

## Project Implementation Review Report Rice and Livestock Farming System Project

### *Background*

The Rice and Livestock Farming System Project (RLFS) at Payakkaphum Pisai District of Mahasarakham Province, Northeastern of Thailand is a special project focusing on agricultural research and development with the collaboration of 3 related organizations namely; CIAT, Faculty of Agriculture- Khon Kaen University (KKU) and World Vision Foundation of Thailand (WVFT). It is funded by ACIAR, who have commissioned World Vision Australia for the overall project management.

The project began in 1 March 2008 in the target communities of 8 villages in 4 sub-districts, Tambol Mek Dum, Tambol Lan Sakae, Tambol Para-And and Tambol Nasinuan of the Payakkaphum Pisai District, Mahasarakham Province. It was due to be completed on 28 February 2011 but was granted a no-cost extension until 30 June 2011 and, most recently, a costed extension through until December 31 2011.

Implementation has been undertaken in cooperation with the Nasinuan ADP by working with selected target farmers who are interested in taking part in the project. These farmers are families of sponsored children in Nasinuan ADP and other families who are members of the Supanimit Mahasarakham Agriculture Cooperative Ltd. Its focus has been to introduce new technologies to target households with the objective that these farmers and the wider community would adopt the improved technologies and invest in them with their own capital, or using loans from the co-operative and elsewhere.

The project has three goals: to optimize and maintain rice yield, improve the profitability of beef cattle and develop the research capacity of the project partners/collaborators. Its efforts to achieve each of these goals are described below:

**Project Goal 1:** To optimize and maintain rice yields through addressing production constraints factors of low fertility soil, soil and water management, seeding rate, and weed management in the rice field of the target farmers.

Indicator: 90% of the 263 target households in the target area from the total of 715 households in 13 clusters of 8 villages in 4 sub-districts of Payakkaphum Pisai District, Mahasarakham Province developed their rain-fed rice farming system appropriately to the environment of the communities.

Results: More than 263 households have participated in the project activities. A group of 50 households have practiced all the methods and steps instructed by the project. Others have followed some steps but have differed from the project's instructions for other steps in order to deal with specific conditions such as droughts, floods, pests or weeds. Some of the promoted techniques and methods needed to be varied in order to fit with the varied growing conditions that they faced each year. It should also be acknowledged that without financial support farmers tend to return to the traditional methods because applying the recommended technologies often requires additional capital investment.

Outcome 1: Farmers improve rice yields and increase income from their products.

Indicator: 90% of 263 target households applied the recommended technologies of rice farming and increased rice production and household income.

Results: Farmers have some knowledge and understanding of the demonstrated rice farming technologies. They can apply some recommended techniques fully but are not able to apply some others due such factors as insufficient water. Rice yields increased for the majority of farmers who applied the recommended technologies.

Output 1.1: Project commencement workshop completed

Indicator: 100% of the workshop participants understand the objectives of the project implementation and give appropriate opinions.

Results: It is found that some representatives from the Farmers' Groups could not clearly share their opinions as they had limited understanding of the project objectives.

Output 1.2: Baseline information on households and communities in the project target areas obtained.

Indicator: 100% of target farmers have been interviewed and baseline data collected for processing and available at the project office.

Results: The household baseline survey has been undertaken, data has been processed and the survey report has been submitted. However, some topics and issues for data collection differed from the indicators in the project's logical framework.

Output 1.3: Trial on rice seeding rate

Indicator: Undertake the study and trial on seeding rate prior to recommending to the farmers to apply in their rice farming.

Results: Two rice varieties, KDML-105 and RD33 have been used for study and trial. Some characteristics of these 2 varieties are different in terms of seeding timing and condition of soil. However the trial has been done at the same time and in the same plot areas of the project instead of treating each variety differently based on its characteristics. The trial was unable to demonstrate differences in the results of the two varieties.

Output 1.4: Activities of Farmer School on soil and weed management

Indicator: 90% of target farmers applied the techniques learned from the Farmer School activities in their rice farming in the area of soil and weed management.

Results: Target farmers have followed the techniques learned from the Farmer School activities with support and monitoring from the project. However, a number of target farmers have gone back to do the traditional method of rice cultivation. Farmers have learned that row seeding rice crop will face the long-leaf Paspalum or Ischaemum aristatum weed invasion, but none of this problem occurred in the transplanted rice crop. However, in dry conditions they are prepared to apply the row-seeding techniques even without support from the project.

Farmers agreed that the cultivator machine was the most appropriate for row-planting, thereby reducing weed incursion, however they stated that it required a lot of capital investment and they did not yet have the skills to operate it. They were most interested in any simple, low-cost techniques which could improve their yield with minimal investment.

