PARTICIPATORY LIVESTOCK DEVELOPMENT PROJECT

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EXTENSION APPROACHES

FOR

LIVESTOCK DEVELOPMENT

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MAP OF THE PROJECT AREA

ACRONYMS

ACIAR	-	Australian Centre for International Agricultural Research
ADB	-	Asian Development Bank
CIAT	-	Centro Internationale Agricultura Tropicale
DAFO	-	District Agriculture and Fisheries Office
DLF	-	Department of Livestock Fisheries
EU	-	European Union
FLSP	-	Forage and Livestock Systems Project
FMD	-	Foot and Mouth Disease
HH	-	Household
HS	-	Haemorrhagic Septicaemia
ICI	-	Inter Calving Interval
ILRI	-	International Livestock Research Institute
PAFO	-	Provincial Agriculture and Forestry Office
PD	-	Pregnancy Diagnosis
PLDP	-	Participatory Livestock Development Project
PPTA	-	Project Preparation Technical Assistance
VVW	-	Village Veterinary Worker

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I. EFFECTING CHANGE IN THE AGRICULTURE SECTOR

A. Traditional Production Systems

1. The northern region comprises an almost continuous succession of rolling hills and rugged mountains. Wherever possible, floodplains and valley floors are developed for lowland rain-fed rice production. Because of the limited area of lowlands, farmers depend to a large extent on upland agriculture, with shifting cultivation accounting for 55% of the cultivated land[1]. With 80% of the population in the north being ethnic minorities, the practice of shifting cultivation is often assumed to be ethically determined. However, given the hilly topography and low population densities, shifting cultivation was formally the most pragmatic choice for upland farmers. Upland cultivation is dominated by rice, the staple crop, with maize, cassava traditionally grown as feed for livestock, and a few cash crops, such as sugar cane and cotton. Collection of non-timber forest products such as cardamom, bamboo shoots etc., also provide cash income. Livestock are the main source of cash income in upland farming systems, but are also used as a wealth accumulation mechanism and converted to cash only when needed, and so are raised in extensive systems.

2. Agriculture is essentially low input and low output subsistence production, with farmers growing a wide range of products for immediate household consumption. It needs to be understood that production systems have evolved in response to local conditions, rather than from cultural or outside influences. For example, the three main types of shifting cultivation systems[2] are not particular to any one ethnic group, including the Lao Loum. Within each ethnic group, all these systems may be used according to local conditions[3]. Farmers adjust their production systems according to local the local conditions. To illustrate this, the Design Team encountered dramatic difference in management of cattle in villages just a few kilometres apart; from supervised grazing, to free range grazing of forest areas. The diversity of the environment and farmers adaptations to this is a characteristic of the northern region that extension approaches must accommodate.

3. Different degrees of social organisation are also evident amongst communities with these diverse production systems. For example, the brushwood weirs and associated earthen delivery canals in traditional irrigation systems require constant maintenance and the distribution of water a high level of management. Communities with these systems have water user groups to manage the facilities. The same applies to livestock production systems. The Livestock Systems Survey (LSS) encountered many communities with locally adapted arrangements for communal grazing. Others had local rules for pig raising, confining them to protect crops, but then releasing them on designated days, to allow mating. Such arrangements have developed spontaneously, but do indicate that the northern communities are capable of adopting collective management practices for livestock.

4. Productivity in upland crops using slash and burn techniques was and is in serious decline, reference and this has been attributed to the implementation of the Land Use Planning and Land Allocation (LUPLA) process[4]. The decline in productivity was evident well before this program was initiated. Farmers recall fallow periods from the 50's being typically 30 years, which by the 90's, had been reduced to five years. The LUP/LA would reduce this to three years, but except in the more accessible areas this is not monitored and the patterns of shifting cultivation are determined more by local resource constraints than the application of policy. The main issues confronting swidden farmers have not been as might be expected, soil fertility, but weeds, rodents and

[1] Northern Region Development Strategy, Vol. II, p.6 (ADB TA 3969).
[2] Better define the types here
[3] W. Roder. 2001. Slash and Burn Rice Systems in the Hills of Northern Lao PDR: Description, Challenges, and Opportunities. International Rice Research Institute, (p.66).
[4] Participatory Poverty Assessment, Lao PDR ADB, December 2002.

drought[5].Swidden fields previously required two weedings, whereas now at least four are required. Weeding consumes over 50% of the labour inputs and amounts to 200-300 days per ha[6]. Thus farmers are caught in a downward spiral of needing increasing amounts of time for upland rice cultivation, to gain declining yields. This brings into focus, time and labor as the key constraint to development in the highlands. High demands on time and labour, for reducing yields, are a pathway to poverty, while at the same time the household is prevented from exploring any alternative production opportunity. Project interventions will first need of reduce the time and labour burden, as much as to promise improved productivity, if upland households are to be able to respond.

5. The Government's strategic vision for the agriculture sector has highlighted the issues of lagging development in the highlands. The document provides socio-economic data that shows whereas the development of the uplands and the Mekong corridor were similar over the period of 1986-93, from this time on the Mekong corridor entered a period of agricultural transformation whereas the upland areas stagnated[7].

6. Upland farmers are aware of their predicament. They are able to articulate this in discussions, with an increasing number interested in alternative income generating activities. This shift can be made spontaneously and independently by some communities. During the Design Team field trip, several villages were encountered where villagers have recognised the diminishing prospects of shifting cultivation and turned to the purchase and raising of livestock. In other cases, some support is required to bring about change. The" Remote Areas Development Project"[8] provided construction materials, starter packs of seed and technical advice to ethnic Prai farmers to establish paddy cultivation, with 50% of the households doing this within 4 years. This is a dramatic change for communities totally swidden based. Farmers are also changing in response to new market demands. The production of Job Tears expanded rapidly amongst upland farmers, first in Luang Prabang, as soon as a company provided an accessible market for farmers. Paper mulberry has seen a similar expansion, with the location of a processing factory in Luang Prabang. Thus farmers are by no means tradition bound and ready to change from shifting cultivation whrre is there is adequate incentive and support.

