Impact of LSUAFRP farm trials: 2002-2006

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Impact of LSUAFRP farm trials: 2002-2006 (Draft)

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Summary

The current report provides overall summary of farm trials and its impact during LSUAFRP Phase I based on existing sets of Programme information. The report especially focuses on the impact of farm trials on farming system, household economy and differences in women and men's decision making on different agricultural activities. Between 2000 and 2006, LSUAFRP introduced up to four main types of annual crop based trials, 16 types of perennial tree based trials, and 10 types of livestock trials. The numbers of farmers participating in farm trial increased by eight times from 32 to 245 during the same period. While it is difficult to assess the success and direct economic impact of each trial on households due to lack of consistent data management, numbers of farmers succeeded in increasing their household income through annual crop and livestock related production. Stories of farmers that achieved success through farm trials also indicate the increased confidence in applying new agricultural technology and ability to purchase goods and services necessary for family members. However, the review of farm trials also suggest the need in carefully identifying the appropriate technology as well as selection of appropriate site, as well as the need for more systematic monitoring and management of data to assess the detailed impact of farm trials. In order to assess the impact of project intervention such as farm trials over time, there is also a need to link household data to the trial activities, and define indices to measure households' social and economic well being. Furthermore, a consideration should be made to disaggregate the impact of farm trials and other project interventions on both women and men in the same household, and across different ethnic groups.

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Abbreviations

DAFEO	District Agriculture and Forestry Extension Office
FSR/EC	Farming System Research and Extension Component
LSUAFRP	Lao Swedish Upland Agriculture and Forestry Research Programme
NAFReC	Northern Agriculture and Forestry Research Centre
NAFRI	National Agriculture and Forestry Research Institute
NTFP	Non-timber forest product

I. Introduction

Background

Under the programme objective of the Lao Swedish Upland Agriculture and Forestry Research Programme (LSUAFRP) to develop sustainable agriculture and forestry technology for the upland farmers, Farming System Research Component and Forestry Research Component of the Programme have initiated on-farm trials during 2002 and 2006. Researchers from NAFRI and NAFReC, together with extension workers from the district programme office designed on-farm agriculture and forestry trials with villagers (see Appendix 1 and 2 for list of farm trials), working with over 200 farmers in two districts of northern Laos[1].

Objectives of the report

Main objectives of the current report are underlined as follows;

- To assess the trends of farmer participation in farming trials during 2002 and 2006
- To assess the overall impact of on-farm trials on farming system and household economy
- To reflect on past approaches of on-farm trial and its impact on addressing gender and rural poverty

The report provides overall summary of on-farm trials and its impact during LSUAFRP Phase I based on existing information. It reviews trends of on-farm trials in two districts, by examining general record of households that participated in different farming trials during 2002 and 2006. It also examines characteristic of people that participated in farming trials and aims to summarize possible impact of farming trials on household agricultural production system, and household economy. Another aim of the current report is to review the approaches that had been undertaken by the Programme to introduce gender balance in access to agricultural technology and household labour, as well as efforts to improve rural poverty through introduction of sustainable agricultural technologies.

Limitations and scope of the report

The current report has two major limitations in analyzing the impact of farming trials. First limitation is the capacity of the team to evaluate technical aspects of each trial including productivity, profitability, acceptability and sustainability. As the team members involved in writing this report did not directly design or participate in farming trials from the start of the Programme, we are unable to compare performance of recommended technologies in comparison with farmers' own technology as had been envisaged as the main objective of farming trials (See FSR/EC 2005a). This also means that it is not in the current report's scope to provide in-depth analysis of each technology and examine its strength and weakness, or explaining reasons why some technologies were more successful than others and have potentials for scaling-up[2].

Second major limitation of the current research is the research team's ability to evaluate the direct economic impact of each trial. While the Farming System Research and Extension Component (FSR/EC) organized a series of on-the-job trainings on data collection for farming trials including socio-economic information of farmers that participated in the trials to understand the direct output of farming trials (See FSR/EC 2005b), the current research team was unable to access this set of information to understand the direct economic impact of each technology introduced by the Programme. The lack of consistent follow-up and systematic management data (i.e. household information, data on farm trials) not only inhibited our understanding on the trend of farm trials and who participated in the trials, but also the changes in households' social and economic situation through their participation in farm trials over time as well as fair

[1] LSUAFRP worked with seven villages in Phonexay District of Luangprabang Province, and seven villages in Namo District of Oudomxay Province.

[2] In identifying potentials for scaling up, it is essential to understand efficiency, productivity, acceptability and sustainability of trials. At the same time it is also important to learn about farmers' preference for technology. For example, during discussions with district staff, it became clear that there were farmers that did not experiment trials as suggested (e.g. maize and legume). This means that in addition to understanding farmers' preference, it is necessary to review the process by which trials were introduced.

understanding of both success and errors of farm trials. It should also be noted that while our assessment on the impact of farm trials relies heavily on information generated through documentation of successful farm trials, which took place between January and February 2007, the current report also reflects on the problems of farm trials in achieving the Progamme objectives to address rural poverty.

Methods

Synthesizing records of farmers that participated in farming trials

A joint team of researchers from different research components of LSUAFRP including the Forestry, Farming System and Socio-economic Research Components reviewed past records of households that participated in forestry and farming trials during 2002 and 2006[3]. In the process, the team consulted field staffs from NAFReC and district project coordinating offices. One of the first steps taken by the team was to synthesize records of households that were kept by different research components during Phase I. This was followed by cross-checking with NAFReC and District Programme Office. Records of names and activities that did not match were marked for further cross-check in villages (See also Keobounnam et al. 2007). After cross-checking activities with villagers, the final record of households and on-farm trial activities was re-entered into MS Excel worksheet for further information processing.

Table 1 Framework of analyzing project impact

Areas of impact	Impacts	Criteria for evaluation	Source of data
Farming system	Impacts of agricultural technologies on sustainable upland farming system	• No. of HH adopting technologies • No. of HH continuing activities on their own • Assessment on household production and labour inputs • Assessment of farmers on application and scaling-up of farming trials	• Consolidated information of project households (2002-2006) • Case studies of successful farmers (2007)
Household economy	Impacts of agricultural technologies on poor rural households Impacts on rural poverty	• Development of pro-poor agricultural technologies • No. of poor households participating in on-farm trials • HH agricultural production and food sufficiency • HH income and asset • HH access to land • Assessment of	• Reports by Farming System Research Component, Forestry Research Component • Farmer survey (2006) • Socio-economic household survey (2002-2004)[4] • Case studies of successful farmers (2007)

[3] This includes Khamphou Phouyyavong from Socio-economic Research Component, Simone Vongkhamhor from the Forestry Research Component and Chanthavixay Keobounnam from the Farming System Research and Extension Component.

[4] Household survey was conducted in 2004 by the socio-economic unit together with the FSR/E and NAFReC. Data for 2002, 2003 are based on recall of households surveyed in 2004. In the meantime data for 2005 was conducted by NAFReC. List of names and their records have not yet been cross-checked with records of farmers participating in farming trials (See Keobounnam et al. 2007).

		farmers on well-being	
Gender	Impacts of farming trials on decision making between different sexes	• Percentage of decision making by male and female on different agricultural activities	• Case study data by Phiasaka (2006)[5]

Understanding direct and indirect impacts of farming trials

In addition to the records of households that participated in farming trials to understand the overall trend, we reviewed other information including short case studies of successful farmers that participated in farming trials (See also Appendix 3), as well as information from household surveys led by the Socio-economic Unit and NAFReC, report of Participatory Poverty Assessment (PPA) conducted by NAFReC, as well as other report (Calub et al. 2006). Table 1 provides general framework for analyzing impact of farming trials on three main areas including farming system, household economy and gender.

II. Trends of farming and forestry trials of LSUAFRP

Household participation in trials

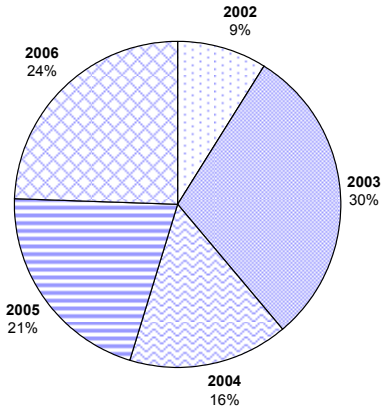
Numbers of households that participated in farming and forestry trials supported by LSUAFRP during 2002 and 2006 increased steadily from 32 to 245 households (Table 2) as numbers of trials introduced increased over the years. Out of the 245 households in 2006, the share of farmers that continued to work with the Programme accounts 9 percent (Figure 1). However, this does not imply that the same households have participated in single farming trials but instead had experienced different farm trials over the years.