#### Output 1.5: Amelioration of soil through fertilizer application

Indicator: 90% of target farmers able to apply proper fertilizer to ameliorate their land soil.

Results: The project has supported the target farmers with 2 formulas of fertilizer, the 16-16-8 and 46-0-0. The fertilizer 46-0-0 should be applied while doing soil preparation prior to rice transplanting. The fertilizer 16-16-8 needs to be applied twice, first during the tillering period or 1 week after transplanting, and then a second time in September or prior to the panicle initiation period. Farmers related that they use 16-16-8 it is more suitable for their sandy soils. The project has also supported the making of bio-organic fertilizer for rehabilitating the soil, including using cover crops such as legumes to incorporate into the soil.

Only a few farmers made their own fertilizer, mostly bringing farmyard manure directly to the farm. Farmers did not make compost, they just mixed farmyard manure with rice husks and brought the mixture directly to the farm. They were most interested in the green manure crop called African sesbania because they believed that it could ameliorate salt-affected soil.

#### Output 1.6: Farmers' knowledge improved on rice cultivation and livestock production

Indicator: 90% of target farmers' knowledge improved through participation in the training and field study trip activities and are able to apply this to rice cultivation and livestock production.

Results: Rice cultivation and livestock raising have been the way of life for this farming community for generations. The training and orientation served to strengthen, enhance and modify this basic knowledge. If the rains begin to come later in the year due to climate change then the farmers will sow later and apply rice transplanting because without rain the RD33 variety is damaged by rice borer and KDML-105 faces thrip caused the rice blast. These diseases can be treated by chemical pesticides but farmers rarely use chemicals because they are unsure of the formula to use and are aware of the negative impacts of chemicals.

Livestock farming is useful as part of the system because at least the animal manure can be used for rice cultivation and the compost fertilizer can be made available.

In summary, target farmers have improved and gained knowledge on rice cultivation and know how to choose the method and variety most suitable to their own conditions that would help reducing investment cost and also increasing yield. In the livestock area, farmers have also improved and gained knowledge in keeping their livestock and choosing the most suitable forage variety for their cultivating area. They also learnt how to raise cattle in a way to achieve a higher price when the cattle are sold. They would have liked to have learnt more about how to use manure and compost fertilizer on their crops, as well as prevention of cattle disease.

#### *Summary of farmers' opinions and recommendations on the rice farming*

1. The need of farmers at this point is water sources. Since each household possesses a limited farm area and is unable to dig a big pond to store water, an artesian bore for agriculture would be the best solution. In the nearby village of like Baan Hnong Kaen Pattana, Nasinuan Sub-district, farmers invested around Baht10,000 for an artesian bore that provided sufficient water for their cultivation. The farmers advised that if the bore is not deep enough the water would be saline. Generally the bores would need to go deeper to reach fresh water, although this depends on the local terrain. Dr, Boonrat Jongdee advised that surveys for artesian bores can be carried out by the Department of Water Resources and need to follow official procedures.
2. Farmers collected rice seeds for growing in the next season by harvesting by hand. The following season they found that the RD33 rice crop does not blossom at the same time as KDML-105. This would be indicated that the RD33 rice variety seed planted in the earlier season bought from the source that has not obtained the pure seed directly from the Ubol Rice Research Center. The seed varieties used for extension are the improved varieties grown by the Rice Research Centers and the Department of Rice gives instruction for extension to farmers for cultivation. These seeds are grown in the demonstration plots of the Rice Research Centers and of the members of the farmer networks who strictly follow the instructions of the Rice Research Centers in transferring the seeds from the demonstration plots to the Seed Multiplication Center of the Department of Rice, where the seeds are packed and sold to farmers for cultivation. The reason for supporting the farmer networks with seed multiplication is because the Rice Research Centers are not able to produce enough improved variety seeds to all the farmers who need it and this may cause other seeds to be mixed in with the new seed varieties.
3. Farmers found that growing legumes as a cover crop resulted in increased rice yields and a reduction in the use of fertilizer by 50%. Mr. Kiatisak Pravai suggested that farmers could work as a group to grow legumes in order to earn additional income as well as produce green manure for soil amelioration. Farmers agreed that this kind of group can be organized.
4. Farmers don't know how to diagnose and eradicate rice diseases and pests and would be grateful for any advice they receive on this.
5. Farmers prefer to use 46-0-0 fertilizer for soil preparation, even though this is not the technology recommended by the project. In the on-farm trial, farmers found

that the 46-0-0 variety was better for sandy, loam soil than 16-16-8 and it can be applied repeatedly.

6. In general, there were comments from farmers that the weed in the broadcasting rice crop spread rapidly and was difficult to eradicate, compared with the row planted rice crop, where there were significantly fewer weeds and they were easier to handle. By row planting we mean row planting by the machine of URRC after broadcast seeding.