7. There have now been several decades of projects for development of agriculture in the highlands, but the main focus has been on arable crops, with an emphasis on soil conservation. There cumlative impact has not been great. Roder, a rice scientist himself, predicted that the solution for the highlands would lie in finding an alternative to upland rice, and nominated livestock or tree crops as the most viable options. At the same time he recognised that tree crops took too long to generate returns, leaving only livestock as the exit from shifting cultivation[9]. There has in fact been little focus given to livestock, other than attempting to reduce mortality through vaccination. Recent experience with the introduction of forages now indicates that its use can lead to an intensification of livestock production, which in turn can lead farmers to change their attitude: from livestock being for wealth accumulation, to that of being an enterprise.

[5] W. Roder. 2001. Slash and Burn Rice systems in the Hills of Northern Lao PDR: Description, Challenges, and Opportunities. International Rice Research Institute, (p.10).
[6] Ibid, (p.88)
[7] "The Government's Strategic Vision for the Agriculture Sector", Vientiane, Lao PDR, December 1999
[8] Ibid (p.167)
[9] Ibid (p.167)

B. Experiences in Agriculture Extension in Lao PDR

1. Early Extension Activities

8. The first effort to institutionalize agricultural extension was begun in 1957 with the establishment of an Extension Division in seven Departments of agriculture, six in southern Lao and one in Luang Prabang in the north. Activities (supported by USAID data collection) attempted to identify problems, train staff, provide inputs and conduct pilot projects. The main extension approach was based on result demonstrations conducted in farmers' fields. In 1967 pump irrigation was introduced to allow second cropping of rice; this was followed but further schemes. The Accelerated Rice Production Program from 1967-69 worked with approximately 10,000 households over four season (wet and dry) and was estimated to produce an additional 22,000 tons of paddy. These extension efforts were however based on inputs, provided to farmers on credit. The use of chemicals was used as an indicator of success, reportedly the use of fertilizer rising from zero in 1965 to 1,300 tons in 1975. While the extension methods might be questioned today for their input focus, this effort did illustrate the impact of extension activities obtained under difficult wartime conditions[10].

9. "Following liberation [1975], improvements in production were attempted through the establishment of cooperatives. The main focus was on rice production and in particular, the practice of composting to improved soil fertility. In support of the co-operatives, a 'hand-on' approach was used, with staff from the Ministry often living in villages and working directly with farmers to instruct them in the use of new technology. In some cases this was effective, but the success cases were small and the approach was abandoned."[11]

10. Following the introduction of the New Economic Management (NEM) in the mid-1980's, various rural development projects in cooperated elements of agricultural extension. Like the USAID programs, the majority of these have been confined to designated geographic locations. These have worked through the PAFO and DAFO staff, but the methods used were variable and often combined with infrastructure development. Generally they were not aimed at building the capacity of these institutions, other than to achieved the immediate objectives of the projects. The majority of these projects operated in a period when most faith for agriculture development was placed in infrastructure development, and agriculture extension was regarded with almost suspicion. This hampered the development of an effective extension service.

11. This project orientation began to change in 1992 with the establishment of the Agriculture Extension Agency (AEA) under the Department of Crop Production. Extension activities were initiated with selected model families, who would provide examples of improved rice production and other production enterprises. DAFO staff identified progressive farmers, and requested them to use an intensive package of technology, and provided seed and fertilizer for the first years of production. To assist the model families, staff from the AEA and DAFO often resided in the village to guide and supervise the families (similar to the model used during the period of cooperatives). This village participation strategy was broadened in 1994 with the training of Village Volunteer Technicians. These were usually nominated by the village headman and trained in short courses. The selection of model families and technicians was not always suitable and they did not fit into any on-going program. These formative efforts did not have a large impact on production"[12].

12. One of the key shifts in the introduction of the NEM was the explicit approval for farmers to engage in independent production activities without having to comply with any sort of regulated

[10] Drawn from, "Evaluation of the Agricultural Extension in Lao PDR FY 1957-1974", Van B.S. Henderson, USAID.
[11] "Consolidating Extension in the Lao PDR" , National Agriculture and Forestry Extension Service, January 2005, p.31.
[12] Ibid, p.32.

plan. This permitted two other mechanisms for agricultural change to occur: contract farming and informal extension.

13. Several attempts were made during this period to initiate contract farming. An indication of the pitfalls for agri-business operators can be seen in a few examples. The Lao Agro Industry Company in Toulakom district Vientiane, cans fruit and sweet corn for export to Europe. The Gold Coin Feed company contracts farmers for maize to produce as animal feed. Both these substantial enterprises had problems obtaining grain inputs as they offered prices below the market or bought on credit with long delays before paying farmers. Several smaller agri-business companies have been established; National Food Products International operates a feed mills and poultry complex in Houayxai district, Bokeo, and the Friends of the Upland Farmers in Luang Namtha purchases soybean and broom grass. Both these smaller companies provide inputs to the farmers on credit, and operate with best fair trade practices. They are well established but, even so, suffered from farmers selling to other buyers despite having received support from the companies. Contract farming has not provided an easy answer to stimulating agriculture production to date.

14. Informal extension has operated through farmer networks with access to information from neighbouring Thailand. This has been particularly effective along the Mekong corridor and had significant effect on production and socio-economic indices of the area. Commercial enterprises of pig production, market gardening, fruit production have flourished, all market driven. The effect of this informal transfer of knowledge and skills is now well recognised and explicitly stated within MAF's document, the government strategic Vision for the Agriculture Sector. This spontaneous and market driven change illustrates Lao farmers' ability to learn new skills and willingness to change production practices.