Table 2 Total numbers of households participating in LSUAFRP farm trials
Unit: Numbers of households

Years	**2002**	**2003**	**2004**	**2005**	**2006**
2002	32	25	24	23	22
2003	0	158	83	93	73
2004	0	0	71	52	39
2005	0	0	0	109	51
2006	0	0	0	0	60
Total	32	183	178	277	245

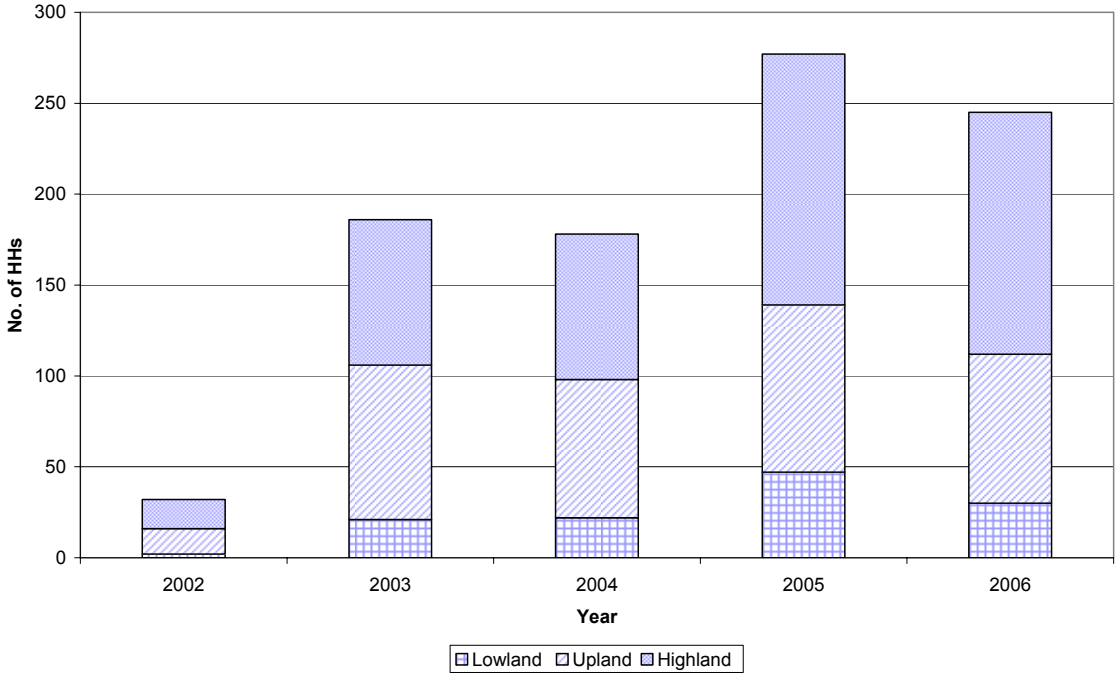
Source: Record of households participating in trials (2007)

[5] This data was collected in 2005 by Phiasakaa in 2005. Household interviews were conducted in five villages in Namo district. The results of the survey are yet to be summarized.



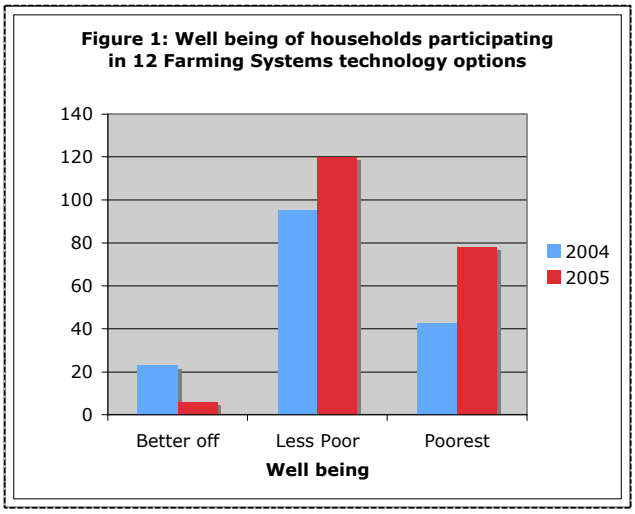
Source: Record of households participating in trials (2007)
Figure 1 Percentage of households that are continuing farm trials in 2006

In terms of ethnic composition of participants, a large majority that participated in farming and forestry trials in total of 14 villages throughout 2002 and 2006 were upland or other wise grouped as *Lao Soung* (i.e. Hmong, Phouxang) and highland or *Lao Theung* (i.e. Khmu) groups. Majority of these groups were also newly relocated in the current village area during the 1990s.



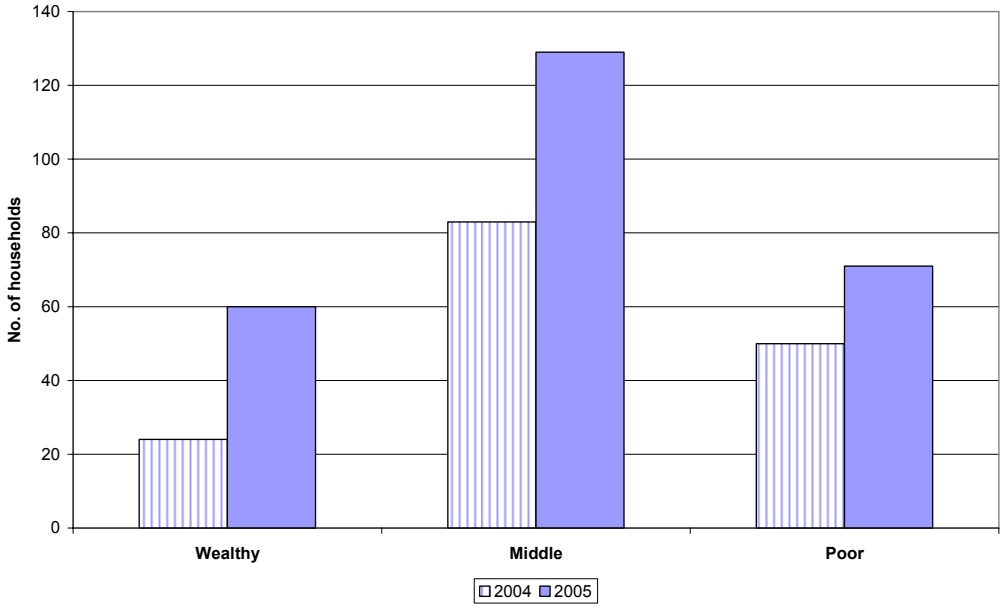
Source: Record of households participating in trials (2007)
Figure 2 Numbers of highland and upland ethnic households in farm trials

Economic and social status of the households that participated in the farming trials and changes over the course of LSUAFRP is difficult to assess due to lack of clear data. For example, Figure 3 based on Participatory Poverty Assessment (PPA) conducted by the Farming System Research and NAFReC claim that the share of less poor and poorest households that participated in farming trials increased between 2004 and 2005 (Figure 3). On the other hand, the results of Household Survey conducted by the Socio-economic Unit and NAFReC in 2004 and 2005 indicate that the share of poor households declined while the share of well-off households increased (Figure 4).



Source: PPA in Phonxai and Namo, FSR/E (2004, 2005)

Figure 3 Economic status of households participating in farm trials based on PPA



Source: Household survey (2004, 2005)

Figure 4 Economic status of households participating in farm trials based on Household Survey

Discrepancies in the data sets with regards to the economic and social status of households have emerged due to numbers of reason. First is the lack of consistency between data set and systematic review of household data. This problem was pointed out earlier in a report reviewing household data management (Keobounnam et al. 2007). Second reason is the lack of consistency in applying sets of criterion to distinguish household's economic and social status across different villages and over time. While the relative status of households and their conditions were studied during the earlier stages of the Programme phase using participatory wealth ranking technique[6], the status of the same families remain to be studied in

[6] During the diagnostic village survey five classes were introduced based on household's food security conditions (See also Appendix 3 for wealth/poverty ranking introduced by IFAD project in Oudomxay). Classes were organised by key informants in the village (SERC 2004). The results of the household diagnostic survey (2004) indicate that both 'Poor' and 'Very Poor' have less agricultural

detail to observe what changes had taken place in their household economy and their perceptions on well-being. In the meantime, criterion used during PPA and household surveys is obscure and does not necessary coincide with the wealth ranking introduced during the diagnostic survey in 2003 (Table 3).