**Project Goal 2:** To improve the profitability of the beef cattle component of the system through better nutrition and health management.

Indicator: 90% of the 136 target households in the target area from the total of 715 households in 13 clusters of 8 villages in 4 sub-districts of Payakkaphum Pisai District, Mahasarakham Province improve their livestock farming incorporation with the rain-fed rice cultivation appropriately.

Results: Farmers are able to compare and see the benefits of raising cattle by applying the recommended technology by the project and the traditional method of allow freely grazing. The growth rate and the duration of fattening are used as indicators to make a comparison with traditional methods, which farmers found very helpful. The needs for long-term solutions are including the availability of supplementary feed and maintaining the developed process with expansion. In summary, responses from the target farmers indicated that applying the recommended technology made their cattle raising more profitable.

Outcome 2: Farmers improve their livestock management system

Indicator: 90% of 136 target farmers well equipped to undertake the livestock as livelihood to generate household income.

Results: Farmers have improved their knowledge and understanding in keeping livestock and have applied recommended techniques well, and able to make income currently increased. However other positive factors are also important, such as the area for forage cultivation, because some farmers able to generate income from selling fresh forage, even in a small number. For this method to be more profitable than the traditional method, a household needs to fatten at least 3 cattle.

Output 2.1: Better production of forages

Indicator: 90% of target farmers have knowledge of forage cultivation and able to manage their own forage plantation plot.

Results: Target farmers have sufficient knowledge on the forage, cultivation technology and handling of the product through the provided training and field study trip activities. They are able to indicate the suitable condition for each forage variety provided by the project and some farmers have begun to grow forage without the project's support. The growing of other crops for supplementary feed has also been supported such as cassava and peanut. However, it was not continued due to the amount of time and care required to grow peanuts, the unsuitable soil conditions and the problem of insects damaging the peanuts. Making hay from rice straw has been

demonstrated, however farmers do not prefer to make hay compressed bundle because it needs to have storehouse to keep them, making haycock instead.

Farmers also commented that there was insufficient water for forage cultivation in the dry season and that silage made for the dry season is still not sufficient. The farmers want to learn the best method for producing silage to support cattle feed in the dry season.

#### Output 2.2: Improve cattle management and health system

Indicator: 90% of target farmers are able to manage their cattle raising and manage animal health care appropriately.

Results: Farmers have been able to practice most of what has been learned from the training and field study activities provided by the project, except in the area of using medicine, for which the local government veterinarians provide support. They raised the need to train one or two farmers in each group to do vaccinations, treatment as well as artificial insemination for the group's cattle. This would be very helpful to the group and the project in terms of effectiveness and sustainability.

#### *Summary of farmers' opinions and recommendations on livestock farming.*

1. Farmers prefer to have their cattle bred by artificial insemination with good breeds. It costs 30,000 baht for each artificial insemination. The most preferred breed is the Brahman.
2. Farmers would like to learn more on animal care and sanitation.
3. Some farmers will continue to apply the recommended techniques. However this will depend on the economic conditions of each household as they need to have the confidence to be able to invest in good breeds and have an area available for forage cultivation. Farmers who have attended the training and have put the methods into practice already will have more confidence to invest.
4. Farmers are confident that the government agency will help them with artificial insemination and veterinary care but would still like to learn more and receive advice on animal care and sanitation.
5. Cattle feed; Cassava leaves and tubers are the preferred form of supplementary feed. Feeding the cattle with cassava leaves and tubers has resulted in a rapid weight gain with good body condition and shape.

**Project Goal 3:** Support research of post-graduate students from KKU on the agricultural problems and on the working improvement of project personnel with farmers in the community.

Indicator: 100% of post-graduate students, project and partner organizations personnel are able to develop their knowledge and skills in agriculture and able to work with target farmer groups in their problem solving process.

Results: Workshop sessions have been organized to select target farmers participation with post-graduate students and personnel of the project and of partner agencies. The lessons learned from the sessions have been shared to the farmer group members in the communities, the application has been undertaken. However, the lessons are still limited due to time constraints for data collection. Only target farmers of the project area shared their knowledge with neighbours. A higher level of technical and knowledge sharing is still very much needed.

Outcome 3: Capacity of project partners/collaborators developed through working together

Indicator: Partners/collaborators are developed to be ready to work together in solving the target farmers' problems

Results:

The result of the project evaluation on the capacity development of the partners/collaborators indicated that the partners/collaborators of the project including the project advisory team and the post graduate students all have the necessary knowledge and skills on agronomy but still lack some skills in working closely with farmers and analysing the results. This might be because of the project advisory team has many responsibilities and the post graduate students concentrated and spent their time in studying and have not taken the results of the project implementation into the research study as specified in the project goal.