2. Initiatives for Institutional MAF

15. Since the 1990s a number of projects have demonstrated viable models for strengthen extension in Lao PDR. This has been accompanied by a increasing awareness of the importance of extension amongst MAF decision makes. This has been followed by a gradual institutional change to facilitate moving to a decentralized extension system.

a. Institutional Strengthening of MAF (ADB TA No. 1745-LAO/ TA No. 233-LAO) 1993

16. Beginning in 1993, this Institutional Strengthening of MAF prepared the MAF "Human Resources Development Plan" setting out the national extension strategy for delivering technology to farmers through Farming Systems Extension Workers (FSEW) at district level through reorganized DAFOs. Under the planning framework, FSEW in DAFOs are to be supported by Subject Matter Specialists (SMS) in the PAES. It was successful in providing an overview of the issues faced in institutionalizing extension (staffing, training requirements, etc.). In particular, it identified the need for the bulk of staff at DAFO level to work as generalist extension workers - defined as FSEW's.

b. Farmer Integrated Agriculture Training Project

17. With the belief that development would be follow from infrastructure development, Significant investment was made in the construction of irrigation facilities. These did not have the desired effect and FIAT? was designed to institute farmer managed irrigation. FIAT was funded by a small UNDP grant of US$1.7 million over five years and aimed to strengthen farmer's organizations and government extension agencies.

18. In its first years, FIAT focussed on establishment and training of water user groups (WUG) to maintain and manage irrigation systems. As the project proceeded, it recognized that farmers also needed assistance to improve their production methods if the full potential was to be achieved. It introduced training for production technologies and extension methods to the DAFO staff. The training process was a cascade system using mainly classroom-training by MAF 'Master Trainers' to train PAFO staff, who would then train DAFO staff. staff ? DAFO trainers worked in a limited number of villages. Only one or two staff were trained for one DAFO, too small a number to effect an approach extension. Over the life of the project 66 WUGs were formed and trained, with an estimated effect of an additional 37,000 tons??? of rice due to expanded cropping area and improved practices.

19. FIAT was notable in institutionalizing its extension approach within MAF. It developed a training facility/capacity with National, Provincial and District trainers training master trainers, 90 provincial trainers, and 209 DAFO staff, respectively. The project contributed to an appreciation of 'staff training' as a legitimate operation, and has left a legacy of effective trainers at PAFO and DAFO levels from which other projects have benefited.

c. Pilot Extension Project

20. The project aimed to develop the extension system at the national, provincial and district levels. This was to be achieved through implementing extension on a pilot basis in four district of two southern provinces Champassak and Saravan. The project was conducted in a parsimonious manner to provide a model that could be replicated and scaled-up. Furthermore the project operated completely from within the Lao institutions of the AEA, PAFO and DAFO.

21. The project attempted (i) to establish an extension approach/methodology that could be applied by DAFO staff and (ii) to establish a training model that could be institutionalised, if MAF agreed to the proposed extension approach. The first followed a simple four step process that conforms with most learning cycles: problem identification; training and implementation of improved technology; follow-up; and evaluation.

22. The extension approach had an exploratory learning approach in which technologies were introduced to farmers on a trial basis, and farmers would assess the outcomes themselves. Inputs were provided to farmers only where they were needed for trials. The pilot villages were resource poor, being all rain-fed paddy with most households suffering from rice deficits of a few months each year. Despite these natural disadvantages, by the third year of the project, in 46 villages of the four pilot districts, 40% of all households adopted the improved technologies[13] covering 20% of the planted rice area. The project estimated that reporting an average increase in yield of 50%. The value of the additional rice generated in this final year alone was 20 times the cost of extension field activities for the full three years[14]. This comparison was used by the project to indicate the high returns possible to extension in Lao PDR when starting from a low technological base.

23. Training of DAFO used an interactive, mentored approach. Relevant training modules were delivered prior to the period when they were to be used in the field. Members of the training team accompanied DAFO extension workers to the field to mentor the initial implementation and review their performance. The initial capabilities and natural talent of the staff varied great deal, but all demonstrated significant improvement in technical knowledge, extension skills and planning of extension activities. It required two seasons for staff to understand the dynamics of extension. By

[13] Improved seed, and minimum fertilizer application applied at recommended times

[14] Transport, Perdiem, materials for field demonstrations, office materials, etc amounting to approx 6/year for 6 staff working in 12 villages.

the end of the third year they were able to plan extension activities and conduct short training courses for farmers.

24. The project drew on technical staff from all sectors (crops, livestock and forestry) and implicitly worked with these as 'generalist' extension workers. PEP initially avoided addressing the organisational structure of the DAFO and the administrative processes under which it operated. However, it became apparent that the structure and organisation of DAFO was constraining extension activities. Project activities then included a series of activities to engage extension administrators (Heads of DAFO, PAFO, and MAF, the Heads of Department of Crop Production, and the AEA) in a dialogue to review the functions of the DAFO and its structure. The concrete impact on production achieved by DAFO staff working as generalist extension workers contributed towards MAF restructuring DAFO, to separate extension and regulatory functions, and having technical staff designated as Farming Systems Extension Workers. PEP is recognised as having great influenced the methodology used by subsequent extension projects.

d. Integrated Pest Management

25. The FAO's Integrated Pest Management program began activities in Lao PDR in 1996 at the same time as the PEP, both based in AEA. The extension methodology sought to persuade farmers to critically observe their production systems for rice, so as to become informed decision makers in adjusting their practices. It provided a model for experiential or exploratory learning. This was introduced through intensive weekly sessions with a selected group of farmers in target villages who made close observations of a specific plot throughout the season, known as Farmer Field Schools (FFS). The intensity and frequency of these extension inputs aimed to generate a 'habit' of observation amongst farmers. Since introduction, the program trained over 100 extension staff, who have conducted 400 FFS affecting 14,000 farmers. The increase in yields due to improved practices is an estimated 25%.

