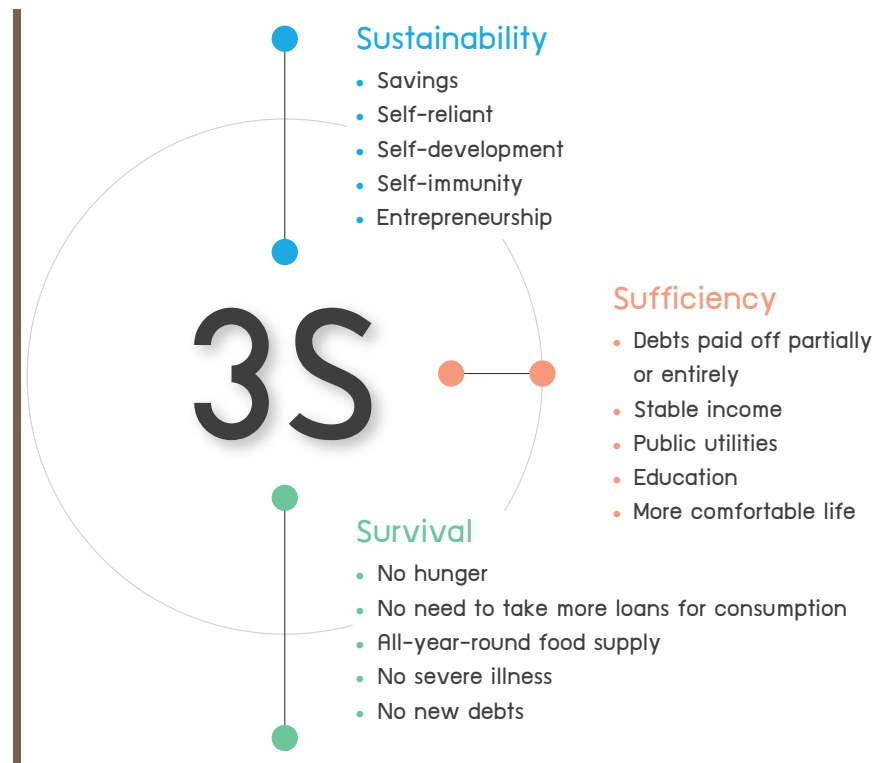
Survival Stage focuses on the development of and access to basic needs such as water, soil, forest, public utilities, and healthcare. This phase also includes household expense reduction and licit income enhancement activities to ensure that local communities earn enough for their living, **not trapped in loan-induced poverty** and further encroaching on the ecosystem. Local communities thus take part in participatory resources management.

Sufficiency Stage emphasises increasing productivity and value addition of local products and services to ensure that local communities **have sufficient livelihood and secure income**. In this phase, local communities are able to partially or entirely pay off their debts, have higher education, understand their rights and responsibilities, follow community rules, continue their local customs and practices, and collectively manage, conserve, and restore the ecosystem.

Sustainability Stage intends to develop local communities' self-immunity in accordance with King Rama IX's royal initiative. This includes: life security; social responsibility; sustainable ecosystem management; an established check and balance system; the ability to “**think and act with due consideration**”, to find solution to problems, to take initiative in continuing the community development; and mutual support and knowledge sharing amongst community members and non-members alike.

Due to differences in natural and livelihood capital, each community has different level of life quality. Some might be at the **Survival Stage** in which there is sufficient food supply all year round, no loan-induced debt from food cost and general household expenses. Some are at the **Sufficiency Stage**, that is, communities start to earn more stable income, better education and living standard, and able to gradually repay their debts. Some may be proceeding towards the **Sustainability Stage** where communities have savings, security in income, healthcare, and education. At this stage, the communities are able to stand firmly on their own feet and move forward to entrepreneurship in the future. It is thus very crucial for the development practitioner team to study, analyse, and identify the stage where a community is and, what gaps need to be filled in. In this way, the development

practitioner team can tailor a suitable area-based development plan that could be done step by step based on a solid foundation, yet flexible enough to support communities in different stages of development to genuinely “help people to help themselves”.



Picture 1
Survival, Sufficiency, and Sustainability Stages of Development

1.2 Community-based development activities : “Plant on Paper”

An important factor contributing to mobilising development in the target areas is when the community sees benefits of development activities, and when the development activities are aligned with the community’s level of life quality. For a community in the Survival Stage, the activities of which the community sees benefits and is willing to participate in are expense reduction and income enhance ment activities. These activities can rapidly mobilise the development. In terms of a community in the Sufficiency Stage

which has sufficient food and income, development activities in which the community would earnestly participate should focus on value addition of the existing capital to create a long-term secure source of income. To conclude, development activities must raise communities’ life quality. It is thus crucial for the development practitioner team to know and understand the community’s way of life based on concrete data and information. Development activities must provide concrete benefits, both directly and indirectly, to the community. An income enhancement activity must clearly demonstrate how much income will increase within how many years, how much in total the income will be, and how much the cost is. The worth of the activity to the community must be calculated or “plant on paper” first.

1.3 Integration

Integration is an important process for development mobilisation in the target areas. Integration is when every stakeholder and relevant agency comes to share ideas, walk and observe the target areas together, and consolidate their work plans into one unified plan with a shared common goal to eradicate poverty and raise the life quality of communities in the target areas. The Mae Fah Luang approach emphasises that the integration is when all stakeholders and relevant agencies “do” according to their expertise together on the ground, not simply having meetings nor reaching an agreement in a meeting room.

In addition to integration of all stakeholders and relevant agencies in the target areas or “horizontal integration”, “vertical integration” or engaging every level of stakeholders within one’s own agency is equally important, as their participation also directly affects development mobilisation. Therefore, the area-based development approach requires the development practitioner team to simultaneously work top-down and bottom-up in a consistent manner. At the same time, the team also needs to continue working horizontally with all stakeholders and relevant agencies based on the issues and needs of local communities.

[02]

HOLISTIC LIVESTOCK DEVELOPMENT FOR POVERTY ALLEVIATION

Development and promotion of livestock is one of many development activities for poverty alleviation. It helps reduce expenses, strengthen food security, enhance income, and repay household debts. Based on many socioeconomic surveys conducted by the MFLF, food cost usually takes up the highest proportion of household spending. Each household can therefore “grow everything you eat and eat everything you grow” to reduce its expense to the great extent. This includes both household gardening and livestock. Yield surplus can be shared or sold. A holistic operation will bring secure and sustainable income to local farmers.

Holistic livestock development is development of every aspect related to livestock: breed; feed; shelter; veterinarians; knowledge; medicine; and management. With healthy livestock and quality livestock products, communities can reduce expense and generate stable income. Types of livestock promoted in each target area might differ due to their geo-socioeconomic differences. The key is to improve livestock farming standard, empower local community members with expertise in livestock farming and awareness of farming standard improvement.



Picture 2
Local community members in the Goat Bank Project area
Yenan Chaung Township, Magway Region, Republic Union of Myanmar



Picture 3
Seven elements of holistic livestock development

Based on the MFLF’s experience and lessons learned in livestock development, holistic livestock development comprises seven following concurrent elements: 1) people preparation; 2) breed and livestock preparation; 3) distribution mechanism; 4) disease and livestock treatment; 5) medicine; 6) feed; 7) shelter.

People preparation is to empower local people in the target areas to develop an expertise in livestock development activities. This includes: 1) building livestock development volunteers, that is, strengthening local capacity in basic animal treatment and disease prevention, to ensure healthy and well-grown local livestock that has good reproduction, providing local keepers with food security and value-added products that reduce expenses and enhance income; 2) training for local community members to tend livestock and manage livestock fund, including proper livestock management and healthcare through awareness building, as well as sharing methods and technique for livestock behavioral observation to mitigate any risk associated with livestock, which is an asset of the community members.

Livestock preparation is to select breeds that suit the target areas and local communities’ way of life. The selected breeds should reduce expense and enhance income of local communities. Livestock preparation also includes livestock nursery that ensures animal safety and health before distribution to local communities, having knowledge of standard livestock management, as well as other relevant practices, such as birth delivery, handling livestock mortality, and transport.

Distribution mechanism refers to the concept and methods of distributing livestock to local communities. The mechanism should be based on equality and fairness, and most importantly, able to concretely address poverty at household and community levels.

Disease and livestock treatment is to train livestock development volunteers and community members to monitor abnormality in livestock and provide basic treatment, including standard vaccination and creating monitoring system within a community. This will help decrease livestock mortality rate, reduce household expense, and enhance income.

Medicine and medical fund is to allocate exhaustive, correct, and quality medicine in the target areas and set up management and maintenance system that will be taken care of by local communities. This allows local communities to have access to quality ready-to-use medicine. In addition, if the target areas have potential and market available, livestock development volunteers may be encouraged to be partners who take part in management of local livestock pharmacy. In this way, they are prepared to move forward to local pharmacy entrepreneurship in the future.

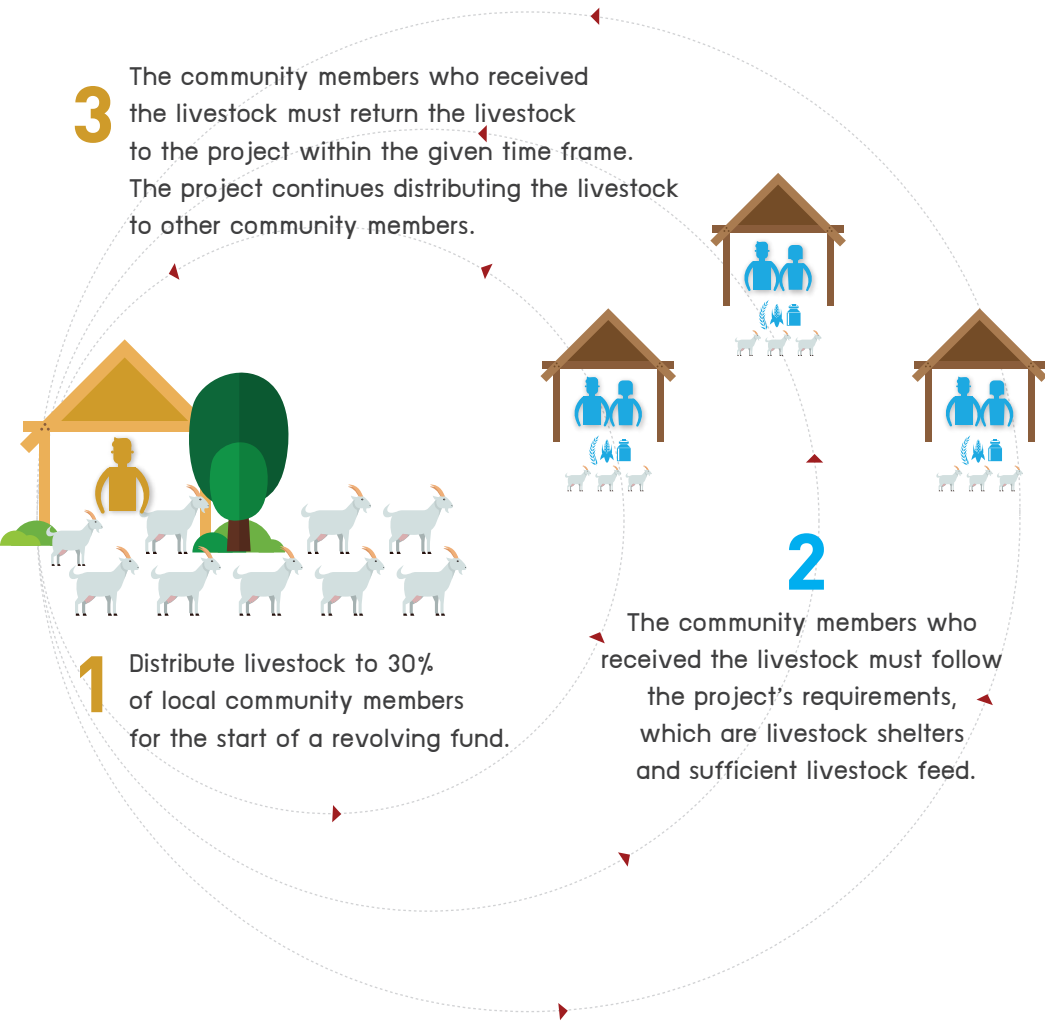
Feed is important for livestock survival and growth. This element covers management of feed and water and developing feed from local ingredients that contain adequate amount of protein to reduce livestock food cost, which is the main cost of livestock farming.

Shelter is another important factor in holistic livestock development. Shelter must be designed and adjusted to suit geographic characteristics, climate, and types of livestock in the target areas, and to be accessible for livestock disease control measures and daily management schedule.

2.1 Principles of livestock development fund

“Fund” is a livestock management mechanism in the target areas. Livestock development does not aim to merely distribute animals to local communities as charity, but a livestock fund serves as a “bank”, in other words, a source of capital (livestock) with a borrowing and returning system. The fund first lends out animals to its members, and the members later return animals to the fund according to agreed rules and regulations. The returned animals will be subsequently distributed to new members who have not borrowed any. A livestock fund is therefore a one-time investment that can expand to cover an entire community. Furthermore, the borrowing and returning system can be practically monitored and enforced, as it is operated and managed by local community members or beneficiaries themselves. A livestock fund usually starts with 30% of local community members in the

beginning, since some households may not be prepared to own livestock yet, while some households prefer to wait and see the outcome of the fund. With the initial participants of only 30%, management and treatment of livestock is also more flexible and efficient.



Picture 4
Mechanism of livestock development fund

Principles and regulations of livestock fund management may differ due to different types of livestock and life quality in each target area. In some target areas, the focus is on generating sufficient income for survival. In other target areas , communities may have good life quality but lack savings, the focus is therefore on savings in the form of livestock asset. One example is **the Meishan pig fund in Nan Province** which first lent out a sow to each of 33% households in a community. The objective was to first support households with necessity which truly needed livestock. If the lent out livestock is well taken care of in accordance with the provided guidelines, pigs will continue to produce offsprings that can be lent out to every household in the community within three years. **The goat fund in Yenau Chaung Township of Myanmar** started with lending out ten nannies per batch, as the amount of ten nannies was enough to generate sufficient income for survival and could be redistributed to other households within one year.

The MFLF absorbs the risk of livestock fund management on behalf of communities by providing full initial establishment cost, but in the end their livestock funds must be self-sustained and operated solely by local community members. In the initial phase, the MFLF's staff who immerse themselves in the target areas act as mentors and coordinators to establish synergy and cooperation between a local community and local authorities, and embed "the local community's sense of ownership towards the fund". The sense of ownership is established by engaging local communities in every step of every process and having responsible persons co-managing the fund. The responsible persons should receive concrete benefits from the fund, since they also need to earn income for their survival.

Management and sense of ownership are two crucial elements in a sustainability mechanism which boost a local community's self-confidence in continuing operating and managing funds on their own.

2.2 Contributing factors to livestock promotion in different target areas

Economic factors

- 1. Availability of market in the target areas with reasonable market prices - in other words, there is demand of livestock products in the market at stable prices that can generate sufficient income for living.
- 2. Time period for local communities to profit from yields

Social factors

- 3. Local communities’ traditional way of life
- 4. Household capacity in efficient tending of livestock
- 5. Risks or livestock survival rate, which could be geography-specific risks, such as outbreaks, venomous animals, or natural disaster

Natural and environmental factors

- 6. Geography and climate, including locally available livestock feed which could reduce farming cost

2.3 Steps to holistic livestock development



Picture 5
Steps to Holistic Livestock Development

- 1. Conduct fieldwork to observe and inquire about livestock issues, types, conditions, and livestock feed in the target areas. Create basic understanding amongst local communities about the MFLF’s approach to holistic livestock development.
- 2. Analyse obtained information. Select breeds that suit the target areas and can reduce household expenses and increase income by factoring in cost of livestock feed. Proceed to create an operation plan.
- 3. Provide on-the-job training to representatives of local communities who are now regarded as livestock development volunteers. The training aims to provide basic knowledge of animal healthcare, animal medicine, vaccination, and basic animal disease treatment.
- 4. Create understanding amongst local communities about the principles and mechanism of livestock development. Enhance local knowledge in livestock tending and, together with the communities, set up community rules and regulations in terms of fund management, livestock loaning and returning.
- 5. Establish livestock development support funds such as livestock feed fund and medicine and medical supplies fund.
- 6. Set up monitoring and evaluation system for livestock tending and livestock development volunteer performance.

[3]

HOLISTIC LIVESTOCK DEVELOPMENT CASE STUDY 1
GOAT BANK, YENAN CHAUNG TOWNSHIP, MAGWAY REGION
REPUBLIC OF THE UNION OF MYANMAR

The MFLF’s Sustainable Alternative Livelihood Development (SALD) in Yen-an Chaung Township, Magway Region, Republic of the Union of Myanmar is under the cooperation between Thailand and Myanmar to alleviate poverty and enhance life quality of people living in the dry zone through application of King Rama IX’s Philosophy and the Mae fah Luang approach to geo-socioeconomic characteristics of 29 villages in Yen-an Chaung Township within the Central Dry Zone of Myanmar.