Table 3 Different household classes introduced by the Programme

Diagnostic survey (2003)	Household survey (2004, 2005) Farmer survey (2006)	PPA (2006)
Leua kin (Surplus food)	*Hang mi* (Wealthy)	*Leua kin* (Surplus food)
Phō kin (Sufficient food)	*Pan kāng* (Middle)	*Pan kāng* (Middle)
Kāt kin (Insufficient food)	*Thuk* (Poor)	*Thuk chon tamadā* (Less poor)
Thuk nyāk (Poor)		*Thuk chon te te* (Very poor)
Thuk chon (Very poor)		

Review LEC 3, ARE TERMS, CONDITIONS OF POVERTY CHANGING? PPA2?

Trends of trials

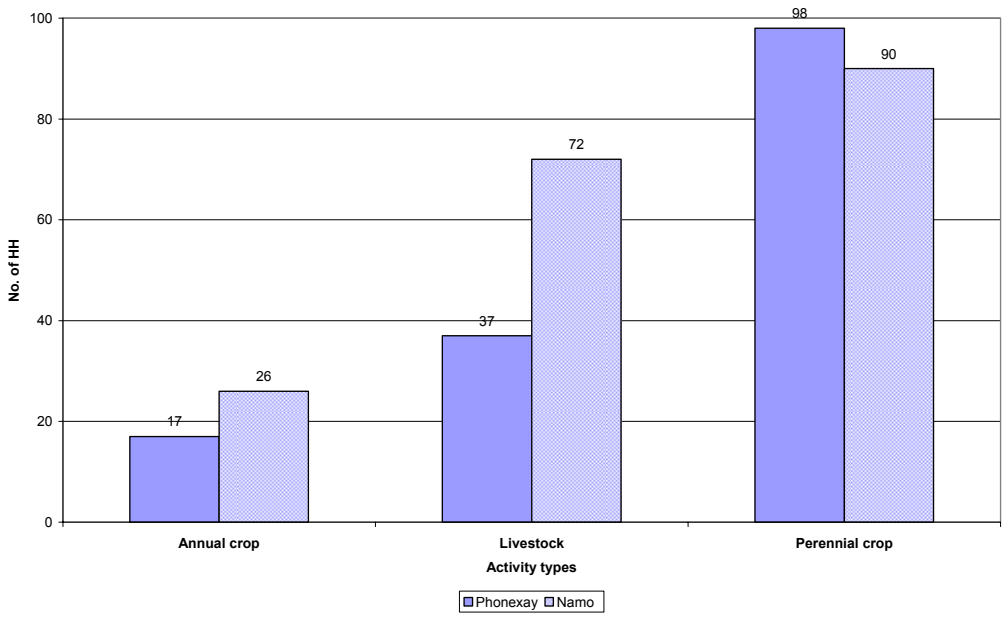
This section reviews overall trend of farm trails initiated by LSUAFRP. Table 4 shows households participating in numbers of farming and forestry trials throughout 2002 and 2006 in two districts. More than 50 percent of participating farmers engaged in single trial. The same table shows that maxim number of trials a single farmer experimented is five. However, farmers participating in more than four trials are less than two percent in all years.

Table 4 Percentage of household participation in multiple farm trials

Numbers of trials	2002	2003	2004	2005	2006
One trial	88 %	67 %	53 %	63 %	81 %
Two trials	9 %	23 %	32 %	27 %	16 %
Three trials	3 %	10 %	14 %	9 %	3 %
Four trials	0 %	1 %	1.7%	0.4%	0 %
Five trials	0 %	0 %	0 %	0.4%	0 %

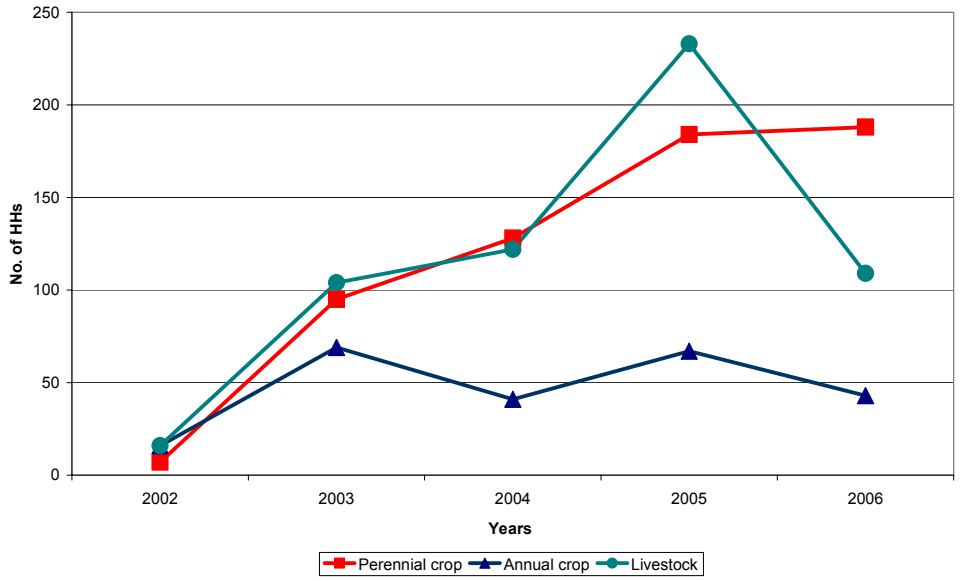
Source: Record of households participating in trials (2007)

land and livestock. It also claims that 'Very Poor' have significant shortage of labour while 'Poor' are able to sell their household labour.



Source: Record of households participating in trials (2007)
Figure 5 Types of farm trials and farmer participation during 2002-2006 in two districts

Figure 5 shows total numbers of households participating in different types of farm trials. More households in Namo district participated in farm trials for all three types (See Appendix 1 and 2 for list of trials). The figure also indicates high participation of households in perennial cropping and livestock production trials.



Source: Record of households participating in trials (2007)
Figure 6 Trends of farm trials in two districts during 2002 – 2006

Finally, Figure 6 shows trend of trials throughout 2002 and 2006 in two districts. While the numbers of households that became involved in annual cropping trials were relatively stable throughout Phase I in two districts, numbers of households that participated in perennial crop and livestock trials particularly increased sharply between 2004 and 2005 (See also Appendix 2).

III. Impacts of farm trials

This section of the report aims to review the overall impact of farm trials. This includes the direct and indirect impact of farm trials.

Direct impact of farm trials

Based on selected stories of 28 households that participated in farming trials in two districts, the direct impact of farming trials supported by LSUAFRP on agricultural production and farming system are summarized in Table 5[7]. Meanwhile, Figure 7 shows pictures of some of the successful farmers that adopted technologies.

Table 5 indicates that households that participated in annual crop trials and achieved success were able to meet their food sufficiency needs and were also able to sell some of the annual crops (i.e. soybeans, maize) to generate household income. While none of the farmers that participated in perennial crops have yet reaped any benefit from sales of fruit or timber, farmers that participated in these trials claim that they are beginning to make additional income from sales of intercrops (i.e. Job's tear, maize, soybean, sesame, etc.). Some farmers also claim that they were able to utilize their household labour more efficiently, particularly as intercrops helped to control infestation of weed. In the meantime, those households that achieved success in livestock trials claim that the new agricultural technology introduced by LSUAFRP helped to improve not only production of livestock but its live weight, and animal health. Introduction of new animal raising technique (e.g. cut and carry feeding), also saved household labour particularly from herding large stock and helped households to increase labour productivity. As a result of improved livestock production, families were also able to increase their household income.

Table 5 Direct impacts of different farming trials

Types of farming trials	Direct benefits	No. of cases
Annual crop	Increases income	8
	Increases food production	3
	Increases production	4
	Saves household labour	1
Perennial crop	Increases income	8
	Increases food production	1
	Increases production	1
	Sales of intercrop	6
Livestock	Increases income	5
	Increases live-weight	3
	Increases production	4
	Saves household labour	4
	Improves animal health	3

Source: Based on successful farmers' stories (2007)

[7] Farmers that achieved success with farming trials were selected and interviewed by staff from NAFRI, NAFRec and district offices during December 2006 and January 2007.