26. Despite its effectiveness, it is staff intensive and cannot provide wide coverage, and is not directly applied to other production activities. However, many of the farmers and staff who have worked through a season have gained an experimental attitude and analytical skills which can be applied to any other agricultural enterprise. The implementation of IPM and the commitment of its trainers continue to contribute towards acceptance of participatory approaches in Lao PDR and the efficacy of extension in general.

3. Extension Experiences Within the Livestock Sub-sector

a. Strengthening of Livestock Services and Extension Activities

27. The European Union funded "Strengthening of Livestock Services and Extension Activities Project"[18] (SLEAP) has been the most substantial (Euro 5.7 million) working with animal health and livestock production. The project was implemented in five northern provinces in two phases: Luang Prabang and Luang Namtha (1998-2000) and expanded to Oudomxay, Sayaboury and Bokeo (2000-2004). The objective was to: *"enhance small holders financial autonomy, through improving the income from livestock"*. The specific objectives were; *(i) to strengthen veterinary services (ii) to reduce disease incidence, improved management practices and increase livestock productivity.* The project worked with large ruminants, pigs and chickens, but eventually focused on pigs and chickens as these species were managed to some degree, making it possible to deliver the animal health interventions, the main technical focus. The project had a number of wide-ranging programs including legislative formulation, disease information systems, diagnostic laboratory services and an extension component.

28. The extension component had four main activities: (i) training of village veterinary workers (VVWs); (ii) training of farmers; (iii) supply of credit and (iv) development of a Village Livestock Information System, (VLIS). Where possible these activities were undertaken in the village. The credit supply was used to provide 'parent stock' to keepers of improved breeds of pigs and chickens (Sjin Ji pigs and Yellow chickens from China) which were then to be provided to model farmers through a revolving fund. These model farmers were the first to attend the short courses (1 week) on pig and chicken production in either Luang Prabang or Vientiane. Selected farmers were trained as VVWs, and the VLIS established. Their activities reached a total of 822 villages from 64 districts, with 70,822 households benefiting. Even though the VLIS had been institutionalized when the project ended, so did the data collection activities. The data is still considered to be of some value and showed a decrease in mortality of buffalo, pigs and chickens by about 20% and of cattle by 7%. Despite this, increases in productivity were insignificant, except for pigs (+37%) stimulated by the use of credit to obtain pigs.

29. Technical information was introduced by short course training events for farmers, in production and animals health interventions. These were supported by posters and books on pig and poultry production. DAFO staff contact at the village level was to use VLIS to illustrate the results of the model farmers and the vaccination as lessons to other farmers in the village.

30. While the EU project made a good attempt to integrate activities, adoption was still essentially driven by external delivery of technical advice, relying on a demonstration effects. This highlighted several weaknesses. The parent stock introduced (and held by the PAFO) are aging and need to be replaced. These were sourced from China and there are no recurrent resources of funding to obtain these.

31. While vaccinations have continued in some villages, the project admits that many of the VVWs trained were poorly selected, weak and did not have a high enough demand for their services from villagers to operate as an independent commercial enterprise. They estimate that of the 537 VVW trained, only 26 VVW remain effective. Initially it was expected that VVWs would also act as the main change agents for livestock production in their village. But due to the general lack of demand for their services, this did not occur. To provide greater incentive and functionality for the VVW, it was recognized that rather than establishing these in each village and acting as a public good, the VVW should be 'professional' and to work over a wider area. Thus by the end of the project it was realized that VVWs should act as service providers. A similar approach is envisaged for the PLDP, with veterinary services to be provided by farmers as small enterprises with their clientele from a cluster of villages. Thus these will be professional and not 'village' based or 'volunteers' as in the past. The SLEAP introduced 'skills test' for the VVWs. This could be a useful tool for the DLF to use for accrediting farmers trained as veterinary service providers.

32. The VLIS was intended to be a key mechanism for change, by providing contemporary data from the village itself, which could be associated with the demonstration of the model farmers and the animals health interventions. Simplified forms were developed suitable for the low intensity production in Lao PDR. However they were not used for the intended purpose. This mechanism could however be useful.

33. The PLDP envisages a similar mechanism, but to be introduced in the last phase of the project once villagers have begun to develop a market orientation. They will then be committed to maximising performance of their livestock, and it could be appreciated as a useful self-monitoring tool, if introduced at a time when farmers have developed a commitment to livestock production.

34. The supply of credit was provided in five forms; (i) for rearing parent stock; (ii) model farmers, (iii) credit for individual farmers, (iv) commercial credits for small enterprises, and (v) the veterinary supply unit to ensure supply of vaccines etc. Despite a general interest in credit, the credit for individual farmers and for commercial small their were not well mobilised mainly due to

what was considered high interest rates (18%). It was noted that the parent stock keepers outperformed similar efforts to provide improved stock by GoL stations[15]. The credit to model farmers provided the mechanisms to introduce improved breeds. The PLDP will not have any similar introduction, but the credit mechanism is of interest. The project provided livestock to groups of three farmers who were self-selecting and responsible to rotate the animals between them. This avoided the establishment of complicated micro-finance mechanisms and was essentially self-regulating, with a very high rate of payment-on. This approach can be used in the "village poverty animal loan funds"

b. Forage and Livestock Systems Project

35. The Forage and Livestock Systems Project (FLSP) was based on the results of the Forage for Smallholder Project which identified a set of robust forage species that could significantly improve productivity of large ruminants. Expected outputs from the project were; (i) forage technologies contributing to improved livestock management practices which contributed to the economic security of about 8% of households in four districts, and (ii) establishment of four provincial level SMS, and five extension workers in each district.