Picture 6
The volunteer and the local community members
check the health of the project’s goats.

After conducting a baseline survey, it was found that local people had low income and loan-induced debt from daily household expense. This was due to limitation in livelihood, caused by low level of natural capital, particularly the “water capital”. The rainfall is scarce. Efficient water management was lacking. The soil is full of sand and cannot hold water, thus not much use for agriculture. For this reason, livestock is an important asset of each household. However, the livestock mortality rate of 7.13% was higher than the standard rate. This was due to lack of knowledge of livestock disease treatment, unavailability of quality medicine, high medical fee, and remote location of livestock medical facilities. Also, goats in the area were of native breed that did not offer a lot of meat, and therefore could not generate worthwhile income.

The MFLF thus regarded livestock development as crucial, since it suited the target area and was based upon local wisdom and traditional way of life. The MFLF’s key work principle is to enhance local communities’ understanding of our work principles and process through action. This is to ensure that local communities are equipped with skills, knowledge, and capacity to continue the development on their own in the future. **Building and training of livestock development volunteers is thus the key to holistic livestock development.** With local people equipped with relevant knowledge and understanding, livestock mortality rate would decrease significantly, and local communities’ life quality would improve rapidly. When local communities become self-reliant, abundance of knowledge will be shared to younger generations and other communities in need.

Our key development partner in this project was Myanmar’s Livestock Breeding and Veterinary Department (LBVD) who, jointly with the MFLF, designed training curriculum for livestock development volunteers. The LBVD also provided support in terms of cooperation and coordination with other authorities and civil society, including sending the LBVD’s civil servants to the MFLF’s on-the-job training on the ground in the Yen-an Chaung Township project areas.

3.1 'People' preparation

3.1.1 Livestock development volunteers

Livestock development volunteers are the key to holistic livestock development. Building livestock development volunteers is to **equip a local community with basic knowledge of animal disease prevention and treatment**. This is to ensure that a local community owns healthy livestock with standard growth rate and a lot of offsprings. Development of healthy livestock is a worthwhile activity that can strengthen food security to reduce household expense. Surplus can also be sold or processed to enhance income. Furthermore, the livestock development volunteer acts as a bridge between a development project and a local community. The volunteer's role is to create understanding of the development project amongst the local community and work closely with community members to address livestock health issues, thus reducing the livestock mortality rate in the area. At the same time, the volunteer also acts as a representative of the local community to inform the development project of real problems and needs of the community, including issues arising during the operation phase, which allows the project to respond promptly.

The main duty of the livestock development volunteer is to safeguard animal health within the project, especially the health of economic livestock, and to monitor animal disease outbreak, give advice and enhance local knowledge of livestock products and breeding to community members.



Picture 7

The livestock development volunteer checks an animal shelter of a project beneficiary.

3.1.1.1 Overview of livestock development volunteer training in Yen-an Chaung Township

The livestock development volunteer needs to have solid know-how of animal health, animal health observation, and disease treatment. The volunteer also needs to spare personal time to address community issues. Therefore, during the training, the mentors not only equip the volunteers with livestock development knowledge and real-life practice, but also need to observe their behaviour, physical and mental readiness for work. The training process is as follows:



Picture 8

The livestock development volunteer training by the project's veterinarian.



Picture 9

The livestock development volunteer practises giving injection to cattle.



Picture 10

The livestock development volunteer studied hard on regular basis



Picture 11

Practice of handling animals

1. Select volunteers who have willingness to help others by asking village headmen to select three volunteers from each village.

2. Provide three trainings, each every three months. During an interval of each training, the development project’s livestock team closely monitors and helps enhance skills and knowledge of the livestock development volunteers while they work with local communities on the ground.

3. In each training, there is a test and behavioral observation to assess each volunteer’s eagerness.

4. The development project and the LBVD jointly design, conduct, and revise training curriculum to be more suited to different target areas and local volunteers.

Experience from the field

Leaving an interval between each training allows the project to observe each volunteer's willingness to work. The assessment is based on the behavioral observation and the theoretical and practical test to select 2/3 of volunteers to be the village volunteers. If any of them resigns or fails to perform the duty, the third unselected volunteer will act as the substitute.

3.1.1.2 Training guideline

1. The mentor gives 1.30-hour lecture on foundation in livestock development.
2. Practice vaccination and deworming for FMD and BQ which are common disease in the area, including treatment of general disease, labour and delivery, and artificial insemination.
3. A theoretical and practical test after every training.

3.1.1.3 Training tools and equipment

1. PowerPoint presentation
2. Injection equipment for practice
3. Vitamin
4. Vaccines
5. Medicine

3.1.1.4 Training topics

First Training	Second Training	Third Training
1. Characteristics of healthy livestock	1. Disease and cause of disease	1. Nasal bots in goats
2. Blackleg disease	2. Goat diseases (Disease, symptom, behaviour, prevention)	2. Nematode in pigs
3. Anatomy and physiology of ruminants	3. Types of medicine	3. Poultry farming
4. Zoonosis	4. Castration of ruminants	4. Food poisoning
5. Anthrax disease	5. Molasses-urea block preparation	5. Medicines
6. Nutrition for poultry	6. Use of effective micro-organism (EM)	6. Dairy production and livestock healthcare
7. Internal parasites of poultry - Internal and external parasites in ruminants	7. Artificial insemination	7. Dairy cattle feed
8. Nutrition for livestock	8. Types of cattle breeds	8. Animal feed from grass and plant material
9. Hemorrhagic disease	9. Experience from the field: breeding	9. Fermented grass silage preparation
10. Foot-and-mouth disease (FMD)		10. Medicinal use of plants and fruits for animal disease treatment
11. Types of pig breeds		11. Toxicology
12. Breeding boar selection method		12. Estimating goat body weight
13. Pig nursery - Internal parasites in pigs		
14. Skin disease in pigs		
15. Erysipelas		
16. Estrus, pregnancy, and farrowing		
17. Grass plot management		
18. Treatment of respiratory disease, diarrhea, bloat, mastitis, and uterine prolapse		

Lessons learned and challenges from the trainings

1. Tailor and adjust the training to suit the level of volunteers, since volunteers in some target areas lack or never receive any formal training.
 - In a training for volunteers from Yen-an Chaung Township, the mentors were the project’s veterinarians and the LBVD’s personnel who were educated from medical universities. Therefore, they had to adjust medical and academic terms into the language that was easy to understand for local communities, including providing more vivid examples of livestock disease treatment from their own experience in the field.
2. Create an encouraging learning atmosphere for volunteers.
 - There were volunteers who were illiterate yet had willingness to work for their communities. Therefore, the project’s veterinarian mentor needed to pay close attention and visit them in their villages to discuss and teach from real-life situations, especially in terms of financial matters and documentation. Documentation format was designed to be simple and easy to use. The mentor also sternly ensured that the volunteers can do documentation properly without making mistake.
3. Be well-prepared and do not feel intimidated when teaching older people.
 - Some of the project’s veterinarians were recent graduates and felt nervous when speaking in front of a large crowd. They needed to take more time to practice.



Picture 12
The project’s veterinarian demonstrates to a volunteer how to
determine a goat’s age by counting its teeth.

3.1.1.5 Follow-up on the progress of the livestock development volunteers

During the training, it is easy to identify quick learners who can follow instructions. Average learners who need more time to practice are given extra training and closely followed up by the project when they do field work.

When problems arose, the volunteers who were on duty could make a phone call to ask for advice from the project’s veterinarians. Most of the issues encountered were injection and the amount of medicine. This demonstrated that the volunteers had a sense of responsibility and paid attention to livestock health.



Picture 13
The volunteers put their skills into practice with on-the-job training by treating livestock of a local community.



Picture 14
Practice of basic castration

3.1.1.6 Knowledge of basic medicine and medical equipment

The livestock development volunteer received a first aid kit box and other medical equipment that covered all treatment for basic disease in the area (see more details about the medicine in the Appendix, 1. List of medicine and equipment of livestock development volunteers). A few points of caution are to only use animal drugs, not human drugs, on animals, and to use drugs on the right type of animals according to their prescriptions. For example, there are different types of medicine for small-big ruminants, poultry, and small animals.

The volunteers were trained to read labels and understand usage and dosage of different types of drugs. A drug label contains the following information:

Brand (trade) name is the drug name given by its manufacturing or distributing company. The name is subject to change any time based on the company's preference.

Active ingredients are name of ingredients that are commonly used worldwide and not subject to change. The active ingredients are the names that the volunteers should always keep in mind.

Drug concentration is the proportion of an active ingredient to a unit of diluent (mg/cc), which is demonstrated on the drug label.

Dose is a specified amount of drug that can treat or prevent disease in each type of animal. The dose comes from experiment with animals and might or might not be specified in drug labels and prescriptions.

What every livestock development volunteer should carefully observe is the dose for an animal. Every animal needs different amount of drug based on the animal's weight. When too little is given, the drug will prove ineffectual, while too much amount will be injurious to the animal.

Basic drug label reading



Brand (trade) name is in the biggest letter size.

Active ingredients specified on the label

Picture 15
Sample of basic drug label reading
(Limoxin-200, 2020,7 July)

Animal dosage calculation

Animal dosage must be based upon the animal’s weight. The livestock development volunteer must be knowledgeable in animal dosage calculation and carefully observe and strictly follow instructions on a drug label.

Precaution

- 1. Type of animal
- 2. Animal weight
- 3. Inter-injection interval, in the case where booster shots are needed
- 4. Appropriate dose

Example

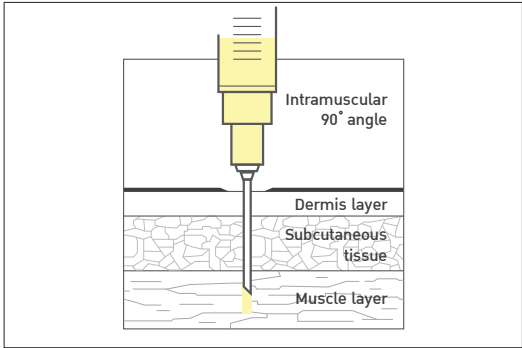
The drug label indicates that the dosage for goats, sheep, muntjacs and deer is 4 ml per 50 kg body weight. Therefore, an injection to a goat of 25 kg body weight is 2 ml. Furthermore, the volunteer must also carefully read and follow the instruction whether the drug is intended for intramuscular injection, subcutaneous injection, or eye drops.

Intramuscular and subcutaneous injections need different sizes of syringes and needles.

- For an intramuscular injection, insert the entire needle up to the hub of the syringe into the skin.
- For the subcutaneous injection, pinch up on the goat’s skin and insert the needle at 45° angle to the skin.



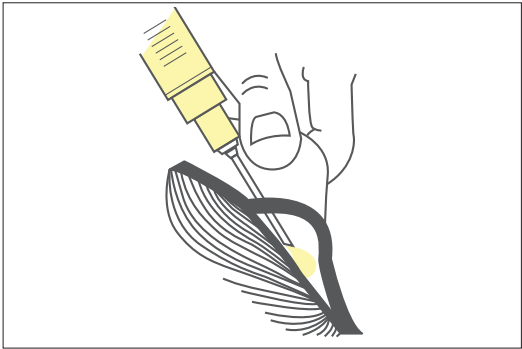
Picture 16
Sample of drug label



Picture 17
Intramuscular injection



Picture 18
Intramuscular injection to animal



Picture 19
Subcutaneous injection



Picture 20
Subcutaneous injection to animal



Picture 21
Injection to a small goat

3.1.1.7 Vaccination

Vaccination is one of the prevention measures against disease. A vaccine is made from weakened or killed form of disease, and injected into the body to produce immunity to a specific disease. Different vaccines have different vaccination timing and schedule. For example, foot-and-mouth disease vaccine is vaccinated before the rainy season and re-vaccinated every six months. When performing vaccination, always change the syringe before injecting a different type of vaccine from the one that has recently been vaccinated. Never use the same syringe for different types of vaccines.

Vaccines should be stored at the temperature range of 2 °C - 8 °C. In a refrigerator, vaccines should be stored in the normal compartment, not in the freezer. The volunteers should carefully study the label to find out which vaccine or drug needs to be refrigerated, and always maintain and monitor to ensure that the vaccine or the drug is in good condition. When working in the field, the vaccine containers should be stored in a tightly sealed bag and put in a cold box packed with ice. The sealed bag will help prevent water from seeping in the vaccine containers.

After the volunteers learn how to use medical equipment and different types of vaccines, they go into villages together with the project’s veterinarians who will demonstrate the process of vaccination in the village. The volunteers follow the demonstration. Then they are divided into smaller groups to do vaccination in each household. The mentors follow them to give advice when necessary.

Experience from the field

Documentation is easier when the volunteers do at-home vaccination individually for each household. Therefore, in a village where there are not many livestock owners, the volunteers should do at-home vaccination for villagers, which is quicker and easier for documentation.

Lessons learned from implementation on the ground

1. When there are a large number of livestock in a village, it is recommended to ask all the owners to bring their livestock to one common location for more efficient and rapid vaccination time. The shortcoming of this method though is there might be difficulty in documentation.
2. Injection or vaccination should be done in the morning and completed in one day for the ease of documentation and efficiency in the next round of vaccination.
3. The livestock owner should help hold his own animal still during the injection, since the owner can recognise which of his animal has or has not been injected.
4. Save time by using one syringe to withdraw enough medication for injection to ten animals in one time.
5. Insert the needle at a 15-degree angle to allow for easier injection.
6. For injection to goats, round them up into one corner of their shelter. Carry goats by their side to allow for easier injection.
7. It is recommended to make a stall to facilitate injection. Injection to an animal in a stall can be done to the side of the animal’s body, which poses less danger to the person performing injection.



Picture 22
The project’s veterinarian demonstrates how to use a syringe.



Picture 23
A volunteer practises using a syringe.

Experience from the field

Duplicate injection to the same animal can be harmful to its health. To avoid the duplication, in the case when the owner cannot distinguish between the injected and non-injected animals, or when the owner cannot be present during the vaccination, the volunteers can mark the back of the injected animal with spray paint, gentian violet, or any colored material available in the village. If no colored material is available, the volunteers can do injection in the shelter and release the injected ones out of the shelter to avoid confusion and duplicate injection.



Picture 24
Technique for holding goats still for injection



Picture 25
Technique for injection to a small goat.



Picture 26
A volunteer demonstrates how to hold a big animal for injection without a stall.



Picture 27
A volunteer demonstrates injection to a big animal in a stall.

Experience from the field

It is recommended to have another person hold the goat still for injection. This can be done by straddling over the goat and holding the front body part of the goat between both thighs.

Experience from the field

In the area where it is not possible to make a stall, it is recommended to hold a big animal such as a cow or a buffalo by connecting it to a cart for the safety of the person performing injection. When there is no cart available, an injection should be performed by persons with expertise, as in the case of Yen-an Chaung area where the volunteer would tie a cow to a stilt supporting the house and inject the cow from above. This method posed less danger to the person performing injection.

3.1.1.8 Equipment maintenance

1. A vaccine vial mostly has a rubber stopper on top to keep the vial clean. The rubber stopper should always be in good condition, otherwise the vaccine may be ineffectual. The vaccine should be stored at 2 °C - 8 °C
2. Syringe - there are two types of syringes as follows:
 1. Disposable syringe
 2. Stainless syringe is a semi-automatic syringe that is used with stainless needles in a variety of sizes that for many types of animals. The syringe must be cleaned with hot water after use. Each part of the syringe should be dismantled and dried completely before applying vegetable oil and reassembling together. The syringe should be stored in a dry place.
3. A trocar must be put in boiling water at least 2 minutes before leaving to dry completely.
4. Store drugs in room temprature and avoid exposure to high temperatures. Medicine in a dark-coloured bottle implies that it strictly must not be exposed to light, otherwise the medicine can turn ineffectual.
5. Read the drug label carefully. Drugs mostly expire within 3-4 years after manufacturing date.



Picture 28
Vaccine vial rubber stoppper
(Jamie Barraband,2020, July 7)



Picture 29
Disposable syringe
(Syringe, 2020, 7 July)



Picture 30
Semi-automatic syringe
(30ML REUSABLE STAINLESS STEEL
HYPODERMIC VETERINARY ANIMAL
SYRINGE GLASS FOR LAB, 2020, 7 July)



Picture 31
Changeable needles in a
variety of sizes for use with
semi-automatic syringes
(Metal Needle, Stainless Steel
No.16, 2020, 7 July)



Picture 32
Trocar
(Trocart 9 cm Ø 5mm, 2020, July 7)



Picture 33
Dark-coloured medicine bottle

3.1.1.9 Management skills training

Besides providing services to the community, the livestock development volunteers are also equipped with basic knowledge and skills in entrepreneurship, such as basic accounting, cost calculation, and medicine stock management. The basic knowledge and skills allow the volunteers to enhance the scope of development activities within the community, which is aligned with the project's goal of promoting self-reliance within the community.