Integrated maize and soybean production in Pangdou village, Namo district

Riverbed cabbage production in Nambo village, Phonexay district

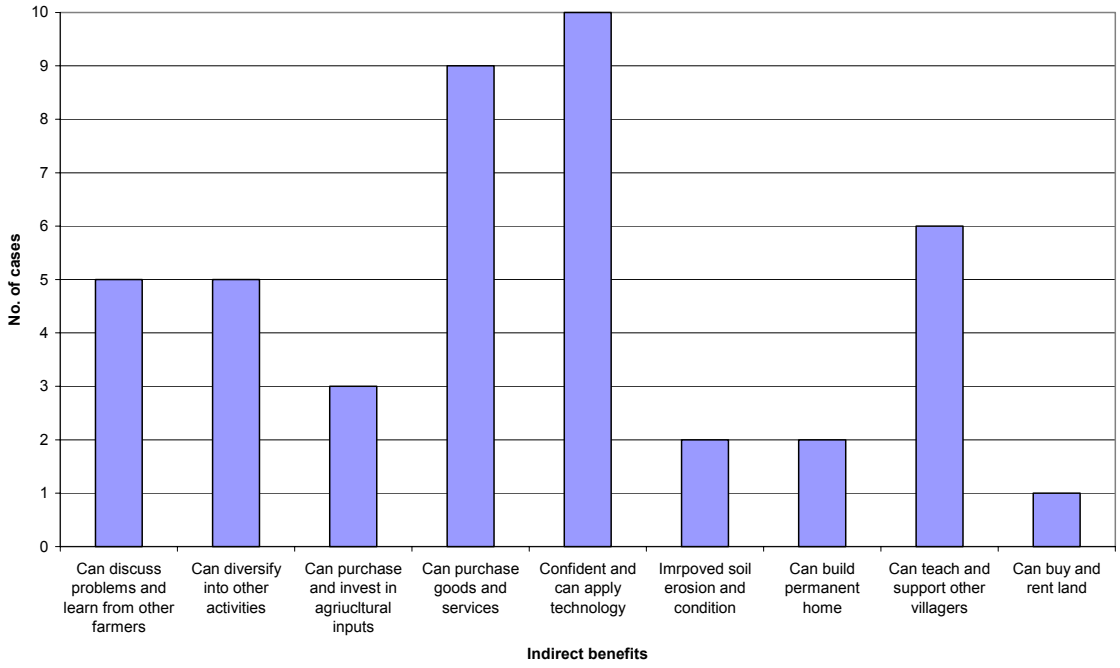
Goat and fodder production in Phonthong village, Phonexay district

Fodder seed production in Phonthong village, Phoenxay district

Figure 7 Successful introduction of agricultural technology

Indirect impact of farm trials

Another interesting aspect of the success stories of farmers is the indirect impact of the trials or perceived benefits beyond the farm trial. Cases of indirect benefits in Figure 8 account benefits mentioned in the stories. Among these impacts, increased confidence in agricultural technology and ability to apply the introduced technology to expand agricultural production accounted the highest (10 cases). This is followed by increased household income and ability to purchase food and other daily consumer goods for family members (9 cases). Some of the stories highlighted that increased income from commercial agriculture production allowed farmers to send their children to school and purchase books for them. Other stories also claimed that farmers were able to pay for medical services. Other indirect impacts that were noted by successful farmers include ability to teach and support other villagers on agricultural technology (6 cases), as well as ability to discuss problems and learn from other farmers (5 cases) and diversify into other agricultural activities.



Source: summarized from successful farmers' stories (2007)
Figure 8 Indirect benefits of farming trials

The indirect benefits outlined in Figure 8 appear to reinforce farmers' ability to expand agricultural production and scaling up activities beyond household level. For instance, increased confidence in technology and its application allow farmers to teach and support other villagers that are interested in the technology. At the same time opportunities to discuss problems and share information with other farmers also allow farmers to apply and adapt technologies. In the meantime, as the farmers move towards commercial agricultural production, ability to generate income and invest in agricultural inputs also becomes important. Figure 8 also indicates that farmers were not only able to benefit from specific trial but it also lead them to diversify into other activities.

Table 6 Farmers' plans for expansion

Types of farming trials	No. of HH	Areas of production					
		Cash crop	Rice	Mulberry	Rubber	Chicken	Fodder
Annual crop	10	2	3	-	-	-	-
Perennial crop	8	1	-	1	1	-	-
Livestock	10	-	-	-	-	1	3

Source: summarized from successful farmers' stories (2007)

Farmers' plan for expansion is also explained in some of the success stories. Table 6 is a summary of farmers' future plans. Out of 10 farmers selected for annual crop trials (i.e. lowland and upland rice, maize, cabbage and other off-season vegetable production), two of them claimed that they will continue to expand their cash crop production while three families will expand rice (both upland and lowland) production. For perennial crop, two out of eight farmers that are participating in mulberry and integrated rubber trials claimed they will continue to apply the technologies that were introduced by LSUAFRP and expand the areas of production. In the meantime, another family claimed that they will continue to intercrop different cash crop together with rubber. Finally, three families out of 10 families that participated in fodder and

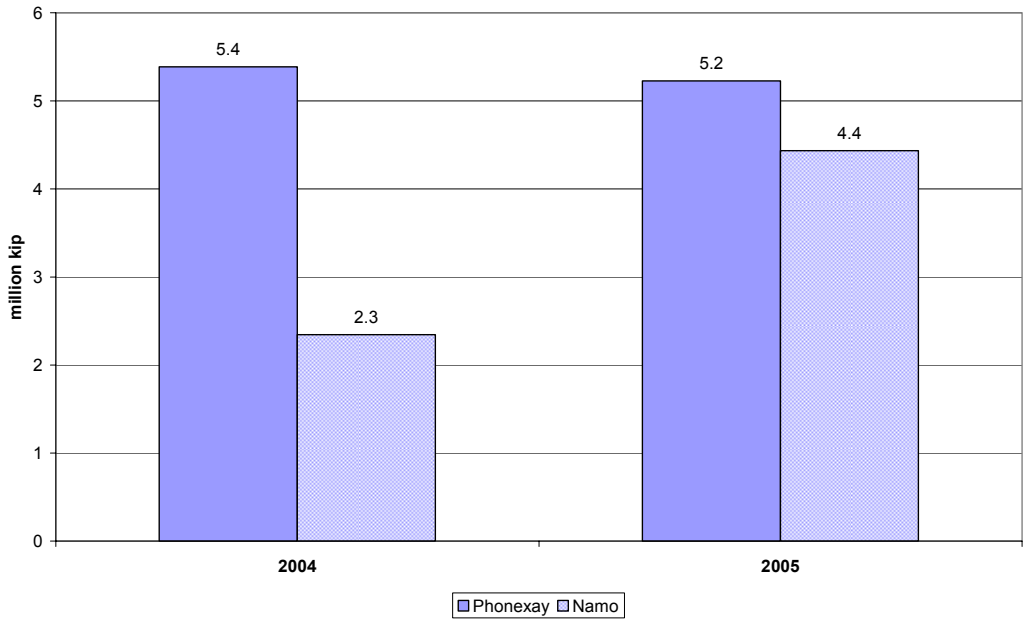
livestock production trials claimed that they will continue to expand the area of fodder production and raise more livestock. One family also claimed that they will continue to expand chicken production.

IV. Household economy in LSUAFRP sites

This section provides general situation of household economy in LSUAFRP sites based on past survey data to highlight the shift towards commercial agricultural production, and economic status of households that participated in farm trials.

Changing sources of household income

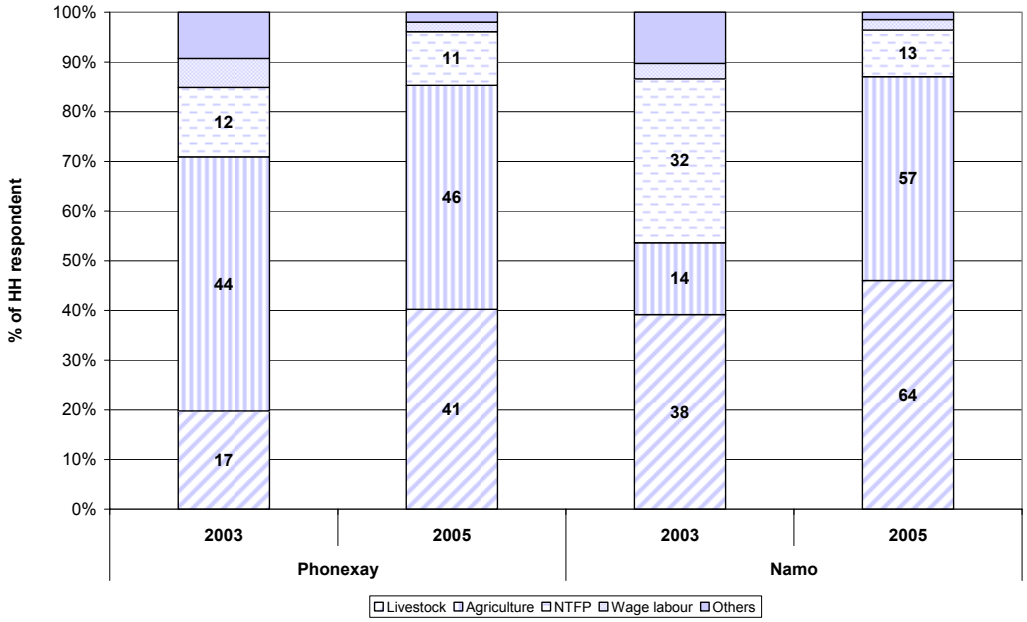
Based on household survey conducted by the Socio-economic Unit in 2004 and by NAFReC in 2005, Figure 9 shows changes between household average cash income in two districts between 2004 and 2005. This indicates that while average household income in Phonexay remained at an order of five million kip (approximately 521 USD, according to the current exchange rate of 1 USD=9,500 kip), which is slightly lower than 572 USD, the per capita income of Laos in 2006. In the meantime, the average household cash income in Namo district nearly doubled from 2.3 to 4.4 million kip (approximately 240 to 459 USD) between 2004 and 2005.