36. FLSP worked in three districts of Luang Prabang and two districts in Xieng Khouang Province. By the end of the fourth wet season (2004), the project was supporting 26 field staff across the five districts working with in excess of 1300 farmers in 106 villages. Most farmers were planting grasses for cattle and buffalo and about 950 farmers were planting *Stylosanthes guianensis* to feed pigs. By this time, 900 farmers (65% of the farmers working with the project) were benefiting from significant impacts and 790 said they were achieving at least one significant livelihood impact. More than 150 farmers report they have been able to reduce or stop shifting cultivation as a direct result of intensifying their livestock production. More than 200 farmers report that intensifying their livestock production systems has allowed their children to attend school. More than 670 farmers said that labour savings have allowed them to start other livelihood activities. These impacts have been wealth, gender and ethnicity neutral.

37. To bring about these kinds of changes is not a trivial matter and requires the development of extension approaches that would help farmers make these system changes, driven by the demonstrated significant livelihood impacts. The project thus was important to identify key entry points and extension process that could intensify livestock production and deal with the system exchange in diverse production environment. The key lessons were:

- The immediate constraints that farmers felt with their livestock was the time and labor required for cut-and-carry feeding. This was a constant load for pigs, periodic for cattle and buffalo, and in many cases precluded households form raising goats. This provided an entry point for forages to be introduced, initially as a labor saving convenience for farmers to further exploit improved management of their animals. This was a production systems change reflecting a change in farmers' mind-set, from being livestock keepers to being livestock producers.

- New management practices were identified by farmers in the ways they used forages. In particular forages (stylo) were used as pig feed, a monogastric, resulting in increased litter size, higher survival, faster weight gains and reduced labour in collecting and cooking feed. Associated with this is the production of stylo leaf-meal which will provide a high protein feed supplement in the dry season when the stylo plants are dormant.

- Extension processes were identified and piloted. The most important for these being (i) use of PD and livestock-PD to facilitate farmers identifying immediate problems associated with feed, and thus the entry point for forages; (ii) the development pathway leading to systems

[15] "Rural Credit to Promote Pigs and Poultry Production in Northern Lao PDR", by Mirjam de Konig, Oct 2002, p.5.

change as described above; (ii) the use of impacts as examples for secondary villages to adopt the technology.

- The use of cuttings, that enable farmers to expand forage production areas, without further external supplies of planting material, which permits faster and more reliable establishment of forage plots.

- The introduction of forages has been gender neutral with almost equal numbers male and female farmers being involved.

38. These lessons particularly those of the entry point and the development pathways towards intensification of livestock production systems are important for PLDP and have influenced the design of the extension approach. In addition, the training experiences have also been important. FLSP provided a series of networking initiatives, such as monthly meeting of DAFO staff at provincial level and bi-annual workshops across the project. These provided a mechanism for improving management of extension. They also provided an opportunity for exchange and peer mentoring, in effect creating a learning organization which engendered a problem solving capacity among the staff. Most importantly, these networking initiatives developed the team spirit needed for staff to have the commitment to the onerous workload.

4. Experiences with Small Enterprise Development

39. Market systems are quite immature and tend to be based on family and other personal links. However it is an area that is beginning to receive increased attention. This has had just over one year field operation in Xieng Khouang province working with two production chains (i) peanuts and (ii) cattle and buffalo meat. While having been operating for a limited time, it provides worthwhile lessons relating to (i) improving smallholder market orientation, and (ii) scaling-up effect from farmer service providers[16].

40. Peanut was one of the many crops grown by farmers in the cluster of the initial five target villages, but was identified by villagers as the product they felt could best be developed. SADU used a process of villagers selecting 'representatives' to carry out a participatory market chain survey. This began at the far end of the chain with the retailers and worked back through the roasters, traders and collectors to the village. The representatives thereby became aware of (i) scale of market demand, (ii) seasonality of the demand and prices, and (iii) quality requirements. These were reported back to each village, thereby stimulating discussion of the demand and opportunities. Subsequently, stakeholder meetings were held between farmers' representatives, traders and processors. Farmers responded by: doubling production within the one season; and began to retain a portion of the crop to gain higher off-season prices. A dialogue was also established between farmers and the larger traders to trade in bulk. Farmers have also become interested in technologies that will give them higher yields and more consistent' nuts (i.e. higher quality).

41. An additional part of the activity focussed on the shelling of peanuts. Through study trips to other areas, farmers, traders and small machine shop operators were introduced to a range of shelling equipment. As a result of this the machine shop operator began to produce shelling machines which two farmers purchased. These farmers, as well as shelling their own crop, have begun to provide a service to other farmers, first in their own village and then to neighbouring villages. They mobilised their equipment and travelled to six additional villages to provide the service. As they do so, they have promoted the production of peanuts as a cash crop, and it is

[16] "Lessons Learnt: Implementation Year1", Small-scale Agro-enterprise Development of the Uplands Project, CIAT. Feb 2005.

expected that there be a significant increase in peanut production in thee village in the coming season.

42. SADU has also begun to work with the cattle and buffalo in Xieng Khouang using a similar approach. This is a more complex chain with a greater volume of material moving along two separate routes (one to Vietnam and one to Vientiane) with more middlemen and many levels of quality and market requirements affecting the prices. The work indicated that farmers can gain up to $50/head higher price for sale of cattle by managing their herds. This will result in the animals having better condition and allow them to sell according to market demand, rather than just when they need cash. To notable opportunities resulted from the work to date:

- Traders have offered a $20 premium per head to farmers who could sell a full truck load of animals (i.e. about 10 cattle). This would reduce the time for traders to seek individual animals from many villages and reduce loss of condition (typically 10 kg) before they ship them to market place.

- The province formed a 'task force' to examine ways to improve the market efficiency for animals traded in the province. This will include examining regulations and procedures for trade.

The Lessons from SADU are:

- There are processes that can be employed to enable farmers to gain a 'market orientation' which will be manifested a in specific understanding of market demand and requirements. This can stimulate production and begin to create a demand from farmers for improved technologies.

- Small farmer service providers can stimulate production by other smallholders, in the process of offering and expanding their service activities.