Training approach

Management skills training for the livestock development volunteers is on the job. This allows the volunteers to develop understanding of the job overview and foresee potential scenarios the project might encounter. To mitigate future risks, the project creates a simulation where the volunteers play entrepreneurs who use their skills to solve problems. The simulation helps strengthen the volunteers' skills in planning, accounting, stock management, and documenting, which will help them plan, make decision, and see through the problems in the future.

3.1.2 Goat or loan recipients

Part of people preparation is getting local community members ready for goat raising. The prcess involves create understanding amongst local community members about the goat fund mechanism and its conditions, as well as selection of goat/loan recipient and goat raising training.

3.1.2.1 Selection of goat/loan recipients

There are two factors determining the selection: 1) poverty; 2) needs of the recipients. The selection criteria of Yen-an Chaung Goat Fund are as follows:



Picture 34

Local community members who are beneficiaries of the holistic livestock development project Yenau Chaung Township, Myanmar

1. The first batch of goat recipients must be poor people who do not own land, livestock, and have family members who can spare time to raise the goats. The recipients are first selected by the village chief and the Village Development Committee (VDC). The project then checks whether the selected recipients meet the criteria based on the recipient data in the project baseline survey.

2. One week before goat distribution, the project must inspect each recipient's goat stall and shelter whether they meet the requirements (see more details about goat stalls and shelters in 3.7 Shelter). The condition of a recipient's goat stall and shelter can demonstrate whether the recipient truly needs

Experience from the field

After a period of project implementation, the head of livestock development volunteers can be selected by the volunteers and the project's veterinarians. The head of livestock development volunteers has the duty to inspect the recipients' goat stalls and shelter once in every month to 1.monitor the livestock development volunteers' performance and 2.monitor to ensure that the recipients' goat stalls and shelters are always functional.

the goats, and how much readiness, attention, and enthusiasm the recipient has. This is due to the fact that construction of goat stall and shelter does not cost a lot of money, and can be done by utilizing locally available materials. A recipient who truly needs the goats will promptly take action to construct the stall and shelter, which also shows that the recipient is ready to earnestly raise the goats.

- 3. After goat distribution, the volunteers must inspect goat stalls and shelters twice a week.
- 4. The loan recipients must acknowledge and understand the terms and conditions of the fund. The village chief and the VDC must be present to acknowledge the entire process, in which the project's staff reads the contract out loud point by point and clarify parts that remain unclear to local community members. The contract is signed after the local community members fully agree with what is written on the contract.
- 5. There must be the following 4 witness and notary public present during the signing of contract:
 - the project manager
 - the village chief
 - the livestock development volunteer
 - the goat recipient

3.2 Breed and livestock preparation

Breed is an important success factor in holistic livestock development. A tangible solution to poverty eradication is a breed that suits the target area, its local way of life, and available resources. The selected breed should also be able to produce a lot of offsprings that are of high value and suitable for many value-adding activities.

However, unsuccessful livestock development and high mortality rates are due to lack of livestock observation, livestock preparation before distribution to the community, and consistency in livestock health monitoring system.

Livestock preparation is therefore selection and also ensuring that animals are in good condition before distribution to the community. Some examples include selection of good breeders and proper handling during transport which, if not done properly, might expose animals to infectious disease and cause death.

3.2.1 Breed

The MFLF prioritises the selection of good breeds that are worthwhile, suit the target areas, and can bring proper economic benefits to the community.

A good breed shows features and characteristics that are in accordance with its strain. A suitable breed can adapt itself to the climatic and geographic conditions and food sources available in the area. A suitable breed must also suit the community’s lifestyle. A good and suitable breed will reduce livestock mortality rate. When goats are healthy and give quality produce, which is a good basis of value-added processing that can generate stable income for the community.

In Yen-an Chaung Township, the project promoted Tengshan (its name in the local dialect) goats raising, since they are a mixed breed between the Kambing Katjang or Kacang meat goat breed and the Etawah breed, which is called as “Burmese goat” by goat farmers in Thailand. Tengshan goats have the following qualities that the project finds suitable for poverty eradication in the area:

- 1. They can be raised in dry zone and can thus survive in Yen-an Chaung Township.
- 2. They are common meat goats in Myanmar and other Southeast Asian countries which have tropical climate.
- 3. They have a lot of meat which can generate high economic values.

- 4. They can be raised with local practices of the community with slight adaptation in terms of standard and quality to mitigate disease and mortality risks. Some examples include building stall fences of over 1 metre and installing shelters with sun and rain shields.



Picture 35
Local goat raising practices

Dominant traits of the Tengshan breed

- 1. Bigger than average native goats, especially a full-grown buck which can weigh 60-70 kg
- 2. Long lanky legs
- 3. Big drooping ears
- 4. Curved face
- 5. Long teats
- 6. Either with or without horns
- 7. Short shiny hair
- 8. Mixture of white and black hairs, with white as the base and black spottings all over the body



Picture 36
General physical feature of a native Tengshan goat

Characteristics of the Tengshan breed

- 1. They can produce a lot of meat and therefore make good profit;
- 2. They give quick yield and return;
- 3. They are able to forage for locally available plants;
- 4. They possess good adaptability to hot and dry conditions;
- 5. They can be raised easily even by women or children.

Goat selection

- 1. Physical appearance in accordance with the breed standard
- 2. No abnormality nor any wound on the body, as a wound can cause infection and spread disease to other goats. Besides, wounds on the body can indicate the goat’s health and its ability to forage.

For example, a goat with wounds on its legs will not be able to forage nor walk to grass plots, thus cannot fully feed itself and becomes unhealthy.

- 3. No neurological disorder. This can be observed through the way a goat walks. A goat that cannot walk straight probably has a disorder of the brain which is a type of neurological illness.
- 4. Smooth, shiny, and refined hair
- 5. Healthy and no physical disability, clear eyes with no visual impairment. Visual impairment will make foraging difficult and cause the goat to become unhealthy.
- 6. The appropriate age is between 1–3 years of age.

Characteristics of fine breeders

A fine buck breeder has both testicles intact. The two testicles must be of the same size. Other physical features include having an upright head, long neck hair, and big strong legs supporting stable posture.

Experience from the field

A healthy goat can be observed from its physical condition and also other abnormalities such as its enthusiasm and alertness.



Picture 37
A buck breeder



Picture 38
A nanny breeder

A full-grown nanny breeder that is ready for mating has a pair of permanent teeth which becomes apparent by the time the nanny goat reaches 1 year of age. Both of the teats protruding from the udder should not be too short and show no abnormality that might restrict breastfeeding to its baby goat.

Reproductive organs of a buck and a nanny should be of dark, not light colour, which is a normal feature of animals in the tropics. Dark colour implies a goat’s normal blood circulation and its breeding ability, whereas light colour might indicate abnormality in a goat’s reproductive system.

In Yen-an Chaung Township, the project worked closely with staff from the LBVD who were resourceful in local animal market. The LBVD helped the project out with goat selection and purchase, which allowed the project to obtain good and healthy goats despite working in an unfamiliar location.

Experience from the field

If possible, choose a nanny goat with pregnancy history, particularly pregnancy with twins or triplets to ensure that the goat does not have reproductive disorder. A goat that can produce twins implies high probability in giving a lot of offsprings, which can generate higher and quicker income to the goat recipients.

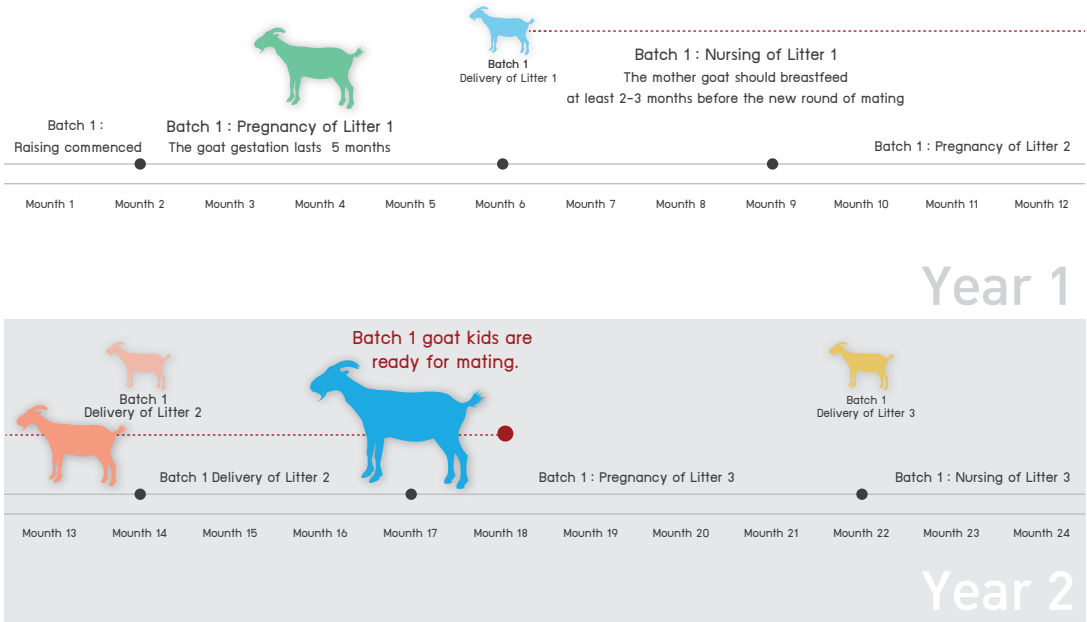


Picture 39
A local’s buck breeder that is in good health
and has good physical features

Goat breeding

Goats are quick in reaching puberty. A nanny goat usually reaches its maturity at 8 months of age, that is to say, the goat is ready for mating. Compared with other animal, goats can mate naturally and immediately during an estrus period without intervention from their caretakers.

Experience from the field
Basic observation of goat’s reproductive organ can be done by touching the organ to see the colour and darkness of blood vessels within the organ. Dark colour implies normal reproductive system. Blood vessels within a goat’s ears and eyelids can also be observed. The blood vessels that are not pale can also serve as a basic indicator of a goat’s reproductive system.



Picture 40
Timeline and estimate of goat offspring production
Within 2 years, the first batch of goats can produce 2-3 offsprings, or 1.5 offsprings/year

Estrous cycle

Goats by nature do not have breeding season like any other animal. They can spontaneously mate year-round. The average duration of its standing estrus is 3 days and for the estrous cycle is 21 days. The estrus period tends to be consistent in healthy nanny goats. Therefore, goat owners should carefully observe and study the estrus period of their own goats to achieve successful breeding. However, an observation of the goats in Yen-an Chaung Township showed that there are two estrus periods in March and May. The gestation period, or length of pregnancy, lasts 5 months on average. The delivery is therefore between August-September before the new breeding cycle starts. A mother goat fertility period lasts 4-5 consecutive years.

Mating

Goats usually mate naturally, but if goat owners can detect the estrus period and organize a favourable environment for mating, the chance for successful breeding is high.

Observation of timing for mating can be done by observing the male buck. The male buck instinctively knows when a nanny goat is ready for mating.

Infertility

Bucks with infertility must be observed during the mating period. However, it is up to local practices and tradition whether an infertile goat should be singled out. The project must develop understanding of local practices and adjust accordingly to show respect for local communities. In the case of Yenana Chaung Township project, the local community prefers to keep an infertile goat as a luck charm and buy a new buck goat as a replacement.

3.2.2 Transportation of goats

Goat transport is a delicate and critical process, as goats can be easily wounded and get sick during the transport.

Process of goat transportation

1. Make an appointment of time and place with the goat seller. The designated place should be accessible by a big truck.
2. Bring an expert to the goat shopping to ensure that you can get healthy goats with correct breed

Experience from the field

nanny goat lets a buck goat approaches her, as a nanny normally does not let a buck mate with her.

To ensure successful mating, after a nanny goat finishes her menstruation, favourable environment should be organized for the first mating to occur within 10 hours.

10 hours after he first mating, another mating should be repeated to increase the rate of conception.

Experience from the field

If a goat falls down during transportation, caretakers must bring it back to standing position, otherwise the falling goat will push other goats to fall and might risk harming themselves.

characteristics. In the case of Yenana Chaung Township project, the project brought staff from the LBVD to help select quality goats from trustworthy traders.

3. Use a truck with an open cargo area to transport 40 goats with 2 caretakers and 1 driver at a time. An additional driver may be needed if it is a long distance transport.
4. In the case of long distance transport, occasional rest stops are needed to not overtire the goats.
5. Have food and water for goats ready. Food can be prepared from locally available plants. Water bowls are also needed for rest stops during the transport.
6. The best time for transportation is in the morning or evening to avoid hot weather that can make goats sick.
7. The best season for transportation is winter and summer during which there is no rain. Goats do not like humidity and an easily get sick when exposed to rain. However, due to its dry climate and geography, it was possible to transport goats during rainy season in Yenana Chaung Township.
8. Upon arrival at the destination, goats must go through health checkup. Pregnant goats are to be separated, whereas the rest can be vaccinated and given dewormers.
9. After vaccination and deworming, goats should be under health inspection at least 7 days before distribution.

Experience from the field

Unhealthy goats can be observed during the load-off from the truck. Unhealthy goats usually show signs of carsickness such as drowsiness, refusal to touch food, or simply lying still not walking around.

The MFLF puts a great emphasis on livestock behavioral observation as part of the livestock preparation. This is due to a past experience where the project distributed goats to local communities without investigation and goat preparation. It resulted in death of a number of goats.



Picture 41
Careful animal transportation to avoid
any potential harm to animals



Picture 42
Caretakers for goat
transportation

3.2.3 Preparation of goat distribution location

1. Choose a soil ground that is easy for transport and accessible by animal trucks.
2. The location is close to water and food sources of animals within the local community.
3. The location should be in the middle of many different villages or not too far away from the target village.
4. The goat stall should be big enough to comfortably accommodate 100-500 goats at the same time.
5. Put on a fence of 1.5 metre height to prevent goats from jumping out of the stall.
6. Install proper rain and sun shades for goat protection.

Experience from the field
Goat density must be taken into account when building a shelter. The appropriate proportion is 1.25-2 sqm for 1 goat.



Picture 43
Goat distribution location



Picture 44
A goat shelter in a village's goat
distribution location

7. Arrange knee height space for goat sleeping area.
8. Prepare adequate mangers for goat food and water.
9. Spray disinfectant inside the distribution location 2 days prior to goats' arrival to prevent disease that may cause sickness in goats.
10. Arrange 24-hour shift amongst goat recipients to guard the goats.

Experience from the field
When disinfectant is not available, sprinkling lime (calcium carbonate) all over can also help disinfect the area.



Picture 45
Sprinkle lime on the ground
to disinfect the shelter.

Experience from the field
Before distributing goats to local communities, the project should recruit more local volunteers from amongst the goat recipients to observe and take care of goats. This is due to the fact that the goat recipients themselves will take good care of the goats that will be distributed to them. Being from local communities, they also know where to find locally available food for the goats.



Picture 46
Locals who volunteered to take care of goats
before distribution

3.2.4 Pre-distribution goat care

Successful livestock development requires understanding of livestock physical and biological risks, and thus mitigating as many potential risks as possible, including planning for risk prevention.

Upon their arrival, goats must be put under health surveillance for 2 weeks to monitor disease and give time for goats, coming from different geographical areas, to adjust themselves to a new environment before distribution. Goats by nature can easily experience stress, which can cause many symptoms or even death. Relevant staff should also undertake health screening and a round of vaccination against infectious diseases, such as foot-and-mouth disease (FMD). Another round of vaccination and vitamin injection can be performed 2 weeks prior to distribution. Unhealthy goats are to be under health surveillance for 1 week before vaccination.

In addition, goats must be separated into different groups according to their different arrival dates. Collars identifying group or arrival date must be put on goats.



Picture 47
Goats that are to be distributed to local
communities



Picture 48
Arrange 11 goats (1 buck and 10 nannies)
into one batch as preparation for distribution

3.3 Goat distribution mechanism

The MFLF’s distribution mechanism is in the form of “fund”, since the MFLF does not intend to simply give away animals, but rather set up a livestock fund that functions as a “bank”. Livestock recipients need to return livestock to the fund according to mutually agreed rules and regulations, so that the fund can continue distributing the returned livestock to other local community members who have not yet received the livestock. The fund usually starts with 30% of a community, since not all households are ready to own livestock from the beginning. Starting with 30% is also more agile and efficient in terms of monitoring and treatment in the initial phase.

In Yen-an Chaung Township, the MFLF also distributed livestock to the local community in the form of fund. The first batch was distributed to the poorest 30% of all households (see more details regarding recipient selection criteria in People Preparation). Each household received 11 goats, comprising 1 male buck and 11 nanny goats. 11 goats are suitable for household-scale livestock keeping and can generate enough income for living in the area. The recipients need to return 11 full-grown goats within 3 years. The goats can be gradually returned one by one or all at once, depending upon willingness and management of each recipient.