Source: Based on Household Survey (2004, 2005)
Figure 9 Average household income in Phonexay and Namo district

From the same Household Surveys, we also observe that primary source of household income changed between 2003 and 2004[8]. Figure 10 indicates that share of income from livestock production has increased in two districts. In Phonexay, the share has more than doubled from 17 to 41 percent, while share of income from agriculture and NTFP did not change significantly. In Namo, the share of income from livestock increased from 38 to 64 percent, but the income share from sales of agricultural product increased by four times from 14 percent to 57 percent. This was accompanied by loss of income share from NTFP and wage labour. This suggests the increasing importance of commercial agriculture and livestock production for upland farmers.

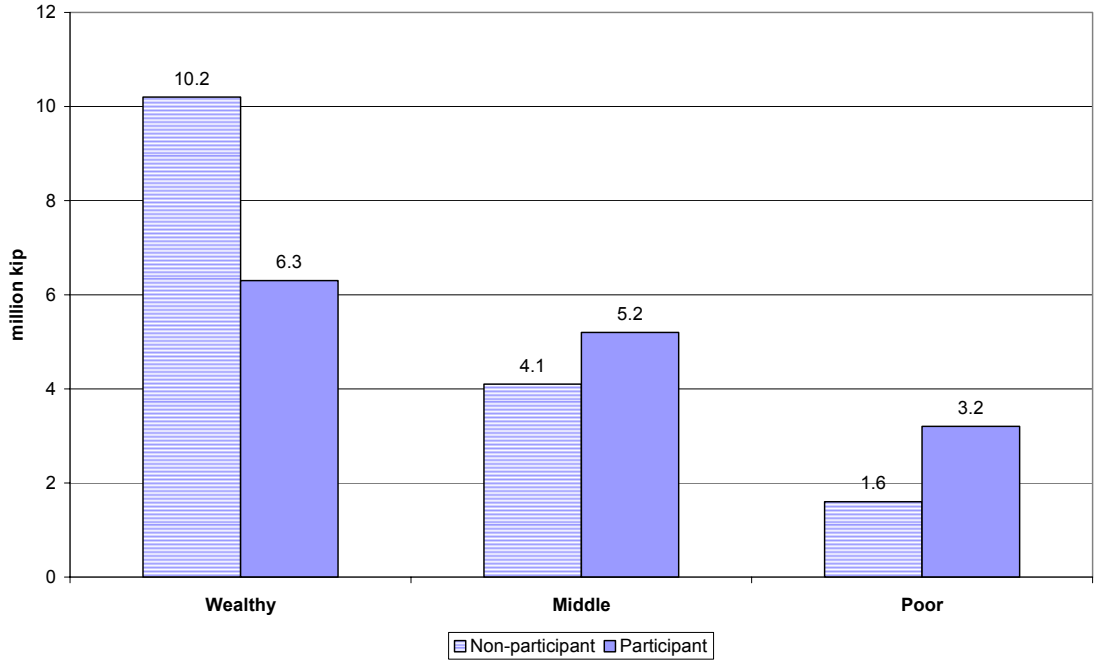
[8] Although the household survey was conducted by the Socio-economic Unit in 2004, household information on the previous year was also collected based on recall.



Source: Based on Household Survey (2004, 2005)
Figure 10 Changing sources of primary income in LSUAFRP research sites

Economic status of households participating in LSUAFRP farm trials

Using household data collected during a survey conducted between December 2006 and January 2007 we are able to compare the economic situation of households that participated in LSUAFRP farm trials and those that did not participate in the trials. The Farmer Survey covered over 200 households from villages where LSUAFRP have been working. From Figure 11 we observe that average annual income of 'Middle' and 'Poor' households that participated in farm trials are higher than those that did not participate in the trials. In particular, the average annual income of the 'Poor' households that participated in farm trials are double the income level of households that did not participate in the trial. Average annual income of 'Wealthy' households is 1.6 times higher than those households participating in farm trials.



Source: Based on Farmer Survey (2007)

Figure 11 Comparison of average household income between farmers in LSUAFRP research sites

In the meantime, Table 7 shows different sources of income and its share between households that did not participate in farm trials and of those that participated in the LSUAFRP farm trials. The table shows that cash crop accounts more than 50 percent of income for non-participant of farm trials, while cash crop's share of income among participant of the trials ranges between 43 to 57 percent. Households of 'Middle' and 'Poor' classes that participated in farm trials also have higher share of income accruing from livestock (24 and 33 percent respectively) compared to households of same social classes that did not participate in the trials (12 and 5 percent respectively). On the other hand, share of income from other sources are higher for households that did not participate in farm trials.

Table 7 Share of income between different non-participant and participant

Cash crop's share of income	**Non-participant**	**Participant**
Wealthy	60%	47%
Middle	57%	57%
Poor	50%	43%
Livestock's share of income	**Non-participant**	**Participant**
Wealthy	27%	30%
Middle	12%	24%
Poor	5%	33%
NTFP's share of income	**Non-participant**	**Participant**
Wealthy	2%	15%
Middle	9%	11%
Poor	13%	14%
Share of other sources of income	**Non-participant**	**Participant**
Wealthy	11%	8%
Middle	22%	7%
Poor	32%	10%

Source: Based on Farmer Survey (2007)

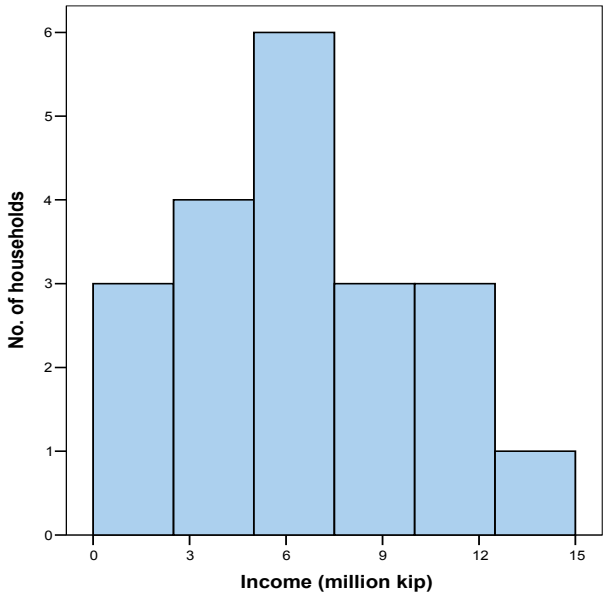
From Table 7 we are also able to rank the relative importance of income sources among different classes of households. Table 8 indicates that for both households that participated and did not participate in farm trials, cash crop are the primary source of household income. Table 8 also shows that for those households that participated in farm trials, relative importance of different sources of income is same across the different social classes in the order of cash crop, livestock, NTFP, and other sources. While cash crop is also an important source of income for households that did not participate in farm trials, livestock's relative importance for household income among 'Middle' and 'Poor' households are lower compared to 'Wealthy' households.