Output 3.1: Skills developed in working with farming communities

Indicator: Partners/collaborator has sufficient and relevant information and techniques to be given to the target farmers that could be applied effectively in their practices.

Results: The information and technologies introduced to target farmers are quite sound and relevant, applicable to the current conditions and farmers are satisfied with what they have learned and practiced. The technologies need to be simplified and contextualized so they are easier for the target communities to apply, which would enable them to be applied more widely.

Output 3.2: Skills developed and fostering farmer-centered trials of technical solutions

Indicator: 90% of target farmers participated in the demonstration and trial activities of the crop and livestock farming to learn the problems, solutions and options in doing agricultural livelihood.

Results: All target farmers have participated by allocating a land area of 1-2 rai to do the on-farm demonstration and trial of various techniques of the rice, other crops, forage livestock raising. This has provided lessons, solutions and alternative techniques for the participating farmers. More help is needed in technical problems such as eradicating pests and diseases.

### **Summary of staff opinions and recommendations on implementation of the upcoming project:**

A meeting was held on March 11 to solicit the opinions of staff on the project implementation. The outcome of the meeting is summarised below:

1. There should be a greater emphasis on a bottom-up approach, where farmers have more say on what they wish to test with support from the advisors rather than only doing what the advisors advise them to do because the materials are provided for these activities.
2. The planning meetings should result in final decisions/conclusions on what should be done, with a more detailed action plan as the immediate outcome of the meetings so that the WVFT staff can proceed with a clear direction at the conclusion of the planning meetings.
3. The students should write analytical reports every six months in preparation for the planning meetings.
4. Trials should ideally compare different options rather than just trialing one option on its own.
5. Students require the support of a staff person to support the administrative work required in buying materials, logistics for meetings, and writing reports. This would allow the students to give more of their time to data collection and analysis.

### **Recommendations from Reviewer:**

#### *Project Operations*

1. It is difficult to say that the project has accomplished its goal while the target farmers have not fully applied or practiced all recommended techniques and solutions. Farmers have had difficulty obtaining enough capital to implement some of the demonstrated technologies, such as the clay materials to improve the soil conditions.

Most of the target farmers prefer to practice rice transplanting , especially in wetter seasons, while direct row seeding and row planting are useful methods for weed control on upper and dry land crops. The limitation is the labour required to make row lines. . The mechanized planting could be helpful in reducing the amount of labour required, which is what many of the farmers are looking for.

2. Ploughing rice stubble into the soil is not completely accepted by farmers. Some farmers believe that the invasion and spread of the rice borer is because of such practice.
3. Cattle raising seems to be a major source of income and is well managed despite a shortage of bulls. The community would prefer to have artificial insemination done in the community and having the animal semen stored locally instead of taking the cows elsewhere for insemination. This would reduce costs and assist with quality.
4. Farmers have not maximized the full benefit from the different quality of the KDML-105 and RD33 rice varieties as the solution for the suitability to the



different conditions of soil and land. The differences between each variety in the ideal planting and harvesting times have not been fully considered so to date there has only been one week difference in the planting and harvesting times of the two varieties.

5. RD33 is more resistant to diseases like thrip and rice blast than KDML 105. However, if it is planted at the beginning of the season it will be ready for harvesting before the KDML-105 and susceptible to birds. However farmers prefer the RD33 because it has greater resistance to leaf blast than KDML-105. Both varieties are suitable for the soil conditions in the target area but the cycle of planting of the year need to be carefully considered and the method of transplanting crop is the most effective.
6. Some of the tools provided were unnecessary, such as the grass cutter machine. Most of the farmers cut grass by sickle and there are not enough cattle per household to justify the expense of the machine.
7. Green manure is the most effective in amelioration of soil. The project has supported a few kinds of crops to make green manure but some crops may not be suitable to the soil conditions. It is recommended that more suitable crops to specific soil conditions be introduced and a range of post-harvest options should be available for farmers to trial.
8. It is found that for the row rice planted crop using the cultivator machine the *Ischaemum aristatum* is the main problem. Other weeds were also found, such as Asteraceae, goose weed and Onagraceae because of the drought of the last season. Eradication can be done only by hand, which is more costly. Transplanted crops do not suffer from a weed problem if there is sufficient water.
9. After the project is completed there will be no more materials or resources supporting the rice cultivation and cattle fattening provided and the target farmers will need to pay for all investments. Accordingly it is possible that many farmers will not be able to continue practicing in accordance with the suggested principles and methodology.
10. Farmers should work together as a group in farming rice. However, this is difficult in practice because farmers want to plant and take care of their crop by their own members of the family rather than asking for help from outside the family.