Picture 49
Locals goat recipients and
MFLF's Myanmar Country Director

3.3.1 Goat distribution procedure

1. Clearly inform the village committee and the village's livestock development volunteers of the distribution. Settle the distribution date and inform local community members to be prepared for goat distribution.
2. Categorise nanny goats into 3 different sizes: small, medium, large.
3. Arrange 10 nanny goats of different sizes into one batch.
4. There is no need to size male bucks, since a male buck can naturally mate with as many as 30 nanny goats.
5. Each goat recipient draws a ballot for a goat batch number.
6. Put a tag on the left ear of every goat with details of the goat's breed. The tag also serves to monitor and record the growth of a goat. The number should be run according to distribution in each village. For example, a big batch of 2,000 goats is prepared for villages A and B, the number thus runs according to the amount of goats distributed — goats number 2401-2411 for Goat Recipient No.1 and goats number 2412-2422 for Goat Recipient No.2.



Picture 50
Putting an ear tag for systematic
goat data collection



Picture 51
Putting an ear tag on where
there is no blood vessel

Experience from the field

With tags on their ears, goats that go missing can be identified and returned to their owners.

When putting ear tags, blood vessels must be avoided. Otherwise, goats will lose a lot of blood and be in danger.



Picture 52
A livestock development volunteer puts an ear tag on a goat while the owner holds his goat still.

3.4 Animal diseases and healthcare

3.4.1 Seasonal diseases

Summer diseases (February - May)

1. Bloat

Cause : overgrazing that can cause death from bloat

Symptom : The initial symptom is when a goat becomes lethargic, with a dropped neck and increase salivation. Its abdomen is distended on the left side, which is where its stomach is. The critical symptom is when the goat lies down and gasps for air.

Treatment : When the inspection shows that there is bloat in big ruminants, such as goats, cows, and buffaloes, immediate treatment must be carried out to avoid danger caused by rapid increase of gas in their rumens.

Feed 50 ml of sesame oil to goats showing initial symptom. Keep them walking and avoid having them lying still as this will increase gas in their rumens. Pass a big syringe, such as the size 16, through their abdomina to help release trapped gas. A big syringe will leave a small wound which can be easily cleaned and sewn. If the condition becomes critical that the animals lie down, lay them on their right side or turn their left side up to avoid putting pressure on their rumens, then pass a trocar to release trapped gas. Carefully clean and sew the wound closed.

2. Diarrhea

Cause : The causes of diarrhea can be many: change in temperature, infection, accompanying symptom of other diseases. However, the main cause of diarrhea in summer is food. In summer, bacteria are found in ripe fruit and vegetable or young grass. Maggots and parasitic worms usually lay their eggs on fruit, leaves, or grass which are goat's food. Their eggs will hatch inside their bodies and harm their digestive system or cause diarrhea.

Symptom : Frequent watery stools. Faeces stains on the buttock area. Fatigue.

Treatment : For basic treatment, feed saline solution or electrolytes for animals. Injection according to the goat's size and closely monitor its symptom.

Experience from the field

Lay a goat on its right side when passing a syringe or a trocar through its abdomina. A goat's rumen is on its left, turning the left side up thus allows a caretaker to clearly see the bloated area within the abdomen and minimize error in abdomen piercing.

Experience from the field

Diarrhea is mostly caused by parasites. Therefore, besides injection treatment, prevention should be initially carried out by giving dewormer every 6 months. Avoid giving dewormer to pregnant goats as it might cause abortion.

Rainy season diseases (May – October)

1. Q fever

Cause : Q fever is mostly caused by infection between rainy season and winter when the climate is humid.

Symptom : high fever, lethargic movement, loss of appetite, heavy breathing, and thick mucus. Caretakers can take a temperature or touch to feel the heat from the goat’s body.

Treatment : fever relief injection or saline injection and giving vitamins to relieve fatigue

Prevention against rainy season diseases is similiar to summer diseases. However, the following extra precaution measures must be taken in Yen-an Chaung Township

1. In rainy season, rain shelter should be regularly maintained to prevent leaking, since goats do not like humidity and may fall ill if proper care of the environment is not taken.
2. Be mindful of flood, which can occur in Yen-an Chaung Township, when walking goats over a flood way,
3. Take good care of goats’ drinking water. In rainy season, small particles are washed away and gathered in water sources which may cause diarrhea in goats.

Winter diseases (October – February)

1. Respiratory infection

Cause : extremely cold weather which can cause difficult breathing or pneumonia caused by bacterial infection

Symptom : runny nose and cough

Treatment : antibiotics injection

Experience from the field

Normally a flood way is dry stream bed with no water that can be crossed over by feet. But during flood the water stream is so strong that it can wash away walking people or animals within a few minutes, which is very dangerous. Therefore, extra precaution must be taken in rainy season. Careful assessment must be made to reduce any potential risks.

2. External parasites (ticks, lice, leprosy, fleas)

Cause : seasonal outbreak in winter and summer

Symptom : skin irritation, damaged and falling hair, lice on the goat’s body which result in frail health, thin body, and less produce from the goat.

Treatment : Clean the shelter thoroughly. Goat kids can be dropped with anti lice medicine for dogs 3 times a week. The medicine must be dropped onto the areas that the kids cannot reach with their tongues, which are: 1. in the middle of the forehead; 2. occiput; 3.tail. Adult goats can be dropped with anti lice medicine and spray with lice spray.

3.4.2 Communicable diseases

1. Foot and mouth disease

Cause : viral infection

Symptom : Oral lesions and difficulty in food intake. Wounds on feet areas which hinder the goats from grazing. Lethargic movement.

Treatment : Separate infected animals out of the herd. Clean the wounds and give antibiotics until the wounds dry up on their own. Regular vaccination is an important prevention against FMD.

Experience from the field

FMD virus is very strong and resistant. It remains on clothes and boots of a person in contact with secretion of infected goats and can spread to other goats. Therefore, besides separating the infected animals out of the herd, persons who are in close contact with infected animals must change clothes, take shower, and put on gloves before touching other animals. The best method is to refrain from working with healthy animals at least 3 days after coming into contact with infected animals. Clothes and boots should be washed clean with disinfectant and let dry.

3.4.3 Other diseases

1. Constipation

Cause : intake of too dry food or wrong type of food

Symptom : Goats attempt to defecate but no faeces comes out.

Treatment : Feed with solution of 1 litre of water and 1 teaspoon of salt or young grass. If the goat still cannot defecate, shape a soap bar into a small lump and insert it into the goat’s buttock (without taking it out) or dissolve

detergent in water and spray it into the goat's buttock. If the goat still does not recover, feed it with animal constipation medicine.

2. Paralysis

- Cause : extreme malnutrition
- Symptom : staggering movement, contracted tendons, paralysed
- Treatment : There is no treatment for paralysis.

3. Retention of placenta

- Cause : After delivery, a goat's placenta usually falls off on its own within 2 hours. A retained placenta will rot away inside the goat's body and cause infection and complication, which can eventually cause death in the goat.
- Symptom : When a placenta does not fall off but is retained in the buttock area after delivery.
- Treatment : Inject oxytocin hormone to release the placenta and monitor the symptom for the next 24 hours with symptomatic treatment.

4. Abortion

- Cause : Goats are easy to be startled. A nanny goat that is highly stimulated may energetically jump and run into things, which cause damage or death of her goat kid. The goat might sometimes experience preterm labour, which can also lead to unsuccessful delivery and abortion.
- Treatment : When abortion happens, the goat kid cannot be saved. But the nanny goat can be supported by providing her with good food to restore her health.

Experience from the field

Even though there is no treatment to abortion in goats, abortion risks can be lessened by finding out causes of abortion. For example, a mother goat might have an infection, be exposed to too many stress stimulants during pregnancy, or lack nutrition.

5. Plastic waste intake

- Cause : intake of plastic waste from grazing areas
- Treatment : There is no treatment to plastic waste intake. Caretakers must therefore take precaution when taking goats for grazing.

6. Loss of appetite

- Cause : an initial symptom of many other diseases
- Treatment : Feed goats with a variety of quality food, such as young grass or peanut meal. Mix salt into their food to stimulate and regain goats' appetite.

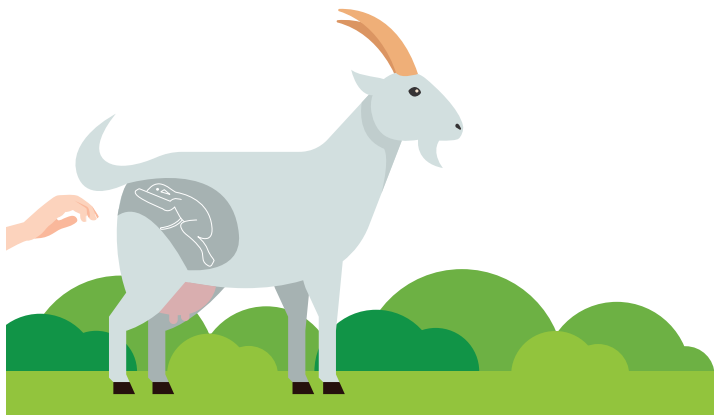
3.4.4 Basic kid delivery assistance

There are circumstances in which a nanny goat cannot deliver naturally, which usually happens in an unhealthy or malnourished nanny goat. It can also be due to unexpected events, such as accident or a situation that gets out of control during delivery. Caretakers should always pay heed to any abnormalities of nanny goats in labour. If the delivery is not succeeded within 1 hour, caretakers must immediately proceed to assist the nanny goats. When caretakers do not have knowledge of kid delivery, consultation with veterinarian for assistance must be undertaken immediately.

What to do when a mother goat cannot deliver naturally

1. Trim your fingernails short and leave no sharp edge on your nail borders. Wash both of your hands clean with soap.
2. Clean the goat's genital/buttock area clean with soap.
3. Put the mother goat in a standing position for the ease of assistance. If the mother goat cannot stand up, lay her down on her right side and touch her neck area.
4. Slowly insert your hand or fingers into her vagina. This step needs extra care because goats are small animals and thus have small vaginas. Too much force might hurt and kill the mother goat.

5. Touch the kid with fingers to find out where its head and feet are. A kid will come out in one of the two positions: either with both front legs or with both rear legs.
6. Slowly pull both front or rear legs out in a correct position. If the front legs come out first, be midful of its head and its nose which should come out at the same time.



Picture 53
Simulation of inserting fingers into a mother goat's vagina
to assist in delivery

7. Once the kid is out, clean blood and liquid from the kid's mouth and nose immediately to stimulate its breathing. Alternatively, the mother goat can also lick her kid clean.
8. In the case where delivery assistance is not possible, consultation with veterinarian must be undertaken immediately.

3.4.5 Newborn goat kid nursing

Newborn nursery is very important, as newborns are fragile, prone to disease, and have high mortaliry rates. Lack of proper care can result in huge economic loss.

Experience from the field

If the kid's front legs come out first, its head might be attached to its body, which complicates the delivery. Delivery assistant must position the kid's head between its front legs and slowly pull both of its front legs out at the same time. The entire process of delivery assistance must not last longer than 45 minutes.

1. When there is a newborn kid, caretakers must pay attention to mucus inside its nose, which can block its breathing, and wipe it away.
2. Mother goats naturally lick their kids clean. But if there is still dirt left on their bodies after licking, caretakers should wipe them clean.
3. Newborn kids must drink colostrum from their mother goats within 6 hours after delivery.
4. New postpartum mother goats should be injected with vitamins and fed with good food, such as fresh grass of good quality for quicker restoration of their bodies.



Picture 54
A mother goat is licking her newborn kid clean.

Experience from the field

Removal of mucus from a kid's mouth and body can be done by opening its mouth and wiping all the mucus away with a clean cloth. Use a big syringe to suck mucus out of its nose, and rub hard on its body to clean mucus. Do not worry if too hard rubbing could hurt the kid. Rubbing helps keep it warm and stimulate its breathing. Press while rubbing to create friction but not adding too much weight. This is the best method to stimulate a kid's sensation after delivery. In the case where a kid does not breath or has too much mucus blocking its mouth, hold it upside down and lightly rock it to drain out the mucus. Make sure to do this very carefully.

Experience from the field

Mother goat's colostrum contains enzymes or antibodies to protect the newborn against disease, as well as hormones that are vital to the newborn's growth.



Picture 55
Newborn kids must drink colostrum from their mother goats
right after delivery to build a strong immune system.



Picture 56
Care takers must bring newborns to drink colostrum from their mother goats
right after delivery.

3.4.6 Precaution of goat mortality

Different geographic and climatic characteristics in different target areas pose diverse natural risks to human beings and animals, causing varied local animal diseases in different target areas. It is thus important to study characteristics of the target area where the project takes place and take appropriate precaution and prevention measures to reduce mortality rate caused by natural causes, local animal diseases, and accidents.

Examples of extra precaution measures in Yenana Chaung Township are as follows:

1. There are many venomous snakes that are harmful to both people and animals. Extra precaution must be taken when taking goats to graze in dense and weedy areas where snakes and other venomous animals harbor in.

2. Be careful of dog bites as they can leave deadly infectious wound.

3. Walking goats to areas that are full of trash might cause goats to consume plastic waste, which can cause death over a long run.

4. When a breastfeeding goat mother dies, the mother's kids will not be able to drink milk and die as well. In the case that a breastfeeding mother goat dies, the kids must continue to be breastfed by other mother goats or fed with formula milk.
- Experience from the field**
Goat kids drink milk from their mothers for 3 months. Therefore, precaution of mother goat mortality should be taken during this period. Mother goats should also be fed with good food for their good health.

After the MFLF had undertaken holistic livestock development in the area, the mortality rate, especially by disease, decreased dramatically. After the MFLF's operation, the top 4 causes of death in goats are as follows:

1. snake/dog bites;

2. falling off a cliff;

3. fever;

4. bloat (from overgrazing and plastic waste intake).

However, precaution taken by caretakers can reduce animal accidents. Caretakers must ensure that goats do not get exposed to rain nor sleep in wet and humid shelters. They must also not take goats to graze in risky areas, such as floodways or high cliffs, and be mindful of dog and snake bites, as well as not letting goat eat plastic waste.

3.4.7 Inbreeding

Inbreeding is the mating of closely related animals, that is to say, kids mating with their fathers or mothers. Inbreeding produces offsprings that are weak and vulnerable. Inbred offsprings have slow growth rate, poor reproduction, and high mortality rates. In Yen-an Chaung Township, nanny breeders were rotated to mate with different buck breeders to distribute good genetic traits and avoid inbreeding. Another method to avoid inbreeding is to mate with buck breeders from neighboring villages. This will ensure prevention of unintended mating.

3.5 Medicine and medical fund

Quality medicine is an important factor in keeping livestock healthy. Different target areas have different medicine, depending upon their types of livestock and local diseases. Types of livestock and local diseases in each target area can be identified when conducting a baseline survey in the initial phase of a project (see more details about the medicine in the Appendix, 1. List of medicine and equipment of livestock development volunteers). The key working principle is to ensure there is quality medicine in local communities for quality, timely, and affordable treatment of livestock, especially economic livestock of local communities. Quality, timely, and affordable livestock treatment will reduce animal mortality rates and contribute to good health of animals.

3.5.1 Medical fund

A village's medical fund is a mechanism to ensure the sustainability of holistic livestock development, that is to say, every village has its own medical fund taken care by the village's livestock development volunteer and monitored by the village chief and the village development committee. The progress is reported in every village

monthly meeting. The fund is sustained by fee collected from livestock treatment and medicine for local communities. This is to ensure that the communities have enough funding to buy animal medicine by themselves.



Picture 57
Medical fund of local communities.



Picture 58
Inside a first aid kit box are basic medical items of which livestock development volunteers will ensure proper disbursement and good maintenance.

3.5.2 Management of medical fund

1. Create understanding amongst local communities about the benefits of medical fund and medical supplies and ask for their rough opinion about fee collection for medicine and services provided by livestock development volunteers. The collected fee is to be used for purchase of medicine and relevant supplies. If the local communities agree to the idea, medical funds may be established.
2. Livestock development volunteers provide basic treatment to animals in villages and collect medical fee based on the agreed rate. They also make detailed record of all treatment, make summary, and present the record in every village meeting.
3. Collection of medical fee is calculated by multiplying the principal cost of medicine by the amount of injected medicine (unit in cc).
4. Livestock development volunteers collect 200 kyat per one treatment, which will be put into the fund for purchase of medicine, of which price may increase in the future, and relevant supplies, such as syringes.
5. When the principal cost of medicine rises up and results in higher treatment fee, volunteers must inform animal owners before every treatment.
6. Purchased medicine should be of good quality and up to standard, such as medicine registered with an organisation or guaranteed by the government.
7. Livestock development volunteers must make a record of all treatments and transactions within a fund. To keep the project's veterinarian informed, the record

Experience from the field

In the beginning of the project, livestock development volunteers provided treatment without collecting any fee. Yet, when the project started collecting medical fee, local communities also understood. In the past, they had to invite veterinarians from town. Sometimes, the transport was difficult and veterinarians would save time by coming to villages only when there were a lot of sick animals. Therefore, when there were volunteers who could give treatment in the village, community members did not disapprove of treatment fee collection.