- Farmers can develop collective selling procedures. This results in higher returns and will provide a mechanism for on-going exchange of information between farmers within a village cluster.

5. NAFES and the Lao Extension Approach

a. Institutional Commitment to Extension

43. Until the 1990's, MAF viewed DAFO Staff administrative and providers of a few 'services' (vaccination of livestock).

The early efforts to initiate some extension functions through the 'model families' and 'village' extension workers were half-heated and had no discernable impact on production. MAF's main emphasis in the mid-1990's was the expansion the area of irrigated rice through the installation of pump irrigation. As the lessons from FIAT and PEP began to emerge late in the 1990's, (at the same time as opportunities and funds for irrigation works were being exhausted), MAF's emphasis shifted to the development of extension capacity. This was officially reflected first in MAF's "Strategic Vision" document which described the restructuring of the DAFO and re-alignment of duties of staff as Farming Systems Extension Workers. The importance of an effective extension service was recognized in 2001. with the establishment of National Agriculture and Forestry Extension Service (NAFES), a department within MAF responsible for….

44. The formation of NAFES was more than a reshuffling of MAF staff. Through discussions with staff at various levels it would appear that a number of important shifts in attitude towards extension have begun to be tacitly accepted by MAF and many of the PAFO and DAFO staff

throughout the country. These are (i) farmers can improved their skills, change practices and improve production, as distinct from reliance on infrastructure as a means for development, (ii) extension should be made in response to farmers' needs, rather than according to production goals. This is accepted both in the context of the highly diverse conditions in Lao PDR and that extension should address farmers' needs particularly in its role for poverty alleviation, (iii) again due to the diverse nature of the environment, it is accepted that farmers will and can, adapt technologies to their own needs, rather attempting to enforce application of 'technology packages' or model farmers; and (iv) training can contribute to effective and committed extension staff, but this incudes extension methodology not just technical knowledge. Importantly, it should be linked to and based on work in the field, rather than in the class room; and that skills will be developed over a period of months, not a few days. While NAFES itself does not embody all these attributes, it does appreciate them and give support to staff and activities which apply them.

b. LEAP and the Lao Extension Approach

45. LEAP is an institutional capacity building project funded by SDC and -----? to support MAF (EA & NAFES) in the development of a decentralised, participatory, pluralistic and sustainable agriculture extension system that reaches male and female farmers equally. In its first phase (2001 to 2004) it built on the experience of projects form the past ten years, and conducted pilot extension and training activities in 98 villages in three provinces (Champassak, Saravan and Luang Prabang). More important than the significant production increases was the formulation by the Central Training and Extension Development Unit of NAFES of a national systems for agricultural and forestry extension system called the "Lao Extension Approach" (LAE). The LAE was ratified by MAF in late 2004 as the preferred approach to extension. Phase II will provide support for the introduction of the LEA throughout the 18 provinces in the country.

46. The principals of the LAE are that extension is (i) decentralised; (ii) pluralistic; (iii) participatory; (iv) needs-based; (v) integrated across sectors; (vi) gender sensitive; (vii) group or community based (i.e. not focussing on particular farmers); and (vii) self-motivated (i.e. that farmers participate voluntarily in extension and production activities). The LAE has two components.

- Government extension services, including NAFES, PAFO and DAFO. At the village level, this extension service provides training and technical advice to farmers on a wide range of subjects by generalist extension staff. The 'generalists' are responsible for all activities in an assigned zone or cluster of villages. The Provincial Agriculture and Forestry Extension Service (PAFES) is an office within the PAFO. It provides capacity building to the DAFO, supports them in the development of their extension plans and use of methods and co-ordinates provincially based SMS to support DAFO staff. The Central Extension Training and Development Unit in NAFES is the main unit responsible for capacity building for DAFO and PAFES personal. It also develops technical guidelines, extension materials and develops extension methods.

- Village Extension System, which includes village authorities and Village Extension Workers (VEW); other village level organisations include production groups. VEWs organize production groups (similar to interest groups) and helps them to identify issues and initiate 'learning projects' drawing on the expertise of the DAFO staff to provide training. The VEW then ensures that knowledge gained through learning projects are disseminated to other members of the village. In some cases they may also provide services such as vaccination of livestock. Within any village, there may be a number of VEWs selected for different production activities. VEWs are selected by the village and receive payment from the village either in cash or in-kind. Networking of VEWs between within a village-cluster is also encouraged and considered as an important mechanism for the future.

47. The extension process used to initiate a learning project is similar to learning cycles. It has been described in six steps with easy to use tools for each step for DAFO staff to use in the field. Once VEW have been established they should use the same steps in conducting further learning projects. The steps within approach include:

1 Introduction of the Village Extension System.
Prior to initiating any production related activity, the concept of the VES is introduced. This describes the steps to be taken and their own responsibility to scale up activities following the learning project.

2 Training Needs Assessment - Keep It Short and Simple
Farmers prioritize and analyse their problems, and identify skills needed to address these.

3 Constraints Analysis for a production process
This supplements the TNA-KISS, helping farmers to identify the underlying cause of production problems, taking account of the roles of both men and women.

4 Success, Implementation Failure and Training Needs
Assists the production group to examine progress made towards their original objectives through their learning project and decide on further actions to be taken.

5 Farmer to Farmer Exchange
Farmers from the production group analyse the results of the learning project and decide on follow-up activities. This involved other interested farmers as well as those in the original production group.

6 Extend Village Extension System
The initial learning project is evaluated by all villages, new activities planned and VEW appointed. Agreement is also reached on further support needed by DAFO.