Table 8 Sources of income and their relative importance to households

Relative importance of income	Non-participant			Participant		
	Wealthy	**Middle**	**Poor**	**Wealthy**	**Middle**	**Poor**
No. 1 source of income	Cash crop	Cash crop	Cash crop	Cash crop	Cash crop	Cash crop
No. 2 source of income	Livestock	Others	Others	Livestock	Livestock	Livestock
No. 3 source of income	Others	Livestock	NTFP	NTFP	NTFP	NTFP
No. 4 source of income	NTFP	NTFP	Livestock	Others	Others	Others

Source: Based on Farmer Survey (2007)

Economic status of households that achieved success with farm trials



Source: Based on successful farmers' stories (2007)

Figure 12 Distribution of household income of successful farmers

In the meantime, the average annual household income of farmers that achieved success with farm trials is estimated at 6.6 million kip (approximately 695 USD). Figure 12 indicates that range of household income of successful farmers. Thus, majority of farmers that achieved successes with farm trials fall in a social class between 'Middle' and 'Wealthy' households. Among the top 25 percent households with the highest annual income include those households that participated in maize and legume trials, off-season cabbage, fodder and cattle production trials, as well as those families that sold intercrops from integrated fruit-tree and integrated *Aquilaria* tree trials. In particular, Mr. Vatho from Nambo village in Phonexay district that participated in off-season cabbage production was particularly successful in generating more than 90 percent of annual household income from cabbage production alone. Meanwhile, Mr. Xiengbunpong in Phonthong village (Phonexay district) was able to generate more than 40 percent of household income from farm trial (See Appendix 3). As had been noted in the earlier section on indirect benefit of the farm trials,

farmers that achieved success with trials claim that increased household income from improved agricultural production had contributed significantly in allowing the households to purchase food and clothes for the family, as well as paying for medical services. Others also claim that increased income had allowed them to rent land, as well as purchasing vehicles and other agricultural inputs (i.e. rubber seedlings) to further expand their commercial agricultural production.

V. Approaching the poor and addressing the gender issues to promote sustainable agriculture in the uplands

Involving poor households and addressing the rural poverty

LSUAFRP made an effort to understand the key problems faced by rural farmers in two districts through series of diagnostic surveys at the district and village levels. Diagnostic household surveys were conducted in September 2003 to further understand the conditions of rural poor in LSUAFRP sites. Results of the household diagnostic survey illustrate main problems faced by rural poor. This includes shortage of household labour, and limited access to land (SERC 2004a,b). Relatively poor households are also prone to engage in wage labour to support their family's need for food and income, which also adds to the labour shortage of the poor households. In terms of possession of assets, two reports from the household diagnostic survey claim wealthy households have a greater numbers of large livestock as well as capital that can be used to invest in agricultural activities. On the other hand, poor households do not have sufficient capital for investment, and rely on small livestock such as pigs and poultry for food and income.

In the meantime, the results of village level diagnostic survey conducted at the beginning of the Programme highlighted the problem of rural poverty in the uplands. This led to development of farm trials to improve farming practices and livelihoods of the poor households. FSR/E Component also led Participatory Rural Assessment (PRA) in 2004 to analyze problems faced by villagers in each village focusing on agricultural production and livelihood. PRA was also used to understand the achievements and constraints of technologies that were introduced to farmers. Meanwhile, FSR/E and NAFReC jointly conducted Participatory Poverty Assessment (PPA) in 2006 to especially focus on the problems faced by rural poor in LSUAFRP sites.

However, as had been shown in the earlier section, income of 'Middle' and 'Poor' households that participated in farm trials are better compared to those that did not participate in the trials. This possibly indicates that trials did not necessary involve the poorest of the poor in the village. Results of Farmer Survey also indicates that average rice shortage month across three classes among households that participated in farm trials and those that did not are the same: no shortage for 'Wealthy' while 'Middle' and 'Poor' have one and three months of rice shortage respectively. Table 9 indicates that there is also little discrepancies between availability of household labour among those that participated and did not participate in farm trials.

Table 9 Numbers of average household labour

Social class	Non-participant	Participant
Wealthy	4	4
Middle	3	3
Poor	2	3

Source: Based on Farmer Survey (2007)

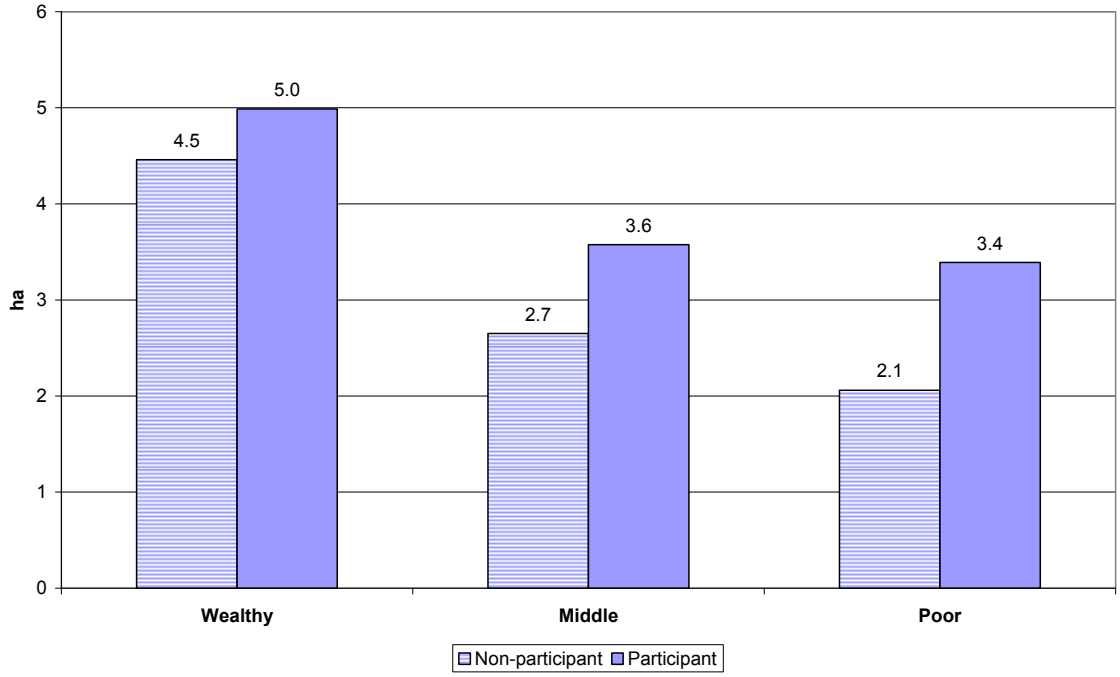
However, in terms of land access Table 10 and Figure 13 show that farmers that participated in farm trials have greater access to agricultural land across different ethnic groups as well as social class. During a discussion with farmers from different villages in March 2007, some farmers claimed that households that participated in farm trials were selected based on the location of their lands: Relative proximity to roads and accessibility were considered as one of the criteria in selecting sites for farm trials as these trials

require close follow-up by district extension staff.

Table 10 Average agricultural land size of households in LSUAFRP sites by ethnicity
Unit: ha

Ethnic group	Non-participant	Participant
Hmong	2.8	4.2
Khmu	2.5	3.3
Lao	3.7	3.4
Leu	1.0	-
Phu Noi	0.6	-
Pu Xang	3.0	5.6
Tai Dam	1.3	3.1
Yang	2.1	3.6

Source: Based on Farmer Survey (2007)



Source: Based on Farmer Survey (2007)
Figure 13 Average agricultural land size of households in LSUAFRP sites by social class

Addressing the gender issue

With regards to the gender issues, LSUAFRP approached to understand the gendered division of labour within rural households and constraints faced by women. In particular, PPA conducted in 2006 approached to understand the conditions of rural poverty from both female and male perspective (NAFReC 2006a and b, Calub et al. 2006). This required selecting female and male facilitators from the Programme to discuss problems separately in gendered groups. This approach was essential as public meetings in villages are often dominated by male representatives from households. Based on PPA in Houayman village, Calub et al. (2006) claims that women are concerned about having too many children in the family, as well as their lack of knowledge to supplement declining agricultural yields (mainly rice) while men are more concerned about not having enough cash income, rice and labour.

As performance of the trials is often recorded at the household level it is difficult to assess whether the introduction of agricultural technologies by LSUAFRP had incurred changes in gendered division of labour within households. However, a data collection carried out in Namo district by Phiasaka in 2005 shows gendered division on decision making for agricultural production. Table 11 also indicates differences across three political divisions of ethnic groups (*Lao Lum, Lao Theung, Lao Soung*). From the table, we observe that more than 70 percent of *Lao Lum* households jointly plan for agricultural activities and decide what to plant, while these decisions are mainly made by male members in *Lao Soung* households. For *Lao Theung* households, planning for agricultural activity is either jointly made or by male, while higher percentage of *Lao Theung* households claim that men make decisions on what to plant. As for decisions on purchasing agricultural inputs, share of men making decisions are higher across three groups.