Experience from the field

An example of medicine cost calculation is as follows: A 200cc/ml bottle of antibiotic costs 10000 kyat. The principal cost is therefore 50 kyat per cc. When 10 cc is used to treat a goat, the goat owner has to pay 500 kyat for treatment.

should include the following information: details of goat recipients, the number of sick goats, types of injection, the amount of injection, and medical fee. In the early stage of a project, every village can make direct report to the project's veterinarian, who regularly follows up on progress and makes house visits to check on record made by livestock development volunteers. Later, the report can be made once a month. After the volunteers have gained 3-4 years of experience, they can report to the head of volunteers, who will subsequently report to the project.

8. In a village monthly meeting, livestock development volunteers inform the total number of in/out goats within the village and the balance of village medical fund to community members.

3.6 Goat feed

Goats naturally feed themselves often. They can feed on a variety of food and adjust themselves well to native plants. In general, goats can walk up to 6-8 kilometres a day grazing. Goats like to feed on shrubs and leaves, which suit their build when they lift up their necks up to feed and watch for danger at the same time. Sheep, on the other hand, lower their necks to feed on grass and never lift up their necks or climb a tree to look for food. Goats can consume food as much as 6-10% of their body weight, and drink water 4-5 times more than food. Therefore, caretakers should understand their nature and always see to that goats receive enough food to meet their daily needs, especially goat kids which need enough amount of food to grow and be healthy.

3.6.1 Feed management for free-ranging goats

1. Goats normally feed twice a day: in the morning from 6.00-11.30 am; in the afternoon from 1-5 pm. In Yenau Chaung Township, goats are free-range and taken out to grazing at food and water sources close to the villages twice a day: at 6 am in the morning; 3-4 pm in the afternoon.

- 2. If there is available land, local communities should be encouraged to grow forage grass to reduce food cost and feed goats with a wider variety of nutrients. Goat feed should be sufficient for future increasing number of goats.
- 3. Goats can be fed with some locally available plants. For example, toddy palm trees can be found in Yen-an Chaung Township. Its fruit can be sliced and fed to goats. Even small cotton plants can also be entirely fed on — from their stems, bark, stalks, to their leaves — anything within the reach of goats. Sesame and peanut grains, grass scraps, or cotton bits that are leftover from weed killing can also be fed to goats. Be mindful of plants that can cause bloating in goats.
- 4. Mineral block is a food supplement which improves goats’ health but does not cause weight gain. However, if mineral block is affordable, caretakers should give them to goats as a dietary supplement, especially for goats that are raised in a closed shelter, since they do not receive as many natural minerals as free-ranging goats.

Experience from the field

Goats need to be cared for, especially when they are turned out to grazing. Availability of caretakers is therefore very important. In Yen-an Chaung Township, selection of goat recipients is also made based on their availability. Selected goat recipients are those who can spend quite some time taking goats out to grazing.

3.6.2 Promotion of forage grass cultivation amongst local communities

Sufficient and low-cost livestock feed is an important factor in holistic livestock development. Development practitioners must ensure that there is always enough livestock feed and water and also taking into account the increasing number of livestock in the future. Thus, the project selected forage grass that suited the target area, self-experimented with cultivation, and promoted it amongst local communities. The results can be summarised as follows:

Types of forage grasses

Name	Propagation	Climate	Water intake	Yield (kg/rai)	Protein (%)
Ruzi grass	Seed or cutting	Hot and dry	Low	3,400	8-10
Guinea grass	Seed or cutting	Hot	Moderate	2,000	8.2
Napier grass	Stem cutting	Hot	Moderate	2,000-4,200	8-10
Stylo	Seed	Dry	Low	1,800	18
Hamata	Seed	Hot and dry	Low	1,300-1,900	18

Steps to promotion of forage grass cultivation

- 1. Create understanding amongst local livestock development volunteers and inquire whether there is any native forage grass that is planted once and can be harvested year round. The inquiry aims to stimulate local community members to think and consider the importance of having sufficient amount of feed for their livestock.
- 2. Experimenting before promoting any forage grasses to local communities. Certain plants might grow differently under different geographical and climatic conditions. Always choose the forage grass which suits most to the target area.
- 3. Inspect the planting area by taking into account the overall feed need of animals in the project.
- 4. Choose land that is suitable for forage grasses. The land should not be in use for growing seasonal crops and its owner is willing to have the land used.
- 5. When the land is a common property of more than one landowner, understanding

Experience from the field

Proportion of livestock feed in the target areas is 1 rai (approximately 0.16 ha) of forage grass for grazing of approximately 5-10 goats or 1-2 cattle.

of mutual use of land and allocation of forage grass for livestock should be made with the landowners.

- 6. Forage grass plots must be taken care of by their beneficiaries, that is to say, locals who bring the forage grass to feed their goats.



Picture 59
A model forage grass plot of local community members



Picture 60
A volunteer is bringing forage grass to feed the goats.

3.6.3 Livestock food supplements in dry season

Preparation of UMB (Urea Molasses Block)

In dry season when natural food becomes scarce, caretakers should be encouraged to prepare UMB from locally available materials as food supplements. Preparation of UMB is as follows:

- 1. Prepare the following ingredients:

- Molasses 31%
- Rice bran 25%
- Cement 15%
- Peanut meal 13%
- Urea 10%
- Lime 3%
- Salt 3%



Picture 61
Preparation of UMB supplement in dry season

- 2. Prepare a container, such as a plastic bucket or a water bowl, for mixing all the ingredients.
- 3. Add in the ingredients from largest to smallest amount, from molasses > rice bran > cement > peanut meal > urea > lime > salt.
- 4. Mix all the ingredients well until the mixture is sticking together and can be shaped into small balls.
- 5. Put the mixture into a block machine. Dry the UMB under the shade. UMB will be too dry and crack easily if exposed under too much sun. Drying under the shade usually takes 3-4 days.
- 6. Examine UMB regularly and replace with a new one when it becomes molded or out of shape. Expired UMB could be potential sources of dangerous disease.



Picture 62
UMB block machine



Picture 63
Hanging UMB inside goats' shelter to provide them with vital nutrients

Preparation of grass silage

Preparation of grass silage is to store food for animal during the dry season. It is similar to food fermentation which is one method of food preservation. Therefore, when natural food is available, for example, during the rainy season when grass grows thick and long, grass should be stored in the form of silage for later use in dry season.

Preparation of grass silage is as follows:

1. Prepare the following ingredients:

• Grass

100 kilograms

• Molasses

4 kilograms

• Salt

500 grams

• Water

4 litres
2. Dissolve molasses and salt in water.

3. Slice or chop grass to 2-3 cm.

4. Pour the solution onto the chopped grass and mix well.

5. Put the grass in plastics bags. Press well to let out all the air.

6. Close the bag with rubber band and store in the shaded area. Be careful not to let the bag rip.

7. Leave for 3-4 weeks before feeding to animals.

8. Start feeding a mix of grass silage and fresh grass for the first few times, then gradually increase the proportion of grass silage to slowly let the animals get used to it.

Experience from the field

Self-prepared animal feedd for cost reduction varies with locally available ingredients. Threfore, the recipe should always be adjusted to use suitable and available ingredients in the target area.

In Yen-an Chaung Township, peanut cultivation is widespread amongst local people. They also keep peanut meal which is the by-product of oil extraction from peanut seeds. Sometimes, when forage grass becomes so scarce in the dry season that hay has to be fed as a supplement, peanut meal can be an important protein addition to the feed.

Peanut meal can be prepared by soaking it in water and mixing with hay. This not only adds protein supplement to the feed, but also helps increase animals' appetite.

3.7 Shelter

Shelter is another important factor in holistic livestock development. Shelters directly affect animal health and hygiene, and must therefore be adapted according to types of animals and different geographic and climatic conditions, as well as disease management practices and daily management routines.

3.7.1 Guideline for building a goat barn

1. A barn for 11 goats should be approximately of 6x6 metres. When the goat number increases, the barn size should also expand to avoid overcrowding.
2. Make a fence from locally available materials. The fence should be strong and has a minimum height of 1.5 metres to prevent goats from jumping over.
3. There must be a shelter of 3-metre minimum height inside the barn to guard against sun and rain.
4. It is recommended to build a gable-roofed shelter for good air ventilation. The material should be sun resistant and waterproof materials to prevent rain from leaking into the shelter.
5. Inside the shelter, there must be knee-height sleeping beds for goats, because goats by nature do not sleep on the ground. The beds will also help prevent goats from sleeping on wet and moist ground, which might cause pneumonia. The beds should not be too high for goat kids to jump up to.

Experience from the field

In Yen-an Chaung Township, the locals build house fences out of plaited dry toddy palm branches. The goat shelter fences are therefore built from the same material, yet leaving wider gaps between between plaited rows for better air ventilation and prevention of foul smell.

Experience from the field

The barn should be built under trees to provide shade for goats during day time. Tree shade can also serve as air and noise filter.

Experience from the field

Goat beds should be made of strong and durable materials that can withstand the weight of goats. The materials should be easy to clean. In Yen-an Chaung Township, goats beds are usually made of wood planks closely attached together without any gap to prevent goats from sticking in their legs and getting hurt.



Picture 64

Build the shelter close to trees which can help reduce wind blow and serve as air and noise filter.



Picture 65

Wooden beds inside the shelter to prevent goats from over exposure to humidity on the ground

- 6. Food and water managers must be provided for goats. The managers should be long enough to accommodate many goats at the same time.
- 7. Livestock development volunteers must spray disinfectant inside the shelter 1 day prior to housing goats in. Be mindful when spraying shelter disinfectant which looks like water. The disinfectant texture is color free, clear, and has odour. Precaution should be taken upon use.

Experience from the field

When disinfectant is not available, sprinkling lime (calcium carbonate) all over can help disinfect the area. Also, lime is not harmful to animals.



Picture 66
Sprinkle lime on the ground to disinfect.
Lime is not harmful to animals.

3.7.2 Barn cleaning rules

- 1. The barn should be cleaned twice a day: after the goats leave the barn or around 6.00 am in the morning, and in the afternoon after the goats are taken out of the barn again or around 3.00 - 4.00 pm.
- 2. Take goat manure out of the barn. Cover goat urine with sand or, when sand is not available, ash.



Picture 67
Cleanliness maintenance inside a shelter in a community

Experience from the field

Goat manure is quality compost that can be sold to generate income for local communities. Its quality is better than manure compost from cattle or buffaloes (goat manure is in the form of solid lumps and not as soluble as manure of cattle or buffaloes, which is softer, more soluble, and therefore cannot last or give nutrients for too long time).

3.8 Monitoring and evaluation towards sustainable development

3.8.1 Monitoring and evaluation system

The ultimate goal of development is when local communities can find solution to their own problems and carry forward the development by themselves. The project thus deems it is important to regularly monitor the works of livestock development volunteer and the project's beneficiaries. Activities to be monitored include animal care, animal trade, outbreak management and treatment. The monitoring aims to

instill in livestock development volunteers and the local community both theoretical understanding and ability to practice, apply, and adapt to real-life situation. This is to ensure that the local community can prepare and plan for potential future challenges.

3.8.2 Documentation

Real data collection throughout the implementation allows for accurate analysis, planning, and problem solving. The collected data can be shared with the local community to stimulate awareness of regular animal care (see guidelines for documentation in the Appendix, 2. Documentation).

3.8.3 Establishment of veterinary pharmacy

There was no veterinary pharmacy in Yen-an Chaung Township. In order to provide swift and regular access to quality medicine for the local community, the project established a veterinary pharmacy in town area which was not too far from the villages. The animal pharmacy served as a local source of quality medicine within the township. It contacted other sources of quality medicine in cities to buy in bulk, from which the villages subsequently bought and stored in their own medical funds. In the initial phase of implementation, the project and interested livestock development volunteers co-managed the pharmacy and shared the cost of medicine purchase. After the pharmacy had started to make enough profit from its medicine trade and the livestock development volunteers had gained knowledge and experience in running the pharmacy by themselves, the project handed over the pharmacy to the volunteers.

Simulation of veterinary pharmacy management

To ensure that the volunteers can run the pharmacy on their own and reduce potential business risks, the project provided entrepreneurship training to the volunteers through the following simulation of establishing a village's medical fund:

1. Divide the volunteers into 3 groups of 5. This is also to train the volunteers to work in groups.

2. Give funds (simulated) for the use of pharmacy management, purchase of medicine and medical supplies, transportation to buy medicine or give at-home livestock treatment, and other miscellaneous cost.
3. The volunteers study medical product details, such as the principal cost, expiry dates, storage instruction, and dosages for different types of animals. This will give the volunteers overall understanding of cost depreciation.
4. The volunteers create revenue and expense accounts. This will help them understand the importance of making record of cash balance within a fund.
5. The volunteers make a record of medicine storage to see the overall amount of medicine. The record will help the volunteers plan for effective use, purchase, and operation.
6. A simulation should include both normal and special scenarios, such as during the outbreak where many villagers need veterinary services and a situation in which villagers have no need of veterinary pharmacy. Some additional situations can also be provided in the simulation, such as news about price fluctuation in veterinary medication or an outbreak in a neighbouring village. These situations will affect the volunteers' decision making in medicine purchase, medicine storage management, and service fee adjustment.
7. Each group gives presentation of its work approach, problem solving, thinking process, and the result of its simulated business management.
8. The development team gives advice for future improvement.

3.8.4 Scaleup of sustainable development

Awareness of raising quality goats with physical appearance in accordance with the breed standard is another factor in goat produce quality maintenance. Good quality produce can be bred, processed, and added value into wide varieties. Therefore, after the initial phase of the implementation, the project must scale up the local community's awareness and understanding of this importance. For this purpose, Goat Day was organised in Yen-an Chaung Township.

Goat Day

The project organised Goat Day or a competition of the best breed and an exhibition of goat product. Goat Day aimed to raise participants’s awareness of importance of owning good breed and healthy goats. It also helped inspire goat recipients to learn from the competition winners and stimulate the local goat market, bringing fame to Yen-an Chaung Township as Myanmar’s centre of goat production.

Goat Day entailed a variety of activities: a competition of healthy and good breed goats to win cash prizes and certificates, of which the winners will share their goat raising experience and methods; goat dish cooking competition; an exhibition of local product from the project’s development activities. There was also a recreational activity such as a blindfold game in which players had to catch a goat within the time limit. The person who managed to catch the goat could take it back home as a reward. More importantly, there was a certificate awarding ceremony for livestock development volunteers with the LBVD as the witness of the ceremony. The ceremony would enable and encourage the volunteers to continue their work in the target area.

Goat Day received support and cooperation from the LBVD and other governmental agencies in the project area. Many goat farmers participated in the competitions. Event participants were from a wide variety of locations, such as communities from neighbouring areas, interested university students, agencies and organisations operating in the area, local traders, and the general public.



Picture 68
Goat Day’s
Healthy Goat Competition



Picture 69
Goat Day’s Best Breed Competition to raise awareness
of breed keeping within the local community

3.8.5 Handover to the local community

Based on the experience of the MFLF, it was estimated that 6 years were needed to solve the problems of poverty in Yen-an Chaung Township. When the project almost reached its end, all-round internal and external evaluation of the local community’s life quality and livestock development volunteers’ performance was conducted. The local community’s feedback on the benefits of development activities was also included. The evaluation result demonstrated significant improvement in the local community’s life quality. The community members could earn enough income from licit activities. Instilled with an immunity against debt, they were healthy and ready to face any potential future challenges. No one was left mired in poverty.

Summary of Goat Bank Project, Yenon Chaung Township								
Item	2010	2011	2012	2013	2014	2015	2016	Total
Number of goats within the project		2,090	3,434	4,962	7,673	8,828	8,539	8,539
Number of goat kids			1,499	2,081	3,371	3,524	3,453	13,928
Number of deceased goats			153	518	689	846	1,720	(3,926)
Number of sold and consumed goats			2	35	741	1,523	2,022	4,323
Sale value	0	-	3,300	57,750	1,222,650	2,512,950	3,336,300	7,132,950
Value of goas within the project	0	3,448,500	5,666,100	8,187,300	12,660,450	14,566,200	14,089,350	14,089,350
Total vlaue	-	3,448,500	5,669,400	8,245,050	13,883,100	17,079,150	17,425,650	21,222,300
Number of goat recipients		190	198	295	443	545	638	638

Note **data based on the goat price of 1,650 baht per one goat.