48. The development of the LEA is timely in that there is a growing demand from the districts and provinces to take on new roles, compared to the predominately administrative roles of the past. During an evaluation of a SIDA funded project in Pien District on the Vietnamese boarder, DAFO staff stated that this was the first work they had ever done “that had helped villagers”. The head of DAFO working with PEP said after the first year of activities that “in the past even if we had had funds, we would not have envisaged what sort of things could be achieved with farmers' production, let alone what methods to use to achieve them.” During the PPTA for the SHDP Heads of DAFO in district along the Mekong corridor voluntarily expressed that it was “time for DAFO work to be done differently.” The demand for improved extension continues to be voiced, in response structural changes have been made. Within MAF it has been the formation of NAFES. Recently in the northern provinces it became apparent that DAFO heads have been changed (for professional not political reasons) so that the DAFO are now all headed by persons with adequate education, technical skills and field experience. These are surprising changes and demonstrate a real political will to ensure extension work becomes effective.

49. The LEA has been adopted in situations of systems planning, where the analysis of constraints has been straightforward, and solutions provided through short training courses. Training of 35 DAFO staff under LEA is limited to one year, a timeframe that is considered insufficient to effect change their work patterns and habits. It is provided to only 2-3 staff in each DAFO, with no mechanism for spreading the impact of training to other DAFO staff. The DAFO heads have not been involved in the training and issues of the administration of extension management have not been addressed. These issues will need to be addressed in the future if extension is indeed to be decentralized and responsive to farmers’ needs.

c. Application of the National Extension Approach and PLDP

50. NAFES, with support from LEAP will be introducing the LEA to the project provinces at the same time PLDP is to be implemented. This will be the standard for extension activities and it is important that project activities are not seen as conflicting with this important milestone in the establishment of extension services in Lao PDR. This section aims to compare the approaches that have been recommended for PLDP with the LEA.

51. The principals of LEA will all be followed by PLDP. Decentralisation and farmer participation are at the core of the establishment phase of the Project where the introduction of forage technologies directly engages farmers in assessing their use and integrating them into their systems. This also means that the Project will be responding to farmers needs and be self-motivated. Work by the FLSP has indicated that this technology is gender and wealth insensitive.[17]

52. LEA accepts that the complexity of livestock systems is far greater than the traditional lowland paddy cropping farming systems, and requires farmers to become engaged in making systems changes. Willy on exploratory learning, with farmers using new technologies on a trial basis and then integrating them into their systems. This can be compared to the 'learning project' but is more and challenging and will usually take longer than the one season. Farmers will need support and back-up throughout this longer learning project. Once initial systems, based on forages have been gained, the introduction of more complex, enhancing technologies will require further support and acquiring a market orientation.

53. The overall methodology of PLDP closely resembles the process described for the introduction of a 'learning project' by the LEA. However there are some specific differences in the method applied:

- The PRA and Livestock-PRA will replace the TNA and constraint analysis. Livestock production is a complex activity and specific tools are needed to assist farmers to identify constraints related to livestock production.

- The Project will introduce technologies for farmers to use on a trial basis. This will be done through working directly with a 'focus group' of farmers. (a sub-set of the interest group or production group in the LEA). This is more akin to a participatory technology development approach. In later stages of the Project, when farmers require more complex technologies, training activities may then become a make appropriate activity.

- Follow-up is not emphasised with the LEA. In PLDP consistent follow-up at the field level will be needed to establish the impact-yielding systems, and again later as farmers attempt to apply the more complex enhancing technologies.

54. The PLDP will not explicitly establish a village extension system, although some elements will be similar. But the formation of interest groups for large and small animals will be equivalent to the 'production groups' of LEA.[18] Natural leaders will evolve from these groups who may play a role similar to that envisaged for the VEW using the LEA technology. PLDP will not pay any fees for natural leaders in the village. This is not appropriate when the on-going innovation and integration of technologies will result from the experiences of the group, and continue to emerge over a numbers of years, rather than being disseminated from a single person, such as a VEW, to other farmers.

[17] Activity Completion Report; Forages and Livestock Systems Project (AusAID AMS: 007K08), March 2005, p.21.
[18] The use of the term 'production groups' will suggests a more formally structured group, whereas the term 'interest group' is understood more generally and used in this document.

55. The issue is not so much the establishment of various structures and organisations, but how information can be shared within a village and how other services, such as vaccination of livestock, can be maintained on a fully commercial basis. PLDP has dealt with these two important issues in other ways. The initial dissemination of experience for the focus groups to the general village will continue to be managed by DAFO extension staff by facilitating 'village evaluation meetings'. These will be similar to the SIFT activities of the LEA. However the longer term mechanism for on-going exchange will be provided by (i) stimulating a market orientation, (ii) enabling villages to monitor livestock production themselves, and (iii) supporting the development of farmer-service providers. In addition to providing services, such as vaccination, these will provide embedded technical advice to their farmer clients, and share experiences gained from farmers from other villages (Section xxxxxxx)

56. The LEA requires DAFO staff to become generalists or farming systems extension workers. PLDP will require greater focus on livestock activities. But does not conflict with the concept of DAFO staff being generalist extension workers. Where there are particular opportunities and farmers' needs demand it, staff will need to develop additional and particular skills to support farmers. This will vary from area to area and district to district. Thus there is no obstacles to staff having additional or specialised knowledge. What is more significant than technical specialisation, is that the generalist staff are responsible for a cluster of villages or zone. DAFO generalists need to be able to facilitate the process of leaning project identification and provide the appropriate responses based on their own technical knowledge. If greater knowledge is required, the information can be sought from within the PAFO. One key element of LEA is that DAFO staff are responsible for a cluster of villages, providing for continuity that develops over a season and over years.

C. Policy Initiatives and Implication for Development of Livestock Production

1. Land-use Planning and Land Allocation

57. Land is not scare commodity in Lao PDR. Communities, including lowland ethnic Lao, have been able to move to new locations and pioneer new land according to their own energies Traditionally, land ownership depended on recognition of prior use of the land, indicated by improvements (clearing of upland areas development of paddies) that have been made. For paddy land the issue of ownership is clear, as it is for tree crops, etc. For upland swidden fields, there is recognition of the labour to clear the plot, Where farmer might want access to an old upland field, some payment would be made to compensate for the labour used for the initial clearing. Other sorts of improvements such as fencing, planting of fruit trees are similarly compensated. The traditional systems for laying claim to land is not perfect, especially when claims are made across communities, for access to timber or the collection of non-timber forest products.