#### *Efficiency of Project Implementation and Management*

1. The project should consider whether demonstrations on just 1-2 rai for each target household are sufficient for adoption and application in a wider area. The results of the demonstration can be actually learned and results from the trial can be adopted and applied in a wider area. What is the variable that needs to be strengthened and what limitations and constraints need correction and improvement.
2. There needs to be more reflection sessions for sharing and seeking solutions together in order to come up with improved techniques.

3. The results of soil condition measurement need to be conveyed to the farmers. Or ideally they should be trained to be able to measure the soil by themselves.
4. The numbers indicated in the indicator statement seems to be far from reality because the actual numbers of the target farmers are significantly lower than the target value. The indicator indicated 90%-100% of target farmers is too high comparing with the number of households in each target community.
5. Informal discussion and sharing among farmer group members seems to be lively, practical and useful while the formal group process is ineffective. Future projects should consider whether the formal group processes which have been organized in the past are really practical and necessary for this type of project.
6. There needs be follow up so the farmer representatives who attended training or participated in a field study share what they have learned with other farmers in order to disseminate and extend knowledge on how the new techniques could be applied.
7. The current target farmers are sponsored children families of the Nasinuan ADP and families who are members of the Supanimit Mahasarakham Agriculture Cooperative Ltd., which are not the sponsored children families of the Nasinuan ADP. The Cooperative team, Nasinuan ADP team and the target group need to agree upon a sustainable process for working together, particularly in the areas of buying the rice variety seed and others.
8. The issue of the labor force movement and shortage should be considered as a regular event happen after each rice harvesting time, the issue should not be included in this project. The review found that in fact there is no labour shortage problem in the period of rice harvesting. The labour can be made available just during the harvest period by family members coming back home from working in other provinces. They then return to their other work once the harvest is finished as very little needs to be done immediately after harvest. However, during planting season, labor shortages still remain a problem for farmers, who require support from neighbors or need to hire workers in preparing the fields.
9. The baseline survey and other monitoring and evaluation should have been based on the values indicated in the project logical framework.
10. The project team has at times been too slow, such as when cassava stems were distributed well before fertilizer was made available.
11. The start of the fiscal year and the budget approval in the month of March was an obstacle to the procurement procedures of the materials and necessary supplies which can catch up with the farmers to start their cultivation of the year.

## **ANNEX 1**

### **Summary report of the Project Implementation Review Workshop**

The workshop was held on 9-10 March 2011 at Project Office, Payakkaphum Pisai District, Mahasarakham Province at the Faculty of Agriculture, Khon Kaen University, Muang District, Khon Kaen Province.

The session on 9 March 2011 at the Project Office, Payakkaphum Pisai District, Mahasarakham Province.

The session started at 10:30 hr.

Report on the project implementation of the Farmer Groups;  
Livestock Farmer Group  
Presented by Mr. Chulee Khemkham

1. Activities implemented in the past year;
  - Forage cultivation for cattle
  - Cassava cultivation for cattle supplementary feed
  - Trainings on the forage cultivation and livestock raising
2. Activities that benefit and not benefit
  - The forage cultivation that provide sufficient feed for animals.
  - Making supplementary feed for animals in the dry season
3. Problems encounter during the activity implementation
  - Rain does not come as usual, lack of water source
  - Need animal breeds, cattle treatment medicines and supplementary feeds.
  - Supporting materials for the activity cannot be provided timely as needed.
4. Recommendations and expectations
  - Supporting materials for activity should be provided in time of need and at the right time of the season.
  - Need water source for the forage cultivation plots.
  - Need good cattle breeds and supplementary feeds.

Summary of farmers' opinions and recommendations on the livestock farming

1. Farmers prefer to have their cattle bred by artificial insemination with good breeds. The budget is at Baht30,000 to have the cold container for storing semen and requires to fill in liquid Nitrogen all the time. The most preferable breed is the Brahman.
2. Need more learning on the animal sanitation.
3. In case of the completion of the project, farmers ensure that the livestock farming will be continued in spite of no other support. However this would depend on individual household with their economic condition. Keep livestock farming continued need to have capital investment and good plans. Two major plans would be on having a good breed owned by the village, and forage cultivation plan in the area. These plans can be accomplished since the farmer group who has gone through the trainings and able to proved it in the real practices and eventually have confidence to more invest.
4. Farmers ensure that the government agency will come to give helping hands in the area of artificial insemination and required treatment medicines, but still need the learning and advice on the animal sanitation.

5. Cattle feed; the supplementary feed made from cassava is the most preferable by using leaves and tubers. The fattened cattle have rapidly gained body weight and have good body condition and shape.