Summary of reduced livestock mortality rate due to the performance of livestock development volunteers, Yenon Chaung Township								
Mortality rate	2011	2012	2013	2014	2015	2016	Average 2012-2016	Total 2012-2016
Total number of livestock	7.13%	4.55%	5.47%	3.76%	4.49%	7.39%	5.24%	
Total		10,926	14,257	24,165	26,676	27,720	20,749	103,744
Number of deceased animals		497	780	908	1,199	2,048	1,086	5,432
Value added to the reduced mortality rate		7,153,569	7,796,412	15,231,868	14,633,882	13,776,110	11,718,368	58,591,841
Goats	12.90%	8.08%	8.74%	6.30%	6.91%	11.65%	8.46%	
Total		5,592	8,146	13,529	16,466	17,138	12,174	60,871
Number of deceased animals		452	712	852	1,137	1,996	1,030	5,149
Value added to the reduced mortality rate (1,650 baht per one unit)		444,457	559,076	1,473,848	1,628,738	354,423	892,108	4,460,542
Cattle	7.58%	0.67%	0.87%	0.33%	0.48%	0.33%	0.49%	
Total		4,637	5,163	9,059	8,738	8,830	7,285	36,427

Mortality rate	2011	2012	2013	2014	2015	2016	Average 2012-2016	Total 2012-2016
Number of deceased animals		31	45	30	42	29	35	177
Value added to the reduced mortality rate (21,000 baht per one unit)		6,730,177	7,273,463	13,790,116	13,027,148	13,446,594	10,853,500	54,267,499
Pig	0.90%	6.04%	5.43%	2.72%	2.83%	2.95%	3.28%	
Total		182	276	955	672	747	566	2,832
Number of deceased animals		11	15	26	19	22	19	93
Value added to the reduced mortality rate (2,250 baht per one unit)		(21,065)	(28,161)	(39,161)	(29,142)	(34,373)	(30,380)	(151,902)
Sheep	N/A	0.58%	1.19%	0.00%	0.13%	0.10%	0.36%	
Total		515	672	622	800	1,005	723	3,614
Number of deceased animals		3	8	-	1	1	3	13
Value added to the reduced mortality rate (1,950 baht per one unit)			(7,967)	7,065	7,137	9,466	3,926	15,702

Preparation for handover to the local community

1. Communicate with the community to create understanding about the handover 1 year in advance to prepare the community members, especially in terms of learning the skills and knowledge that still remain unclear to them, such as the project's cash flow management.
2. Develop the capacity of the community, especially the livestock development volunteers, in the area of basic business administration, such as cost and profit accounting.
3. Develop standard manuals of maintenance of the community's development activities, for example, maintenance of serum storage, maintenance and repair of reservoir, and giving medicine to livestock. The manuals can serve as reference for the community's development work after the project ends.
4. Promote establishment of community funds at least 1 year before the project ends. Some examples include a medicine fund, a seed fund, and a water fund. Go through the community's understanding of fund establishment mechanism to ensure sustainability within the community.
5. Manage the knowledge arising throughout the project and learn from work experience.



Picture 70
One of the project's goat recipients

[04]

HOLISTIC LIVESTOCK DEVELOPMENT CASE STUDY 2
MEISHAN PIG (BLACK PIG) FUNDS OF PANG MAHAN
VILLAGE, THOET THAI SUBDISTRICT MAE FAH LUANG
DISTRICT IN CHIANG RAI PROVINCE AND THA WANG PHA,
SONG KHWAE, AND CHALERMPRAKIET DISTRICTS
IN NAN PROVINCE

When the MFLF conducted baseline survey and identified needs and wants of rural communities in Thailand, it was found that many areas in Thailand still face food insecurity and become trapped in loan-induced poverty. Most of their expenses are mainly from food cost. Pork is a popular food source among Thai people. Yet landrace pigs are raised free-range without shelters, feed management, and proper care. The pigs are also fed with expensive store bought feed which adds up to the cost and leaves the pigs unhealthy and unable to give standard produce.

The MFLF thus implements holistic livestock development activities in many parts of Thailand with the focus on pig as a solution to problems of basic need and consumption. The activities also help reduce food-induced loans and create good-earning livestock occupation for local communities.

4.1 ‘People’ preparation

4.1.1 Livestock development volunteers

Livestock development volunteers are the key to holistic livestock development.

Building livestock development volunteers is to equip a local community with basic knowledge of animal disease prevention and treatment. This is to ensure that a local community owns healthy livestock with standard growth rate and a lot of offsprings. Development of healthy livestock is a worthwhile activity that can strengthen food security to reduce household expense. Surplus can also be sold or processed to enhance income. Furthermore, the livestock development volunteer acts as a bridge between a development project and a local community. The volunteer’s role is to create understanding of the development project amongst the local community and work closely with community members to address livestock health issues, thus reducing the livestock mortality rate in the area. At the same time, the volunteer also acts as a representative of the local community to inform the development project of real problems and needs of the community, including issues arising during the operation phase, which allows the project to respond promptly.

Training of livestock development volunteers in Pang Mahan and 3 districts of Nan province was based on the same principles and process as the training in Yen-an Chaung Township. It was also done jointly with a key partner or local offices of Thailand’s Department of Livestock Development. What differs is the change from goat and cattle to more common livestock in Thailand, which are pig, chickens, cattle, and buffaloes.

4.1.2 Pig recipients

Preparation of pig recipients is an important step of holistic livestock development because they are pig, caretakers, and beneficiaries, who directly affect the livestock mortality rates. Preparation of pig recipients cover selection of recipients by the project and the communities, training on rearing skills and knowledge, including preparation of cost reduction feed formula and fermented feed, basic animal health observation, proper shelters, and monitoring.

4.1.2.1 Creation of understanding before recruiting members

The project started with creating understanding of the pig fund principles amongst community leaders, who would subsequently spread their understanding within their own communities. Afterwards, interested community members who were willing to be members of the fund would be selected. The key principle is to communicate the reason why the project promotes pig raising amongst local community members, and why it must be done in the form of a fund to which recipients must return certain number of animals. The key points to be communicated are as follows:

- 1. It is for food security. Pigs are animals that can be raised by the communities themselves, and will thus reduce food expense.
- 2. Pigs can be used in religious ceremonies and practices.
- 3. Promotion in the form of a fund can help a larger number of people. When the members return pigs to the fund, the fund will distribute the returned pigs to others on rotation. Furthermore, it fosters the idea of coexistence, acceptance and compliance of the commonly agreed rules, as well as generosity within a community.

4.1.2.2 Member selection

The village chief and the village committee, together with livestock development volunteers, select pig recipients based on the following criteria:

- 1. They live in the project area;
- 2. Their income is lower than average (based on the baseline survey conducted by the project) which must be also approved by the community leader and its committee.
- 3. They have willingness to join the fund;
- 4. They are diligent, honest, and interested in livestock tending, since these are characteristics of thoughtful caretakers who will not take their livestock for granted.

- 5. They are ready to comply with the fund's conditions and regulations;
- 6. They are eager to participate, which can be observed from the way their pig stalls and banana trees are preapred. In the case of a family with too low income to build a pig stall, the project is ready to provide support in terms of construction materials, such as bricks, rocks, cement, sand, poles, and roofs. But the recipient must put in their labour for construction and/or bring the recipient's own materials, such as poles or roofs.

4.1.2.3 Selection of boar caretakers

Another key principle is that the recipients must be responsible for pig mating. The proportion of boar caretakers to sows should be 1:5. The selection criteria are as follows:

- 1. They are interested in and willing to raise boars. Raising boars will make less profit than sows, in other words, a boar caretaker can earn remuneration of 1 piglet for the service, in the case that the mating is successful. A boar can mate approximately 10 times in 1 year, its caretaker therefore can earn approximately 10 piglets a year.
- 2. They are experienced in boar raising. A boar caretaker should have good attitude towards livestock raising and is able to manage the boar's service schedule. The project will also provide extra training on boar caring and mating.
- 3. They can get along with other fund members.
- 4. They are available to take their boars to mate with the sows in the village.

4.1.2.4 Member training

The project must provide training to each and every recipient on basic understanding and appropriate method of pig raising, such as pig feed, basic diseases, and the community rules and regulations to ensure that they will be successful and benefit from pig raising.

The training should be conducted together with local livestock authorities to build relationship and mutual familiarity between local authorities and communities, paving the way for their cooperation after the project ends.

Training approach

Since most of the members were already knowledgeable in basic pig raising, the project therefore focused on giving advice, communicating, enquiring about their pig raising methods, and having the members ask any question about livestock tending. Then the project gave advice to each individual member, especially in terms of pigsty cleanliness maintenance and basic animal health observation so that they know how to detect abnormalities and make decision for proper livestock treatment.

4.2 Animal preparation

4.2.1 Breed

The breed promoted by the MFLF in the project areas was Meishan pigs, which is from quality “Taihu” breed from the People’s Republic of China. They are prevalent in Shanghai municipality due to their resistance to diseases and low maintenance. They are prolific and traditionally and culturally proper. The MFLF promoted raising of Meishan pigs for consumption, which would first reduce food expense. When the number of pigs grows larger, the project then promoted selling the excess to increase income. It should be noted that high potential for value addition is the strength of pigs, that is, pigs can be sold and processed into a wide variety of products, which also increase local communities income. With appropriate technology, quality materials, a market-driven strategy that is based on local potential in terms of human and natural resources, the communities can earn more secure and higher income in a sustainable manner.

Dominant traits of the Meishan breed

- 1. Black body, wrinkled face, thick skin
- 2. Long large drooping ears
- 3. Black hair, straight back line
- 4. Usually having 16-22 teats
- 5. White on all 4 feet



Picture 71
a Meishan pig with dominant traits

Characteristics of the Meishan breed

- 1. Prolific, high milk production, good at rearing their offsprings, and high post-weaning survival rate;
- 2. Highly resistant to diseases and easily adaptable to different climate and environments
- 3. Low maintenance and easily feeding on crude texture food, such as banana, elephant ear leaves, vegetable and food scraps
- 4. Resistant to reproductive diseases, such as brucellosis, which usually cause most loss.

Characteristics of fine breeders

- 1. Its physical appearance is in accordance with the breed standard, that is, a black body, a wrinkled forehead, long large drooping ears, black hair, a straight back line, a large hip, and 11 pairs of or 16-22 teats;
- 2. A boar should have good body balance;
- 3. Its genital organ appears normal;
- 4. It is enthusiastic, not lethargic nor fierce.

Pig breeding

Like goats, pigs reach their puberty early, that is, a sow is ready to mate when it is 8 months-1 year old. The gestation or pregnancy period is 112-115 days or 3 months 3 weeks 3 days, or 3-3-3 which is easy to memorise.

Meishan pig caretakers who are knowledgeable and want to breed for good characteristics usually mate a Meishan sow with a Duroc boar, which can produce healthier offsprings with more red meat and less fat.

Estrous cycle

Pigs estrous cycle lasts 21 days. The ovulation period lasts approximately 4 hours, in which the conception is very likely. Therefore, caretakers should pay attention to detect the heat behaviour. A sow in heat is fidgety, does not eat, and tries to climb over its pigsty with mucus dripping from its genital organ. Another indication of heat is when applying pressure to its back by hand and the sow continues to stand rigidly. When the sow comes into heat, a boar can be brought to mate in the next and the following days, or 2 days in total, which will increase the conception rate.

Mating

Boars and sows are large and heavy, caretakers must therefore ensure successful mating when taking boars out to provide services. The steps are as follows:

- 1. Clean the boar and the sow with room temperature water and wipe dry with cloth.
- 2. Let the boar mount the sow naturally.
- 3. If the boar is unable to penetrate its penis into the sow, the caretaker may assist by holding the boar while it is mounting, or hold its penis to mate for 5-10 minutes to increase successful rates.
- 4. Check the sow for signs of return of estrus in 21 days. If the sow shows signs of being in heat, it can be implied that the mating is unsuccessful and needs to be done again.
- 5. When there are no signs of return of estrus, note down the mating date and count forward for 112-115 days or follow the 3-3-3 formula. Pay attention to when the breast milk starts to leak out which is a sign of farrowing.

4.2.2 Transportation of pigs

- 1. Apply for an animal/carcass domestic transport permit to the District Livestock Offices at the origin and the destination.
- 2. After agreeing on the price and confirming the transaction, take a suitable transport vehicle to the pig nursery. Use 4WD pickups when the target area is high and not easily accessible.
- 3. Piglets should be healthy and ready to be transported in order to reduce loss.
- 4. In the case where the transportation distance is over 50 kilometres, every piglet needs to be injected with 0.3 cc of painkiller and 0.2 cc of antihistamine 30 minutes prior to departure time.
- 5. The appropriate time for pig transportation is early morning or in the evening when the weather is not too hot, and when there is enough sunlight for caretakers to observe piglets' behaviour during transport and immediately detect any arising problems.
- 6. A truck should accommodate not more than 50 piglets to prevent congestion that can cause stress and shock in piglets. But less than 50 piglets in a truck can mean high transportation cost.

- 7. Carpet the bottom of the cargo area with a 20-cm-thick layer of straw or yellow rice husk as an anti-slip cushion to prevent potential damage during transport. Straw and yellow rice husk must be sprayed wet with water to let off the heat from piglets' bodies.

4.2.3 Pre-distribution pig care

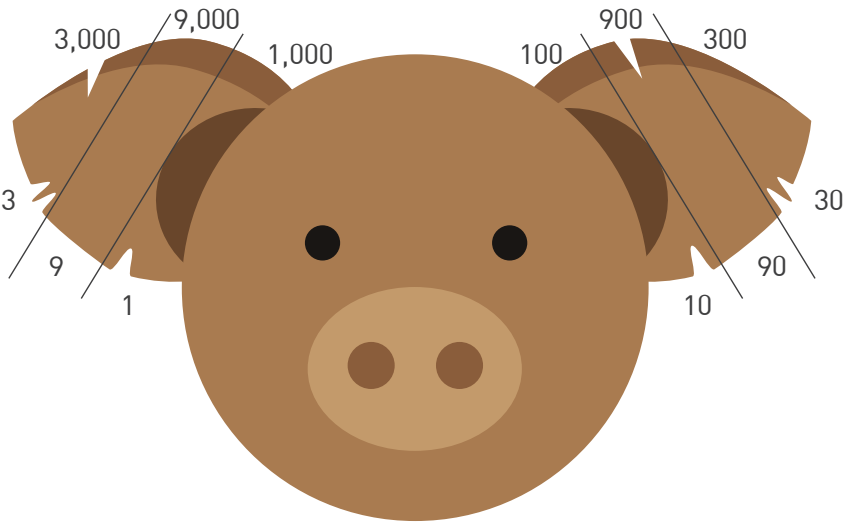
- 1. In the case when piglets that are to be transported come from different locations and/or the transportation takes longer than 1 day or is over 300 kilometres, there should be a nursery near the collection point where piglets can rest and familiarise themselves with a new environment for no less than 20 days before transporting to the destination. Too long distance can tire and cause shock in piglets.
- 2. Upon their arrival, the piglets must be put into a nursery for 7-10 days to rest and settle down. As a preparation before distribution, they will be fed with local food and injected with vitamins.
- 3. Make pig record before distribution for the ease of management in terms of vaccination, healthcare, and tracing of family lineage to prevent inbreeding in the future.

Making pig records

Making pig records is to fill details of each pig in a pig record form (see guidelines for documentation in the Appendix, 2. Documentation). The pig details include vaccination history, types of feed, and their family lineages, which will be highly useful for later management.

Conventional way of making pig records is notching the ear and recoding the weight, although implantation of microchips is more popular in the present day. A basic guideline for notching the ear is as follows:

- 1. Divide a pig ear into 3 equal sections vertically: base (no.1); middle (no.9); tip (no.3).



Picture 72
Example of ear-notching for the pig no. 3,977

- 2. The upper part of the right ear is for thousands.
The upper part of the left ear is for hundreds.
The lower part of the left ear is for tens.
The lower part of the right ear is for single numbers.
- 3. Ear-notching for the pig n.o. 3977 will be as follows:
3000 section: 1 cut and is therefore equivalent to 3000
900 section: 1 cut and is therefore equivalent to 900
30 section: 2 cuts/10 section: 1 cut and are therefore equivalent to 70
3 section: 2 cuts/1 section: 1 cut and are therefore equivalent to 7

There must not be more than 2 notches in each section. For example, notching for the pig no, 7,827 will be as follows:
3000 section: 2 cuts/1000 section: 1 cut and are therefore equivalent to 7000
300 section: 2 cuts/100 section: 2 cuts and are therefore equivalent to 800
10 section: 2 cuts and are therefore equivalent to 20
3 section: 2 cuts/1 section: 1 cut and are therefore equivalent to 7

- 4. Notch ears according to the running numbers.
- 5. After ear-notching, stop the bleeding and apply antibiotic ointment and anti-larvae powder to prevent flies from laying eggs on the wound, and then proceed to fill in the pig record.