Table 11 Gender division on decision making for agricultural activity

Planning agricultural activity			
	Female	**Male**	**Joint**
Lao Lum (n=24)		25%	75%
Lao Theung (n=7)	14%	43%	43%
Lao Soung (n=27)	4%	70%	26%
Decisions on what to plant			
	Female	**Male**	**Joint**
Lao Lum (n=24)	4%	17%	79%
Lao Theung (n=7)	29%	43%	29%
Lao Soung (n=27)	11%	70%	19%
Purchase of agricultural inputs			
	Female	**Male**	**Joint**
Lao Lum (n=24)	0%	54%	46%
Lao Theung (n=7)	29%	43%	29%
Lao Soung (n=27)	7%	81%	11%

Source: Based on survey conducted in Namo district by Phiasaka (2005)

Furthermore, Table 12 shows gendered division on management of livestock. As had been noted in Calub et al. (2006), the table shows that female have greater share of decision for managing small livestock including poultry and pig. For decisions on sales and purchase of large livestock (i.e. cattle, buffalo, goat), Table 12 indicates that *Lao Lum* households tend to jointly decide, while the decision are mainly made by men among *Lao Soung* households.

Table 12 Gender division on management of livestock

Decisions on sales/purchases of large livestock			
	Female	**Male**	**Joint**
Lao Lum (n=24)	8%	17%	67%
Lao Theung (n=7)	29%	43%	29%
Lao Soung (n=27)	0%	70%	26%
Decisions on sales/purchase of small livestock			
	Female	**Male**	**Joint**
Lao Lum (n=24)	63%	8%	29%
Lao Theung (n=7)	57%	14%	29%
Lao Soung (n=27)	56%	22%	22%

Source: Based on survey conducted in Namo district by Phiasaka (2005)

VI. Afterthoughts and recommendations for Phase II

Farm trials and data management

One of the major difficulties in assessing the impact of farm trials was the lack of systematic management of data and monitoring of technologies. As had been pointed out by Keobunnam et al. (2007), records of farmers that participated in trials were often uncertain, and were not systematically updated. Furthermore, details of farm trials (i.e. rational, research questions, methods, implementation, results, and follow-up) were not managed systematically and shared across researchers and extension workers at different levels of the Programme to monitor the performance of each trial. During our review of the farm trials, staffs that were responsible of farming trials in district offices in Namo and Phonexay districts that told us that the records of trials were sent to NAFReC and to NAFRI, while they did not have a systematic filing system (i.e. filed hard copies, no systematic filing of soft copies or backing up in case of computer hardware problem). Neither at NAFReC and NAFRI, information on each trial was not readily filed for review.

These problems require more systematic management of data and monitoring if in case the new Programme phase continues to engage in farm trials. This is particularly important considering the high staff turnover at NAFRI and its line agencies. An example of the monitoring system was recommended by the Farming System and Extension Research Component Advisor in 2004 (e.g. Progress Monitoring Record Book, Quarterly Progress Report). However, as majority of researchers and extension workers at NAFRI, NAFReC and district offices lack research experience, it is necessary to regularly supervise and train documentation of research process, and develop a systematic monitoring process that can be shared across the Programme. The information on household and its members that participate in trial activities also needs to be linked to the household information to avoid redundant data collection by the Programme.

Addressing the rural poverty

In order to address the government goal to alleviate rural poverty in the upland areas of Laos, the Programme also need to understand conduct an in-depth analysis of household well-being. While characteristic and causes of poverty were analyzed by LSUAFRP's diagnostic studies, it is essential to understand whether the conditions surrounding rural poor have changed over the last years. In particular, we need to understand how different changes including relocation and transition towards market economy are affecting different groups in the research site, and whether these changes are building households' resilience to cope with change or increasing vulnerability. At the same time, researches in the future should address ways to improve households and communities' ability to cope with changes.

While different sets of household data generated during Phase I take note of household economic status (e.g. "well-off" or "wealthy," "middle" or "poor," and "poor" or "very poor"), it fails to provide an accurate picture of the status of poverty, as the criteria of classes differ in each village and the classification often depends on the judgment of village leader. To understand the changing household social and economic well-being, future survey needs to take note of other key indices ranging from food sufficiency, income, access to land, assets, numbers of healthy household members, numbers of children with education, and housing conditions. A new ranking of family's social and economic well-being can be measured using these indices.

Promoting gender balance and addressing the issues of ethnicity

There are still limited efforts made by the Programme to investigate gendered impact of farm trials. This is partly due to the fact that farm trials are initiated at household level. However, PPA and other case studies point out the existing discrepancies between men and women's access to information on agricultural technology and market. While Calub et al (2006) claims that relatively high rate of illiteracy among women

in rural areas creates a barrier for women in participating in farm trials, the Programme should make efforts to provide information on agricultural technology through other media for women across different ethnic groups. Also, the Programme should also make conscious effort to provide equal opportunities for both sexes in terms of training, and approach women's group in villages separately when necessary to enhance their participation in sharing ideas and experiences. This will be particularly important when working with women of minority ethnic groups that may not have the language skills to communicate in Lao language. The Programme also needs to consider working in local language as much as possible.

At the same time, impact of agricultural technologies and changes in farming system also needs to be studied from gender perspective: whether the new technologies and farming system incur more labour on men or women; how the benefits derived from new technologies and farming system are distributed across men and women in the same household. It is also important for the Programme to raise awareness on gender across institutions, as there is still a strong tendency within NAFRI and other government agencies to assign women to study the gender issues and to treat gender issues as separate from the agriculture and development research.

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Appendix 1 Types of on-farm activities and trials

Types of on-farm activities	On-farm trials
Annual Crop (or Integrated Annual Crop-based Farming Systems)	Corn and legume Lowland rice Upland rice Vegetables (Cucumber, tomato, etc.)
Perennial crop (or Perennial Crop-based Intercropping Systems)	Aquilaria and fruit tree Aquilaria, bohemeria (*Peuak Meuak*) Bitter bamboo Black ginger Cardamom Broom grass (*Khaem*) Bohemeria (*Peuak Meuak*) Rattan Rubber and annual crop Silk Worm and mulberry tree Teak, paper mulberry and annual crop *Yang Bong* and bohemeria Fruit tree Rubber and fruit tree Rubber Teak and Job's tear
Livestock (Crop-animal Farming Systems)	Pig, pigeon pea and cassava Chicken, pigeon pea and cassava Duck and lowland rice Forage and cattle fattening Cassava Fish Frog Fodder and cattle Fodder and goat Fodder seed production

Source: Farming System Research and Extension Component (2007), Forestry Research Component (2007)

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Appendix 2 Numbers of households that participated in farm trials: 2002-2006

Namo District

Unit: numbers of households

Year	Perenial crop															Annual crop					Livestock									
	Aquilaria and fruit tree	Aquilaria and peuak meuak	Bitter bamboo by root	Black ginger	Cardamom	Khaem	Peuak meuak	Rattan	Integrated rubber and annual crop	Silk worm and mumberry tree	Integrated Teak, posa and annual crop	Yangbong and peuak meuak in fallow	Fruit tree	Rubber and fruit tree	Rubber	Teak and Job's tear	Corn and legume	Cucumber	Lowland rice	Upland rice	Vegetable	Pig, pigeon pea and cassava	Chicken, pigeon pea and cassava	Duck in lowland rice	Forage and fattening	Cassava	Fish	Frog	Fodder and cow	Fodder and goat	Fodder seed production
2002	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0
2003	2	0	0	0	19	0	0	0	0	3	0	0	36	0	0	0	11	0	8	5	7	3	5	6	0	1	7	7	0	0	10
2004	10	0	2	0	4	0	14	1	0	0	0	0	26	10	8	0	14	0	3	0	6	11	19	12	0	0	10	0	0	10	3
2005	8	5	2	0	3	0	14	0	0	0	0	0	44	18	10	0	9	0	5	4	2	9	16	0	0	32	0	6	17	2	9
2006	9	11	0	0	6	0	14	1	1	0	0	0	21	14	13	0	5	11	0	6	4	6	11	1	0	0	27	0	6	18	3

Phonexay District

Unit: numbers of households

Year	Perenial crop															Annual crop					Livestock							
	Agar-wood and Fruit tree	Agar-wood+PuekMuek	Bitter Bamboo by root	Black Ginger	Cardamom	Khaem	PuekMuek	Rattan	Integrated rubber and annual crop	Silk Worm Mumberry	Integrated Teak, Posa and annual crop	Yangbong and PM in fallow	Fruit tree	Rubber+Fruit tree	Rubber	Teak+Job's tear	Corn+Legume	Cucumber	Lowland Rice	Upland Rice	Vegetable	Chicken+ Pigeonpea and cassava	Duck in lowland rice	Forage and fattening	Frog	Grass and Cow	Grass and Goat	Grass for seed production	Pig+Pigeonpea and cassava
2002	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	0	1	4	2	0	0	13	0	0	1	0
2003	1	0	0	0	0	0	0	0	0	0	31	0	0	1	2	0	10	1	9	18	10	2	18	17	2	1	15	0
2004	19	3	0	4	0	2	0	1	0	0	0	7	0	0	17	3	0	4	1	10	16	9	0	0	0	7	4	21
2005	20	9	0	0	0	2	1	1	14	0	6	15	0	0	22	14	0	0	3	7	8	26	0	0	16	12	3	16
2006	16	7	0	0	0	2	3	1	20	4	7	4	12	0	0	22	1	0	0	5	11	8	7	1	0	0	7	5	9