#### Rice Farmer Group

Presented by Mrs. Vibulwan Chua-nij

1. Activities implemented in the past year;
  - Trainings on the rice cultivation
  - Handle on the rice variety of RD-33 and Jasmine KDML-105
  - Pre legume cover crop cultivation of Jack bean, mung bean, Cowpea and peanut.
  - Demonstration on comparing the row seeding rice cultivation by labor with the traditional broadcasting.
  - Demonstration on comparing the row planted rice crop by the interrow-cultivator with the traditional broadcasting.
2. Activities that benefit and not benefit
  - The Jasmine KDML-105 rice transplanting crop
  - Cultivation of cover crop to reduce the application of chemical fertilizer and increasing yield.
  - Plow rice stubble incorporate into soil help ameliorating the soil
  - The rice variety RD 33 is leaf blast resistant greater than the Jasmine KDML-105 but it is not popular in the market
  - The row planted rice crop by the interrow-cultivator is effective in maintaining the soil structure (loosen soil) but farmers need to experience and be more skillful in handling the machine.
3. Problems encounter during the activity implementation
  - Problem of disease and insect invasion, farmers still need experiences in managing the diseases and insects.
  - Lack of water source, prolong drought that causes heavy weed ingress.
  - Problem of the RD 33 did not blossom in the same time, not popular in the market (have to tell traders that the produce was the in-season crop) and the grain weight is lighter than the Jasmine KDML-105.
4. Recommendations and expectations
  - Need water source, need the artesian well in the areas.
  - Need rice seeder that helps reducing the capital investment for rice farming.

#### Farmers' opinions derived from the Project Implementation Review

<b>Plan</b>	<b>Opinions</b>	<b>Additional Info.</b>	<b>Recommendation</b>
Livestock Farming System			
Outcome 2: Farmers improve their livestock management system	Agreed with the result of the review.		
Output 2.1: Better production of forages	Agreed with the result of the review for the farmers having basic	1. Some farmers grow legumes.	1. Insufficient water for forage

<b>Plan</b>	<b>Opinions</b>	<b>Additional Info.</b>	<b>Recommendation</b>
	<p>knowledge on forage and able to manage their forage cultivation. Supplementary feeds have been produced in the forms of silage and concentrated feed. For the rice straw, hay compressed bundle is done but is not preferable.</p>	<p>2. Making of supplementary feed is not continued.</p>	<p>cultivation in dry season. 2. Silage made for the dry season is still not sufficient.</p>
Output 2.1: Better production of forages	<p>Agreed with the result of the review for the farmers having basic knowledge on forage and able to manage their forage cultivation. Supplementary feeds have been produces in the forms of silage and hay. For the rice straw, hay compressed bundle is done but is not preferable.</p>	<p>1. Some farmers grow legumes. 2. Making of supplementary feed is not continued.</p>	<p>1. Insufficient water for forage cultivation in dry season. 2. Silage made for the dry season is still not sufficient.</p>
Output 2.2 Improve cattle management and health system	<p>Not agreed with the result of the review on the finding of the review team which said the farmers allow their cows naturally breed among themselves which is not effective and not worth for investment</p>	<p>1. Most of the farmers have bred cattle by artificial insemination. 2. Farmers still lack of knowledge on animal sanitation.</p>	<p>1. Unavailability of good breeds. 2. No knowledge on artificial insemination. 3. No knowledge on using of treatment equipments for cattle.</p>
Rice Farming System (Field Crop)			
Outcome 1: Farmers improve rice yields and increase income from their products.	<p>Agreed with the result of the review.</p>		
Output 1.3 Trial on rice seeding rate	<p>Agreed with the result of the review due to 2 rice varieties, KDML-105 and RD33 have been used for study</p>	<p>Farmers have based their practices on the past experiences</p>	

Plan	Opinions	Additional Info.	Recommendation
	<p>and trial, characteristics of these 2 varieties are different in terms of seeding timing and condition of soil for cultivation, but farmers have done the trial at the same time and in the same plot areas of the project. The trial is unable to indicate differences of the results of these 2 varieties</p>	<p>and determined how much of the variety seed would be needed for the next growing season.</p>	
<p>Output 1.4: Activities of Farmer School on soil and weed management</p>	<p>Agreed with the result of the review particularly in the area of weed, one lesson learned is on the row seeding rice crop will face the long-leaf Paspalum or Ischaemum aristatum weed invasion, but none of this problem occurred in the transplanting rice crop.</p>		<ol style="list-style-type: none"> <li>1. The interrow-cultivator machine is the most appropriate but need more capital investment and still lack of skills.</li> <li>2. Want to know the simple rice cropping techniques with less cost investment.</li> <li>3. Lack of water source in the dry season</li> </ol>
<p>Output 1.5: Amelioration of soil through fertilizer application</p>	<p>Agreed with the result of the review for the application of the fertilizer 46-0-0 before rice transplanting and the fertilizer 16-16-8 twice, first time in the tillering period and the second time prior to the panicle initiation period. The support of making bio-organic fertilizer is not preferred by farmers because they can bring the farmyard manure added with rice husk and or bring directly to the farm. Farmers are also</p>		