Picture 73
First aid treatment after ear-notching before making pig record

4.3 Pig distribution mechanism

One of the key factors in rule compliance of pig recipients is to engage the community in rule making process from the beginning. Rules established by a community will be accepted by the community. Moreover, nobody knows the reality and geo-socioeconomic characteristics of an area better than the locals. Basic rules of a pig fund are as follows:

- 1. When a recipient receives a Meishan sow, s/he must return 3 piglets which are 45 days old or weigh between 8-15 kg to the fund within 3 years. The returned piglets must be healthy and have no disease.
- 2. A boar caretaker can keep 1 piglet from each litter as remuneration. The remuneration piglet will be collected when it is over 45 days old. For every 10 piglets collected, the

- caretaker must return 1 piglet which is over 45 days old or weigh between 8-15 kg to the fund within 3 years. The returned piglet must be healthy and have no diarrhea nor any disease.
- 3. The boar and the sow caretakers may make an agreement to make financial remuneration of 500 baht per 1 successful mating instead of a piglet.
- 4. When the breeding is unsuccessful, the boar caretaker cannot claim any piglet nor any remuneration.
- 5. The sows definitely cannot be sold, unless some adjustment is deemed appropriate by the development team, for example, when a sow is unhealthy and does not conceive at least 3 times, or when a sow is injured by an accident and can no longer perform her duty.
- 6. The sows must not be killed or consumed if the recipients have not returned all piglets to the fund, since the sows are still considered the projects assets. This also encourages the member's responsibility for self and their community.
- 7. When the breeder (boar and sow) dies, its caretaker member shall compensate the fund with a new pig of the same size, weight, and age within 1 week after the incident. The new pig can be distributed to either a new or old member according to the development team's approval and the member's intention. The project must be strict since this is the rule commonly agreed within the community from the beginning.
- 8. In the case that a boar or a sow dies of diseases under Animal Epidemic Act B.E.2558 (2015), such as hog cholera, foot-and-mouth disease (FMD), and brucellosis, the caretaker member needs not compensate for the loss to the fund.
- 9. After pig distribution, in the case when the project finds that a pig becomes unhealthy due to lack of appropriate care, the project reserves the right to reclaim the pig. Moreover, when the owner no longer wishes to raise the pig, the project can give the retrieved pig to another interested member after the project-funded treatment at the project's rehabilitation centre. If the owner wishes to continue raising the pig, the project can bring the pig to treatment at the rehabilitation centre. In this case, the expense must be fully covered by the caretaker member.



Picture 74

A local community member draws a ballot to receive pigs

The project usually started with distributing sows to 1/3 or 33% of all communities in the target areas in order to support the poor who really need to raise animals. This is also effective in terms of management and monitoring by livestock development volunteers. When the first batch of recipients take good care of pigs and comply with the fund's condition, that is, returning 3 piglets to the fund within 3 years, the fund can continue to distribute the returned piglets to the rest of interested individuals in the community within 3 years.

For fairness, the pig distribution was made in the form of ballot, since each pig was of different size. After the ballot was the recipient registration which entailed recording of handwriting, photo, and making records of pig handover for future reference.

4.4 Animal diseases and healthcare

Basic animal health observation might not help identify the disease, yet caretakers can separate the sick one from its herd to prevent the spread.

1. Observe the eye. If the eye is red and swollen and there is tear and gum in the eye, it can be assumed that sickness is caused by respiratory system or pneumonia.
2. Observe the body. If the hair is swollen and the body shaking, it can be assumed that the sickness is caused by changes in climate.
3. Observe the body balance. If a pig cannot walk straight and appears weak, it can be assumed that its overall health has issues.
4. If a pig does not walk around but simply lies still, it can be assumed that the pig might have been bitten by venomous insects, such as centipedes.
5. Observe faeces. If a pig has diarrhea or has mucus in its faeces, it can be assumed that its digestive system has issues.

4.4.1 Communicable diseases

1. Hog cholera

Cause : exposure to sewage, urine, and faeces of infected pigs, which is due to unclean shelters or virus carriers, such as birds, rats, insects, human beings, pets, and vehicles that come close to pig shelter area.

Symptom : The initial symptom is lethargy and loss of appetite. Later the conditions will worsen quickly, that is, high fever with rigor, sleeping in a pile, conjunctivitis, runny nose, watery eyes, paralysis, and violent seizures when it is close to death.

Treatment : After careful observation, separate the infected pig from its herd as soon as possible. Then call local vets or paravets to investigate the disease. If the pig is found to be infected with hog cholera, get rid of it right away and clean the pigsty thoroughly with caustic soda (sodium hydroxide) and detergent. Sprinkle lime (calcium carbonate) all over the pigsty to disinfect.

Consumption : Infected pork must not be consumed under any circumstances.

2. Foot-and-mouth disease (FMD)

Cause : viral infection from within pig shelters and/or from contaminated pig feed

Symptom : The symptom is similar to other diseases, that is, high fever and lethargy. With close observation, vesicles are found on nose, top of the claws, breast, and teats. There can be skin erosion or even cracks and splits in claw areas which prevent them from walking.

Treatment : FMD vaccination, keeping shelters clean and feeding with good food

Consumption : Infected pork must not be consumed under any circumstances.

3. Erysipelas

Cause : viral infection from within pig shelters and/or from contaminated pig feed

Symptom : inflamed joints which cause walking abnormality or uncoordinated leg movements, high fever, hiding their faces when sleeping, red eyes, possible eye sleep, refusing to eat, cough, runny nose, constipation followed by severe diarrhea, vomiting, swollen skin and urticaria-like red bumps also found in some cases.

Treatment : erysipelas vaccination, separation of infected animals, antibiotics. Deceased pigs should be buried in ground and clean the pigsty with caustic soda (sodium hydroxide).

Consumption : Infected pork must not be consumed under any circumstances.

4. Transmissible gastroenteritis

Cause : viral infection

Symptom : vomit, yellow to green diarrhea, severe dehydration, nearly 100% mortality in piglets, less mortality in sows and boars with possible abortion

Treatment : antibiotics injection for complications prevention, giving water and electrolyte fluids

Consumption : Infected pork must not be consumed under any circumstances.

5. Pseudorabies

Cause : Herpesvirus infection

Symptom : Abortion can occur throughout the entire period of pregnancy. Infected pigs may have high fever, vomit, diarrhea, become unstable, develop seizures, and die. The disease is asymptomatic which can be transmitted to piglets through breast milk. An infected piglet of over 6 months of age can show symptoms of coughing, sneezing, difficult breathing, irritation, with possible blindness.

Treatment : No treatment should be done. Infected pigs should be disposed of immediately.

Consumption : Infected pork must not be consumed under any circumstances.

4.4.2 Other diseases

1. Internal and external parasites

Cause : Pig raising ground is not kept clean regularly. Intake of food with parasite eggs.

Symptom : There are visible external parasites, such as ticks, lice, fleas, which cause irritation or scabies. Examples of internal parasites include giant roundworms and tapeworms which can cause deficiency in pigs' digestive system, less food intake, thin, slower growth rate than normal.

Treatment : prevention with deworming every 6 months

Consumption : Cook pork thoroughly before consumption.

2. Diarrhea in pigs

Cause : viral infection, changes in temperature, unclean food and shelter

Symptom : vomit, yellow to green diarrhea with strong smell. Diarrhea can cause as nearly as 100% mortality in newborn piglets within 3-4 days. Full grown pigs can self-recover in 7 days.

Treatment : There is no vaccine available. Strict food and water hygiene must be observed. Precaution of fecal contgion must also be taken.

Consumption : Cook pork thoroughly before consumption.

3. Pneumonia

Cause : Gram-negative bacteria infection

Symptom : acute, brief coughing, vomit, nose bleeding after coughing, quick death in finisher pigs, chornic, difficult breathing, breathing from stomach and mouth, dark ear tips

Treatment : Examples of effective medicine are gentamicin and amoxicillin which must be injected and taken consecutively for 2 weeks. Infected pigs must remain under veterinary care. Prevention can be made by 2 doses of vaccines in piglets (weaned for not less than 17 days) which can help reduce risks of contagion from their mother sows.

Consumption : Cook pork thoroughly before consumption.

4.4.3 Practices during sow pregnancy

1. Keep the pigsty dry. Do not spray water on pigs' bodies since pigs always lie down on their bodies and might cause an abortion.
2. Take good care of the pig feed. Do not give more than 2-2.5 kilograms of feed per pig per day since it will cause abnormalities during the embryo implantation and lead to an abortion.
3. Take good care of pigs' overall health and give enough water.
4. 3 weeks after mating, take good care of the pig feed and reduce the amount of feed 2 weeks before farrowing according to the amount of protein in the Picture 74. This will allow the sow to release excess off its body in order to provide more space for piglets in the womb to grow and be farrowed easily.

4.4.4 Practices during farrowing

1. If the farrowing is not normal, for example, when the duration is longer than 4 hours and farrowing assistance is needed, the sow must be given antibiotics with intramuscular injection for 3 consecutive days based on the dosage prescribed in the drug label.
2. Inject oxytocin in case of abnormal farrowing, that is, when the farrowing takes longer than 4 hours or when the placanta is retained.
3. When the piglets come out, observe whether the mother sow bites its piglets. Some mother sows might be under stress during farrowing and end up biting their own piglets. Caretakers must therefore keep an eye on the piglets. Wipe the piglets clean and separate them from their mothers until the farrowing is finished.

4.4.5 Newborn piglet nursing

1. Use a clean cloth to wipe mucus and membranes off the piglet's mouth to facilitate its respiratory system.
2. Ues a dry cloth to wipe mucus off the piglet's body.
3. The piglets' needle teeth must be clipped and ground right after farrowing. Their needle teeth are very sharp and might leave wounds on their mother sow's teats when breastfeeding. The wounds can cause inflammation and prevent the sow from breastfeeding. A pair of needle teeth is found at each of the front four corners of the piglets' jaws. Clip all of them close to the gum line and feel if there is still sny sharp edge left.
4. Every newborn piglet must drink colostrum from its mother sow within 48 hours after farrowing.
5. 2 days after farrowing, give 1 cc of iron to piglets with intramuscular injection in the neck or leg areas to prevent anemia which is caused by iron deficiency,

4.4.6 Postpartum piglet care

1. Clean the shelter everyday in the morning and evening. Keep the shelter dry and not humid to reduce infection in pigs' respiratory and digestive system.
2. Install 100w bulbs to increase light in the shelter during nursery. Leave the light on all night for 7 days in a row to reduce the piglets' stress. The light can also help increase the warmth and allow caretakers to look after the piglets more easily. The brightness in the shelter can be lowered after 7 days.
3. At night, cover the four sides of the shelter with plastic sheets to protect against the wind blow, rain, and keep the piglets warm. But this must be done when the shelter is located a well-ventilated area where wind can blow pass by.

4.5 Medicine and medical fund

Quality medicine is an important factor in keeping livestock healthy. Different target areas have different medicine, depending upon their types of livestock and local diseases. Types of livestock and local diseases in each target area can be identified when conducting a baseline survey in the initial phase of a project (see more details about the medicine in the Appendix, 1. List of medicine and equipment of livestock development volunteers). The key working principle is to ensure there is quality medicine in local communities for quality, timely, and affordable treatment of livestock, especially economic livestock of local communities. Quality, timely, and affordable livestock treatment will reduce animal mortality rates and contribute to good health of animals.

4.5.1 Medical fund

The project established medical funds to reduce mortality rates in pigs. The key principle is to allocate quality medicine to the target areas and ensure that there is personnel capable of using medicine for basic treatment. In the first year, the project provides full financial support to the medical fund, whereas livestock development volunteers operate the fund, keep a record of transactions, and provide basic treatment services. During this period, if the livestock development volunteers can provide good treatment services, local community members will have trust and see the benefits of the fund. They will also be willing to pay for medical fee, transportation and other service fees which are commonly agreed amongst their communities, for example, 10-20 baht based on distance. Most importantly, they will eventually become part of the community-led management of the medical fund.

4.6 Pig feed

Pigs that receive complete nutrients will grow well, gain a lot of weight, and have good health. This will reduce pig mortality rate, increase food produce per household, and generate more income to each family. In addition to providing appropriate amount of nutrients, such as protein, according to the pigs' age, the development team must consider developing feed formula from locally available ingredients or cost reduction formula to reduce animal feed cost, with which the pig fund can truly address poverty in rural areas.

The basic training on pig raising that the project gave to local communities also included the topic of animal feed preparation. Pig recipients must try preparing the feed to ensure that they can do it later by themselves.

Classification	Feeding period	Protein content (%)	Feeding amount (kg/1 day)
Boar	from selection at the age of 5-6 months	12-16	1.8-2.2
		11-14	2.2-3.1
Gilts	from selection at the age of 5-6 months	12-16	1.8-2.2
		11-14	2.2-3.1
	to mating	11-14	2.4-4.0
	Pre-mating at 7-9 months old	11-14	1.8-2.7
	Mating 3 weeks before mating	11-14	2.2-3.1
	Gestating increase by 0.5-1.0 kg during 3-5 weeks	13-16	2.7-4.0
Sows	before farrowing	12-15	1.5-1.8
		11-14	1.8-2.2
		13-15	5.0-6.8
	Lactating-rearing 3 weeks before weaning		
Milk replacer	only 3 weeks before weaning	20-24	Unrestricted
	Weaned pigs until 8 weeks old	18-20	Unrestricted
	F inisher pigs from 8 weeks old until selling	12-16	Unrestricted

Picture 74
Different feeding amount for pigs at different periods

In the project areas in Nan Province, the project distributed 1-month supply of thick feed to every pig recipient, or 10.5 kilograms of thick feed for 1 piglet, which was calculated based on the amount of thick feed that a piglet should take per day or 350 grams per a piglet per day. The pig recipients mixed the thick feed with the cost reduction formula at the proportion of 1 to 1, totaling 700 grams of feed per one piglet per day. It should be informed to the fund members that, even though this formula can keep pigs healthier and reduce pig mortality rates, it does not guarantee that every pig that feeds on this formula will be equally big and healthy. There are also other factors contributing to pigs' growth, such as health management, shelter cleanliness, external and internal deworming.

4.6.1 Cost reduction feed formula

Fermented banana trunk

Ingredients

- 1. Chopped banana trunk 50 kg
- 2. Brown sugar 2 kg or chopped sugar cane 20 kg
- 3. Salt (based on the amount of chopped banana trunk) 0.5 kg
- 4. 1 100-litre bucket or a large plastic bag

Steps

- 1. Chop banana trunk into small pieces (of the size that animals can easily feed on)
- 2. Mix chopped banana truck with peeled sugar cane or brown sugar and salt according to the fermentation proportion (100-4-1).
- 3. Put the mixture into the bucket or the large plastic bag.
- 4. Close the bucket lid or seal the bag tight to not let the air pass through.
- 5. Leave the mixture fermented for 7-10 days. Do not open the lid or the bag since it might let the air in. After 10 days the mixture can be fed to animals.

The recipe is a simple formula to use local plants to increase protein in animal feed. The fermentation process can increase as much as 5-7% of protein in the feed.

4.6.2 Pig feed adjustment

Pigs are static animals and generally stick to their routines. They must slowly and gradually adjust themselves to changes in living conditions and food. Otherwise, pigs might eat less and become weak.

Pig feed adjustment method

- 1. In the first 3 days after piglets' arrival, feed them with the same formula that they are used to.
- 2. On the fourth day, start feeding a mixture of the new (cost reduction formula) and the old formula at the proportion of 40 to 60.

- 3. Gradually increase the proportion of the new formula until the piglets can purely feed on the new formula within 7-10 days.

4.6.3 Establishment and management of the pig feed fund

Meishan pig feed fund is one of the success factors of Meishan pig raising, since it is a mechanism to ensure that pigs receive enough nutrients and therefore increase the number of pigs with average weight. It also reduces animal food cost and promotes effective community-led resource management.

Principles of the pig feed fund

In order for the fund to be sustainable and self-supporting, local communities must truly understand and see the benefits of the fund. The project can create understanding amongst local communities by explaining the differences between having and not having an animal feed fund. It must be pointed out that the fund does not give away but sell animal feed (cost reduction formula) to local communities at a price cheaper than the market. The fund aims to help reduce the communities' household expenses and be a common market where people can come to sell their excess of agricultural produce (ingredients for pig feed).

The project provides initial capital to set up the fund and transfer the knowledge of pig feed preparation to pig recipients. The fund can become self-supporting through sale of pig feed to the fund members.

Steps to establishment of the Meishan pig feed fund

- 1. Create understanding amongst pig recipients regarding causes and problems of diseases in pigs and extra cost from ready-made pig feed. Point out the benefits and nutrients in Meishan pig feed and the return they will get within 1-3 years after the pig feed fund is set up.
- 2. Conduct a survey to verify whether the animal feed used in the project area is suitable and test the community readiness in establishing a pig feed fund.

- 3. Analyse, create a work plan, and assess the scale of the fund based on the number of pigs in the project area which will be used to calculate for the first purchase of thick feed. The calculation is — a 45-day-old pig needs 350 grams of feed which contains 17% of protein daily. Therefore, within 1 month, a pig will need 10.5 kilograms of pig feed.
- 4. Prepare a suitable location for feed preparation and storage, that is, a big and clean patio for mixing and a shelter to store feed ingredients, thick feed, and ready-made cost reduction formula. The storage shelter should come with a roof, good ventilation, and a strong fence line to prevent animals from breaking in. The stored items should be shelved to prevent humidity from the ground.
- 5. The thick feed ingredients should not be stored in an area with high humidity longer than 1 month. Otherwise it can become molded.



Picture 75
A livestock feed storage in a community



Picture 76

A community's livestock feed fund

Selection of pig feed fund working group members

The pig feed fund working group members can be the same group of people as the pig fund's. The pig feed fund, however, must entail the position of animal feed representative. The animal feed representative is a local community member who wishes to be the representative and chosen by the committee and pig recipients. The representative must also sign a contract with the fund.

The responsibilities of the animal feed representative are: procuring animal feed ingredients; announcing ingredient buying prices by putting up a sign in front of the fund's office; controlling preparation of nutritionally complete formula and appropriate selling prices; announcing selling prices of cost reduction formula; maintaining

record of incoming and outgoing ingredients to report to the fund's members and the project; operating and evaluating the fund.