Source: Record of households participating in trials (2007)

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Appendix 3 Success stories of farmers
(Translation from original document written in Lao)

Cultivating cabbage on and off seasons have significantly improved family income: Case of Mr. Vatho in Nambo village, Phonexay district

"I am now really able to cultivate cabbage!" said Mr. Vatho. He continued to say that he is able to cultivate cabbage based on his past experience. But what about off-season cabbage production? Mr. Vatho consulted Mr. Khamsompheng who is responsible for agricultural activities supported by LSUAFRP at the Phonexay district in 2003. Mr. Khamsompheng then provided him with technical advice. In particular, he recommended Mr. Vatho to be attentive during the seeding period (25-30 days). After the seeds germinates, cabbage plants can be transferred and planted with 40 x 40 cm spacing. Beds for cabbage plants must be prepared in advance (5-7 days prior to planting) using ground soil (25-30 cm deep). The beds should be 40-50 cm high from the ground. This is followed by application of natural fertilizer i.e. dried cattle dung (0.5 kg per square metre). Cabbages can be planted during May and September. It should be harvested after 90-120 days. The full size cabbage should weigh approximately 2 kg. Approximately 18 ton is harvested from one hectare of land.

Mr. Vatho's family helping harvest of cabbage

Mr. Vatho and his vegtable garden

Mr. Vatho is 46 years old and his wife Ms. Vamy is 40 years old. They only have two main labour in the fmaily. In 1997, the family lived in Tinpha village. Upland rice cultivation was the main agricultural activity. Although he also produced cabbage when he was living in the old village, he could only produce one season and the yield was low. Previously his family had rice shortage averaging 6 months. They also had limited income source to buy things for the family. The family resettled in the current village in 1998 but continued to cultivate upland rice. Mr. Vatho gradually began to think how he can lift his family's well being.

In 2002, Mr. Vatho became interested in farm trial supported by LSUAFrp. He decided to use 0.32 ha of his land to plant cabbage (HAYA variety). Initially, he was confused because farm trial required many steps and the technology introduced was different from what he was used to. However, he and his followed extension workers advice in weeding, applying fertilizers, watering and treating pests. After 70 days, both husband and wife began to smile as they had more cabbage than before. They continued to take care of the cabbage after 90 days, by late 2002 they were able to produce a ton of cabbage which yielded 3 million kip. He continued to cultivate cabbage in 2003 in the same area and was able to increase the production up to 6 tonnes earning total of 12

million kip. Because of the couple's urdous effort, the family now had enough to eat. They were also able to purchase a motorbike for 5 million kip to travel to and from his cabbage field to the village. Ms. Vamy no longer had to walk to the field every day. They were also able to purchase school items for their children. Not only were they able to improve household income but also the family's social status in the village improved.

In 2004, they were able to raise up to 14.5 million kip from cabbage production, followed by 11.7 million kip in 2005. The income declined in 2005 due to flooding that damaged the crop. Increased annual income had allowed his family to build permanent home. In 2006, his household income accounted 33.5 million kip as he not only cultivated cabbage but also tomato, and raised livestock.

Fodder production had helped to increase live-weight of the capital and saved household labour: case of Mr. Xiengbunpong in Phonethong village, Luang Prabang

Phonthong village is located in the remote areas of Luang Prabang Province. Mr Xiengbounphong is 59 years old and is Tai Phuan ethnic origin. His family has been living in this village for generations. He used to cultivate upland rice, maize and sesame. He is living with total of eight household members with four household labour. In 1996, his family was allocated a paddy rice field (0.72 ha) and its cultivation became his family's mainstay. Mr. Xiengbunpong said that "In the past, our family did not have sufficient cash income and was poor. We had little household labour and didn't have enough money to send the children to school. We grew crops and raised animals but were not so productive. Livestock were free grazed and our animals were prone for theft and disease regardless to our effort in raising them."

In 2005, LSUAFRP expanded its activities in Phonthong village. It is not only far away but also mountainous and cold. The Programme introduced many activities including integrated tree planting, corn and legume production, fodder and livestock production (especially goat). During that time, Mr. Xiengbunpong decided to participate in cattle and fodder production activity. One of his early motivations was that he wanted cattle to graze (by free grazing). When the extension staffs, Mr. Meut and Choy introduced livestock fodder production trial, many farmers felt dumbfounded as there were lots of natural grazing land. Farmers wondered "why do we have to grow grass?"

Farmers were organized into a production group, and there were 14 households in his group. The group planted three types of fodder in total of 3.3 ha field. At the end of 2005, the Programme provided two cattle per household. After receiving the cattle, all members of the group began to prepare grazing land. Mr Xiengbunpong was responsible to manage 0.18 ha of grazing land. He planted two types of fodder (i.e. Guinea and Lousy). After having the experience with the farm trial, he was able to continue growing fodder.

Mr. Xiengbunpong was selected as a member of the cattle production group as he participated in a study tour to Xiengkhouang Province, which was organized by the Programme. In the three villages that he visited, he saw that young children and adults were cutting fodder crops planted near the house to feed their cattle. This method shortened the time required for raising cattle. Discussion with farmers that experienced this method, and observation made him certain of the technology.

In 2006, he continued to raise cattle and was able to improve his household income from selling fodder seeds (130 kg) at 3.74 million kip. This allowed his family to purchase food and other items for family members. In addition to the income, Mr. Xiengbunpong feels that the technology

saved his household labour and allowed him to engage in other activities. He was able to increase the numbers of cattle and improve the health conditions of his cattle.

Group-based fodder production and grazing

Mr. Xiengbunpong dedicated his time and efforts because he was interested and eager to learn new technology. He particularly learnt that the new technology emphasized on providing sufficient food for livestock that had high nutritional value. In addition, setting up feeding ground, and regularly vaccinating livestock also improves cattle production. He also divided tasks among different members of the family. Mr. Xiengbunpong would like to encourage other farmers in the village to apply this new agricultural technique to expand the cattle production.

Appendix 4 Village wealth ranking introduced by IFAD project in Oudomxay

Categories	Indicators
Leua kin (Surplus food)	• Surplus rice, sells and lends to others • Sell cash crops, NTFPs and livestock between 500,000 to 700,000 kip per year • Cattles more than 8 heads, small animals more than 10 heads, poultries more than 30 • Owns a lot of agricultural land • Owns assets including a tractor, TV, rice mill, solar panel, small electricity generator, etc.) • Children go to school and few family members are ill; can spend for treatment and has enough clothes • Permanent house
Kum kin (Sufficient food)	• Surplus rice • Sells cash crops, NTFPs and livestock between 300,000 to 500,000 kip per year • Cattles more than 5-8 heads, small animals more than 5-10 heads, poultries more than 20-30 • Owns enough agricultural land • Don't have assets (i.e. TV, solar panel, small electricity generator, etc.) • Children go to school and few household members are ill; can spend for treatment and has enough clothes • Half-permanent house
Pan kāng (Middle)	• Rice sufficiency to eat for whole year • Sell cash crops, NTFPs, and livestock and earn between 200,000-300,000 kip per year • Own 2-5 calltes, 2-5 small animals, and 10-20 poultries • Own medium agricultural land • No assets • Children go to school and few household members are ill; can spend for treatment and few clothes • Half permanent house
Thuk nyāk (Poor)	• Not enough rice to eat for 1-3 months per year • Sell cash crops, NTFPs and livestock between 50,000 to 100,000 kip per year • Own none or one cattle, none or 1 small animal and 5-10 poultries more than 30 • No assets • Have to go for wage labour for money • Not enough agricultural land • Children can not go to school and several household members are ill; can not pay for the treatment and does not have sufficient clothes • Temporary house
Thuk thisut (Most poor)	• Not enough rice for more than six month • No income from cash crops, NTFPs, or livestock • Doesn't have any livestock • No assets and needs to go for wage labour

	• No or little agricultural land • Children do not go to school and several household members are ill; does not have enough money foe treatment and does not have enough clothes • Temporary house