Plan	Opinions	Additional Info.	Recommendation
	interested in using African sesbania as green manure with understanding that it can ameliorate the saline soil.		
Output 1.6: Farmers' knowledge improved on rice cultivation and livestock production	Agreed with the result of the review for the target farmers basically have knowledge and experiences as their livelihood. Attending the trainings and field study visits facilitated strengthening their skills in improving their farming. And know-how on which disease or insect can be treated by which chemical pesticide but rarely using chemical substance because of the unsure on the formula ratio use and aware of the negative impact of it. On the livestock farming, the usefulness would be on more availability of animal manure and more compost fertilizer.		

Summary of farmers' opinions and recommendations on the rice farming

1. The need of farmers at this point is water sources. Since each farmer household possess a limited farm area and unable to dig a big pond for keeping water, artesian well for agriculture would be the best solution. It is found that in the nearby village like Baan Hnong Kaen Pattana, Nasinuan Sub-district, farmers invested around Baht10,000 for an artesian well that can give sufficient water for their cultivation. Farmers advised that if the well is not deep enough would get saline water, it need to go down through this level to reach fresh water, however it also depends on the land profile. Dr, Boonrat Jongdee advised that artesian well can be done by the survey of the Department of Water Resources and need to proceed through the official procedures.
2. Farmers collected rice seed for growing in the next season by harvesting by hands, and the next season to that it is found that the RD33 rice crop in the field does not blossom in the same time. This would be indicated that the RD33 rice variety seed planted in the earlier season bought from the source that has not obtained the pure seed directly from the Ubol Rice Research Center.

3. Farmers found that growing legume as cover crop resulted in increasing rice yield and reducing the use of fertilizer by 50%. Mr. Kiatisak Pravai suggested that if farmers could work as a group in producing green manure from legume for soil amelioration would be developed to be as sustainable work group in terms of making their own green manure and produce legume variety seeds for additional income. Farmers agreed that this kind of group can be organized and functioned.
4. Farmers don't know how to diagnose and eradicate rice diseases and pests as found symptom, Dr. Boonrat Jongdeed advised that if farmers found the thrip can use wet hand rub at the lower part of the stem and will find the insect. In case of rice blast which caused by fungus not being insect.
5. Farmers prefer using fertilizer 46-0-0 for soil preparation that is not complying with the recommended technology. The on-farm trial, farmers found that the fertilizer 46-0-0 work for soil preparation better than the fertilizer 16-16-8 and it is repeatedly applied.
6. Comment from farmers that the weed in the broadcasting rice crop spread rapidly and difficult to eradicate, comparing with the row planted rice cropping there are quite fewer weed and easy to handle.

Summary of the comments and recommendations from the Project Advisory Team in relation to the research study topics

## **Applied Research Topics**

### Livestock / Forage

1. Economic evaluation of cassava as dual purpose crop
2. Socio-economic analysis for adoption of cut/carry forage and retention
3. Evaluation of cassava varieties for dual-purpose cropping and nutrient management

### Rice Production

1. Direct seeding technology and weeds management
2. Post-rice cash cropping with RD 33 and crop rotation
3. Farmer assessment of best bet management, practices, including fertilizer, weed management and seeding rate
4. Farmers suggest water resource access

## **Comments and Recommendations**

### Rice:

1. Direct seeding rice crop / weed management
2. Post rice cropping for income generation
3. Assessment of the appropriate technologies management on fertilizer application, weed management and variety seeds.
4. Lack of water source, may consider the artesian well

### Recommendations:

1. Artesian well can be done through the coordination with the Department of Water Resources.



2. Post rice cropping is as agreeable activity
3. Applying of fertilizer should consider the matching of formula and time of application

Livestock:

1. The economy of cassava cultivation
2. Socio-economic analysis on the technology application in terms of acceptance and not acceptance of farmers
3. The processing of the forage variety selection to have the most suitable variety that could produce double side benefits and also the soil fertility management that appropriate for the northeastern region land areas.

## **ANNEX 2**

### **Summary report of the Project Implementation Review Workshop**

The session on 10 March 2011

At the Faculty of Agriculture, Khon Kaen University, Khon Kaen Province

The session inaugurated by Asst.Pro.Dr. Anan Pholthanee, Dean of the Faculty of Agriculture, Khon Kaen University.