Fund management

- Animal feed price setting: Calculate the overall cost (based on the market price) per 1 kilogram and the fund will make a profit at 2 baht per 1 kilogram.
- Monitoring of the feed fund income and expense: The fund's advisor monitors income and expense of the feed fund.

Monitoring and evaluation

1. Organise a meeting between the fund committee and members once a week. Any emergency, such as an accident or an urgent health issue, must be informed to the committee and members immediately.
2. Inquire about problems and needs of the community. Since each target area has its own context, it is important to exchange knowledge and opinion with the community members to learn different techniques and their problems and needs.
3. Elaborate on the fund's budget earned from pig feed to all the members in every meeting, or when a member wishes to receive the information.

4.7 Shelter

Another success factor of pig raising is a clean shelter and a proper manager which is in accordance with the principles of animal husbandry, since it can provide basic protection against transmissible animal diseases.

One of the pig recipient selection criteria is, the recipient must build a shelter that is in accordance with the principles of animal husbandry as a preparation for pig distribution. This also demonstrates how enthusiastic the recipient is. However, if a recipient truly needs pigs, but lack capital, such as cement or sand, to build a shelter, the project is ready to

support with tools and materials, which the recipient can return in the form of money or piglets as initially agreed after the recipient's sow produces offsprings.

The project first gives training on sanitary and easy-care shelters, after which the recipients build or adjust their shelters accordingly before pig distribution. The development team and livestock development volunteers will also inspect the shelter condition of each recipient to prevent potential diseases and reduce loss occurred from lack of knowledge and understanding.

4.7.1 Shelter building

A proper shelter does not require a lot of capital. It can be built from locally available materials or adapted from the area's geographical features to reduce cost. For example, opt for thatch instead of tile when making a rood, or use local wood materials to make a fence.

Cautions in shelter building

- 1. The shelter should be slightly elevated from the ground to give space for drainage pipes.
- 2. The shelter should be located east-west to allow the sun to shine through.
- 3. The shelter should be approximately 20 metres away from the residential area to prevent zoonosis diseases, for example, FMD, anthrax, and external parasites such as fleas, ticks, and lice.
- 4. The shelter must include proper food and water managers.
- 5. The size of a shelter for 2 pigs should be 1.2-metre wide, 3-metre long, and 1-metre high.

Types of shelters

There are 2 types of shelters of pigsties : the elevated shelter and the non-elevated shelter.

• Elevated shelter

An elevated shelter is a shelter that is built 50 cm above the ground. The strength of an elevated shelter is it can drain sewage, such as water, pig manure, and food waste, which will always keep the shelter dry and prevent other animals, such as snakes or centipedes, from crawling in the shelter.



Picture 77

An elevated shelter allows the caretaker to easily rinse off pig manure and clean the shelter. It also prevents potential danger from small animals and insects.

• Non-elevated shelter

A non-elevated shelter must be built with approximately 25-degree inclination and cemented floor to drain water and sewage off the shelter.

In the case of a large shelter, that is, a shelter with over 10 pigs, there should be a wastewater treatment pond and concrete drainage pipes located 10-20 metres away from the shelter to prevent against transmissible diseases. The pond size depends

on how the pigs excrete waste and the amount of wastewater from pigsty cleaning. The pond should be 3 times larger than the pig waste. It should be noted that a pig excretes 3-5 litres of waste per day, and wastewater from pigsty cleaning is 20 litres per a pig per day.



Picture 78

A non-elevated shelter allows the caretaker to maintain cleanliness of the shelter. It also prevents potential danger from diseases on the ground and can easily control humidity.

4.7.2 Shelter cleaning and waste disposal

The key principle of pigsty management is to always bear in mind that animals are not different from human beings. Animals need lodging that is safe, clean, and comfortable. Keeping this in mind, caretakers will pay attention to animals and properly manage their sties.

A pigsty should be cleaned twice a day or in the morning and evening. Cleaning can be done by a besom. A brush can also be used if a besom alone is not clean enough. Or if the shelter is open-air and can be reached by sunlight, the shelter floor can be sprayed clean with high pressure water. Be careful not to spray the water directly to the pigs. In winter and rainy season, the cleaning should be done from 10 am onwards so that the shelter can get dry easily and cause no harm to pigs' health.

4.7.3 Shelter inspection

The development team and livestock development volunteers shall inspect whether every pig recipient has a shelter that meets the commonly agreed criteria. Regular inspection should be done after pig distribution.

Shelter inspection criteria

- 1. The shelter floor is not damaged nor rugged, which can cause dirt and animal waste to pile up.
- 2. The shelter roof is in a good condition and has no leakage.
- 3. The fence is strong.
- 4. The shelter is clean and tidy. Animal waste is properly put away.
- 5. The smell does not reach the area outside the shelter.

4.8 Monitoring and evaluation towards sustainable development

4.8.1 Monitoring and evaluation system

- 1. Create a community visit plan to oversee the overall activities, share knowledge, and solve any arising problems in the community once a week.
- 2. Provide training to pig recipients once in every 6 months. In the case of epidemic, knowledge and prevention measures must be communicated to the community immediately to reduce loss.

- 3. Visit and talk to pig recipients about their problems. Be mindful to choose appropriate visit time when the recipients are available. For example, the team should not visit the recipients during the daytime since they usually go out to work in their famrs. The team should visit them in the early morning or in the evening after they return from their work.
- 4. Organise the community's livestock development team meeting once a week, or when there is an emergency, such as an epidemic which cause unidentified death pigs, and always do weekly report.
- 5. Record encountered problems and solutions as references for future use. The records can also be shared as an exchange of knowledge with other project areas which have different sets of problems.
- 6. Keep in touch and report to the District and Provincial Livestock Offices on a regular basis.



Picture 79
Careful animal transportation to avoid any potential harm to animals



Picture 80
Caretakers for goat transportation

4.8.2 Establishment of the pig fund committee

Selection of the pig fund committee

The committee has duties to maintain the fund’s rules, regulations, conditions, and ensure that the fund members’ compliance to the rules, regulations, and conditions set up by the community. The committee is selected by the pig recipients or the fund’s members. The development team acts as the Advisor in the initial phase in order for the community to own and manage the fund by itself. Moreover, the local leader and the government’s representative are also part of the committee in order to keep the leader and the relevant government agencies informed of the fund’s activities.

The pig fund committee

Title	Qualifications	Selection	Duties
1. Chairperson	Pig reicipient who does not hold any position in the government	Selected by members	Leads the committee meetings
2. Deputy Chairperson	Pig reicipient who does not hold any position in the government	Selected by the Chairperson	Assists the Chairperson and stands in when the Chairperson is away
3. Secretary	Pig reicipient who does not hold any position in the government	Selected by members	Keeps records of the fund’s information
4. Treasurer	Pig reicipient who does not hold any position in the government	Selected by members	Keeps records of the fund’s financial information
5. Member 1	Pig recipient	Selected by members	Suggests, follows up, coordinates, and supports the fund’s activities

Title	Qualifications	Selection	Duties
6. Member 2	Pig recipient	Selected by members	Suggests, follows up, coordinates, and supports the fund's activities
7. Member 3	Local leader	Selected by members	Suggests, follows up, coordinates, and supports the fund's activities
8. Member 4	Government's representative	Selected by members	Suggests, follows up, coordinates, and supports the fund's activities
9. Advisor 1	Livestock development volunteer	Selected by members	Suggests, follows up, coordinates, and supports the fund's activities
10. Advisor 2	Livestock development volunteer	Selected by members	Suggests, follows up, coordinates, and supports the fund's activities

4.8.3 Establishment of the pig rehabilitation centre

Even though the community receives training on animal care and shelter maintenance as well as there are inspections at the members' household before pig distribution, pig health issues can arise after distribution. Post-distribution monitoring is thus necessary. If pigs are ill or have severe diseases, there must be a “rahabilitation centre” where recipients can leave their pigs under temporary care of the development team and livestock development volunteers. When transporting pigs to the rehabilitation centre, be mindful not to visit or stop by to treat other pigs to avoid transmission of diseases.

The pig rehabilitation centre should be located at the pig fund’s office. The project supports the construction, looks for the location, and oversees all the activities. The project’s veterinarians and livestock development volunteers are responsible for

close care of animals, animal feed, and cleanliness of the centre. Treatment of an ill pig takes approximately 7-30 days (might take longer in some cases depending upon complications during treatment). The pig owner must pay for the treatment fee during the pig’s stay at the centre. This is to create the sense of ownership of the owner and give the working capital for management of the centre. The treatment fee is 20 baht per day, accounting for 13 baht of animal feed and 7 baht of labour fee. Medicine, which comes form the medical fund, is free of charge. The treatment fee is used as the working capital for management of the centre. In the case when a pig dies during its stay at the centre, the project must inform the owner and inquire whether the owner is still interested in raising another one.

Conclusion

A project to solve the problems of poverty and improve the life quality in a target area must start from a thorough geo-socioeconomic study of the area, that is, socioeconomic and geographic information gained from socio-economic and ground survey, listening to the local people, and talking to the community to understand the community’s natural capital, problems, and livelihood potential. After gaining understanding of the area’s context, a development practitioner will see what potential can be promoted, what important activities are lacking and within the community’s capacity to develop. Based on the aforementioned information and consideration, holistic development can begin as can be seen at the MFLF’s holistic livestock development work in Yen-an Chaung Township, Magway Region, Republic of the Union of Myanmar; Pang Mahan Village, Thoet Thai Subdistrict, Mae Fah Luang District, Chiang Rai Province; Tha Wang Pha, Song Khwae, and Chalermprakiet Districts in Nan Province.

The key principle of successful holistic livestock development is ensuring that skills, knowledge, medicine, animal feed, and other supporting tools and mechanism are ready and available in the community. This can be done by building livestock development volunteers; preparing pig recipients; building proper pig shelters; establishing a medical fund, animal feed fund, and a just and effective distribution and management mechanism in the community.

In the initial phase, the holistic livestock development project focuses on an uplift in the community’s income and life quality. In the following phase, the project must be scaled up towards sustainability which entails, for example, a community-led animal healthcare management and monitoring mechanism, transfer of knowledge to younger generations, and exchange of knowledge and experiences with other communities.

Appendix

1. List of medicine and equipment of livestock development volunteers

1.1 Antibiotics

Brand name : Limoxin-200

Active ingredients : Oxytetracycline (1 cc of drug contains 200 mg of oxytetracycline)

Benefits : Used for arthritis, gastrointestinal, and respiratory bacterial infections in calves, cattle, goats, sheep, and swine, since this medicine kills the bacteria.



100 cc solution for injection
(Limoxin-200, 2020, 7 July)

Brand name : Penstrep-400

Active ingredients : Procaine pen G + Dihydrostrep-tomycin (1 cc solution contains 200000 IU procaine penicillin G and 200 mg dihydrostreptomycin sulphate)

Benefits : Used for arthritis, mastitis and gastrointes-tinal, respiratory and urinary tract infections in calves, cattle, goats, sheep, and swine.



100 cc solution for injection
(Penstrep-400, 2020, 7 July)

Brand name : Interflox-100

Active ingredients : Enrofloxacin (1 cc solution contains 100 mg enrofloxacin)

Benefits :Used for gastrointestinal, respiratory, and urinary tract infections in calves, cattle, goats, sheep, and swine.



100 cc solution for injection
(Interflox-100, 2020, 7 July)

Brand name : Metamizol 500

Active ingredients : Metamizole (1 cc solution contains 250 mg metamizole)

Benefits : Used for fever reliever, anti-inflammation, and spasm reliever effects.



100 cc solution for injection

Brand name : Biocillin-150 LA

Active ingredients : Amoxicillin (1 cc solution contains 150 mg amoxicillin)

Benefits : Used for gastrointestinal, respiratory and urinary tract bacterial infections in calves, cattle, goats, sheep, and swine



100 cc solution for injection
(LV Biocillin-150 LA, 2020, 7 July)

Brand name : Genta-100

Active ingredients : Gentamycin (1 cc solution contains 100 mg gentamycin)

Benefits : Used for typhoid, pasteurellosis, pneumonia, urethritis, and urinary tract infections



100 cc solution for injection
(Genta-100, 2020, 7 July)

Brand name : Biomycin-M

Active ingredients : Amoxicillin trihydrate + Neomycin sulphate (1 cc contains 100 mg amoxicillin and 50 mg neomycin)

Benefits : Used for teat infections in animals



Syringe
(Biomycin-M, 2020, 7 July)

Spray bottle

Brand name : Limoxin-25 Spray

Active ingredients : Oxytetracycline hydrochloride + Gentian violet (1 cc solution contains 25 mg oxytetracycline hydrochloride and 5 mg gentian violet)

Benefits : Spray on externally wounded skin or paws to prevent and kill bacteria. Clean the wound before spraying for higher effectiveness.



Spray bottle
(Limoxin-25 Spray , 2020, 7 July)

1.2 Vitamins

Brand name : Introvit

Active ingredients : 12 kinds of vitamin and amino acids

Benefits : Prevention or treatment of vitamin or amino acid deficiencies in animals and stress (caused by vaccination, transport, temperature changes); appetite stimulation and balancing level of vitamins in animals



100 cc solution for injection
(Introvit, 2020, 7 July)

Brand name : Vitol -140

Active ingredients : Vit A + Vit D3 + Vit E (1 cc solution contains 80000 IU Vitamin A, 40000 IU Vitamin D, and 20 mg Vitamin E)

Benefits : Prevention or treatment of Vitamins A, D, and E deficiencies in animals and stress (caused by vaccination, transport, temperature changes); appetite stimulation and balancing level of vitamins in animals



100 cc solution for injection
(Vitol -140, 2020, 7 July)

1.3 Other medicines

Brand name : Oxytocin

Active ingredients : Oxytocin (1 cc solution contains 100 IU oxytocin)

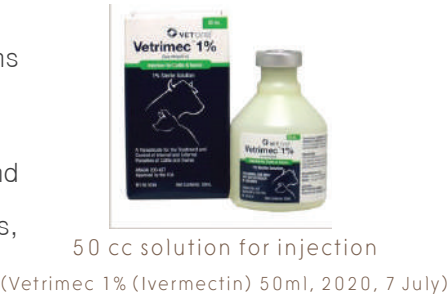
Benefits : Used to induce labour, release retained placenta, and stimulate breast milk production



Brand name : Ivermectin

Active ingredients : Ivermectin (1 cc solution contains 10 mg ivermectin)

Benefits : Treatment of roundworm in intestine and lungs, lice, fleas leprosy in calves, cattle, goats, sheep, and swine



Brand name : Bio-Dexa

Active ingredients : Dexamethasone (1 cc solution contains 150 mg dexamethasone)

Benefits : Used for severe inflammation, dry lactation, liver failure, high ketone levels, and septic shock



Notes : mg is an abbreviation for milligram
cc is an abbreviation for cubic centimetre, it is equal to millilitre.

1.4 Tools

Name :Needles - the sizes that are mostly used in animal husbandry are 18, 20, 21, and 22.

Usage : Pierce through the skin to give medicine or collect blood sample.



Name : Syringes in a variety of sizes - 1, 5,10, 20 cc for instance.

Usage : Contain solution or medicine



Name : Handle and blades - blades that are mostly used in animal husbandry are the sizes 21 and 22.

Usage : For surgical operations or cut through animal tissues



Name : Trocar and canular

Usage : Emergency bloat curing by passing them through the skin to release trapped gas



Appendix 2

Documentation

2.1 The Goat Bank Project's documentation forms

2.1.1 Vaccination report

[illegible]

2.1.2 Documentation of the number of the project's goats

[illegible]

2.1.3 Number of registered goats

[illegible]

2.1.4 Livestock mortality rate

[illegible]

2.1.5 Cause of death record

[illegible]

2.1.6 Treatment report

No.	Diseases	Number of treatment						Percentage					
		Cattle	Non-project goats	Goat bank goat	Sheep	Plg	Total	Cattle	Non-project goats	Goat bank goat	Sheep	Plg	Total
	Total												

2.2 Medical fund’s documentation forms

2.2.1 Village medical fund record

Income	Year	Income			Expense	Cash balance	Remarks
	Month	Medicine price	Fund	Vaccination fund			
	Year 20 Opening Cash						
1	January						
2	February						
3	March						
4	April						
5	May						
6	June						
7	July						
8	August						
9	September						
10	October						
11	November						
12	December						
Total							

2.2.2 Medical fund (monthly)

No.	No. of the village	Village	Investment	Year 20.....												Total	Remarks
				January	February	March	April	May	June	July	August	September	October	November	December		
1																	
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	
Total																	

2.2.3 Summary of medical fund records

No.	Area	Village	Year 20.....		
			Fund balance	Medicine cost balance (village)	Total
Total					

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with Mae Fah Luang Model:
Holistic Livestock Development

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"What works, record it
for use as a guide in the future.
Whatever is a failure,
record it as well, so as not to repeat it."

King Bhumbol Adulyadej

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Handwriting practice lines on page 140.

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Handwriting practice area with 20 horizontal dotted lines.