#### **Livestock Farming System**

Overview reported by Mr. Odthon Sarngnork

##### **Comments and Recommendations;**

1. Farmers reported that the reason on delayed cultivation of the cassava is because of the selection on the source to purchase the breed stems. Looking for the reliable source and the desired breed stems need to go out of the project area.
2. The need for correction and improvement should be the breed selection that needs to be a short life span, proper capital investment management and the suitable growing period. (Commented by Dr. Gamini).
3. The Project Advisory Team has been interested in cassava cultivation for making animal feed where its leaves and tubers can be used as the major ingredient of the cattle supplementary feed and particular tubers can be the source of additional income of the farmers' households. Cultivation should be in the dry season. December would be the suitable month. The issue of soil, that need to be well arranged since the cassava cultivation will be post rice harvest crop, and in the month of June if the land is flooded would cause impact to the cassava production. Considering from the past activity, farmers used the cassava breed that will be harvested within 6 months if the delay occur on the starting plantation, when the rain come, cassava need to be pulled out for the next round of rice cultivation, the cassava production would be quite limited. However, consideration need to be placed on the looking for the short life span breed to be cultivated and made further research study.

#### **Rice Farming System**

Overview reported by Ms Jiranan Poyprakhon

##### **Comments and Recommendations**

1. Mr. Suraweth (former Agriculture Engineering Expert) introduced the rice seeder; however the limitation of this machine is on working in the very wet land and the soil need to be well and evenly prepared before using this rice seeder.
2. Farmers commented that growing rice by following the instruction of the project can produce good yield because of the land areas are properly selected for the rice cultivation and closed monitoring and care. However farmers have done a careful comparing between the traditional and the recommended practices and adopting the fruitful method to be applied in their own rice farming.

#### **Summary of activities to be implemented in the future**

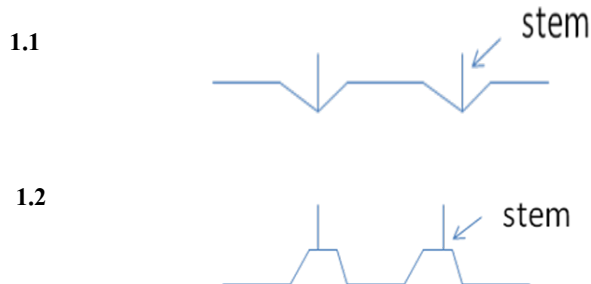
##### **Livestock Farming**

Plans to be implemented during the pre-project closing period (3 months);

1. Support the farmer group of 40 members on Purple guinea forage cultivation, will be implemented in the month of May 2011
2. Support the farmer group of 40 members on Pangola forage cultivation, will be implemented in the month of May 2011
3. Follow-up on the cassava cultivation

Activities for future implementation (New Project)

1. Selection of cassava breed and the cultivation method suitable to the area.



- Change the spacing between plant from 1x1 metre to 1x0.6 metre or 0.75x0.75 metre
- The suitable breeds are Rayong-72 and Rayong-60

2. Study on the level of nutrient in the soil
3. Study of the capital investment / factors supporting the socio-economic development

Comments and Recommendations;

1. The study of the level of nutrient in the soil should be done prior to and after the cassava cultivation
2. Cultivation period should be carefully decided and the growing area selected should be on the upper land area where there is no rice cultivation
3. Cultivation of cassava as the post-rice crop, the short life span breed needs to be selected, or cultivation should be done after the harvest of the RD-33 rice crop due to the life span of RD-33 is only 130 days.

**Rice Farming**

Plans to be implemented during the pre-project closing period (3 months);

1. Follow-up on the post-rice cash crops (Economic, capital or income gain)
2. Applying of the interrow cultivator and seeder machine to replace the broadcasting.
3. Select the KDML-105 as the main rice crop and RD-33 as supplementary rice crop because of the blast resistant attribute.
4. Rice transplanting crop that producing higher yield is still emphasizing, supported by application of green manure.
5. Continue reinforcing the comparison of applying fertilizer as recommended and comparing with traditional practice by farmers.

Activities for future implementation (New Project)

1. Application of the post-rice cash crops system.



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**Jasmine KDML-105**

2. The interesting of using the rice seeder to replace the broadcasting of the Jasmine KDML-105 rice crop (purchase or built by farmers)



3. Emphasize the support on growing several kinds of soil building crops or as a supplementary income such as African sesbania, fiber jute (collect seeds and send back to the Department of Land Development), Cowpea and peanut.
  4. Continue emphasizing the group process development toward future sustainability
  5. Undertaking break-even analysis on every production processing from the capital investment to the profit gain.
  6. Undertaking the management on diseases and insects through the IPM and bio-control.
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