58. The Land Law (year?) is intended to reduce conflict and promote land management through application of the Land Law, as all land belongs to the State but is leased to farmers for their long term use. The Law allows, for each family unit: 1 ha for upland rice production and fish farming; 3 ha for commercial crops; 3 ha for orchards; 15 ha of grasslands for livestock grazing, amounting to a total of 22 ha per unit of labour.[19]. This is a generous provision for the needs of most households, although there is a proviso that if land is not used effectively within three years, it will revert to the state and be made available to others. The Forestry Law describes the type of forest areas that may be included within the boundaries of a village; (i) protection; (ii) conservation; (iii) production; (iv) rehabilitation and (v) degraded forests[20]. These categories provide the various limitations on the non-timber forest products and timber that may be harvested from these areas and the limitation of agricultural activity permitted there.

[19] Land Law, Art. 17.
[20] Forestry Law, Article. 16-21

59. A number of government programs have been instituted to give effect to the Land Law including; (i) Land Use Planning and Land Allocation (LUPLA); Village Relocation; and the Shifting cultivation reduction Programs. Of these, the LUPLA has been the most extensively implemented LUPLA. Piloted in 1991 in the northern provinces since 1996, it has been extended to all provinces. DAFO is responsible for its implementation, with representatives of the Lands Department (who initially focused on lowland areas). From 1991 to 2001[21] it has been implemented in 5,370 villages of the total 11,000 villages in the country, with each household being issued Temporary Land Use Certificate (TLUC) which delineates the plots of land households have the right to cultivate. At the end of this period, TLUC, can be converted to a formal land title (or certificate of long term user), as long as the land has been used in accordance with the allocation.

60. The implementation of LUPLA focused on the reduction of shifting cultivation, rather than being a mechanism for effective land use administration and management[22]. Seven steps are involved in the implementation of the LUPLA programme. (i) LUP and LA preparation - village orientation; (ii) village boundary and delineation and land use zones, (iv) data collection and analysis; (iv) forest and land allocation decisions; (v) field measurement of agricultural land (vi) forestry-land agreements and transfer of rights to villagers, (vii) land management extension and monitoring. In practice, most districts have allocated three plots of land per household all of which could be upland plots. This does not allow sufficient fallow time for soil fertility to recover, leading to reduction of yields and eventual rice shortages. The Participatory Poverty Assessment[23] found that land allocation had resulted in the impoverishment of swidden households[24]. Data from the Shifting Cultivation Extension Centre in NAFES showed that of the land allocated to villages in 2000/2001, only 6,006 ha was allocated as agricultural land, just 5%, which would confirm the findings of the PPA[25].

61. The LUPLA has however been carried out with many flaws. The DAFO teams implementing the program had minimal training, a very limited budget, including attempting to complete village activities in as short a time as possible. Apart from the difficulty of surveying of plots boundaries on slopping hillsides, village boundaries and land-use zones within areas have been defined inaccurately and cannot be used for land administration or management purposes.

62. While some communities have been negatively affected by LUPLA, most villagers have continue to cultivate upland fields as they did previously. In a detailed study made of a group of 14 upland villages in Bokeo[26], the land allocated to households was on average just 0.5 ha per household, inadequate for a sustainable livelihood. Most households were not been issued TLUCs, and monitoring had not been carried out. This had little impact on villagers as they continued to use the land as before, even paying taxes on land not allocated.

63. Most agencies recognise the need for land management and land administration. The program has been used as a means for reducing shifting cultivation and has slowed as the methods for its implementation have been reviewed. One option under consideration for upland areas is to focus on land-use planning, but allow communities to manage land within these land-use zones, according to their traditional systems.

64. For PLDP, the key factors affecting land use in most areas remain the availability of land and traditional rights, rather than the extent of application of LUPLA. The initial area of forages

[21] Shifting Cultivation Reduction Extension Centre, NAFES.
[22] Resolution of Nation-wide Review Conference on Land Management and Land-Forest Allocation, 9 July 1996
[23] "Participatory Poverty Assessment, Lao People's Democratic Republic", ADB, Dec. 2001.
[24] "Participatory Poverty Assessment, Lao People's Democratic Republic", ADB, Dec. 2001.
[25] Existing Land Tenure and Forest Lands Study", Final Report submitted to the Land Titling Project, Ministry of Finance , May 2002, p.12.
[26] "Research on Land and Forestry Allocation System", Bird Phase III – Tafa / Moksuk area, Houeyxai district for Concern Worldwide.

needed to demonstrate significant benefits is small, 40 x 40 m and will not disrupt existing land use activities. Where farmers grow larger areas (0.5 ha or more), there has been an associated increase in the sale of animals for income, and a reduction of shifting cultivation. As forages are perennials, there is also likely to be an overall reduction of land area tilled by farmers.

65. PLDP can contribute to LUPLA in two ways. The allocation of three parcels of land has used an assumed livelihood model of intensified agriculture based on cropping. An examination of the land allocated in the northern provinces up to 1992, shows that of the 642,947 ha allocated, only 1,445 ha has been allocated to communal grazing, and 11,268 ha to household grazing (with the bulk of this in Phongsaly). Livestock has been left out of consideration[27]. The intensification of livestock production under PLDP will in effect provide a new income generating activity in the livelihood systems. This could provide a viable model for upland livelihoods on which a revitalised LUPLA could be based. Secondly, the establishment of perennial forages, fenced or unfenced, will provide farmers a firmer basis for claim user rights to their land. Thus the work of PLDP will also contribute in a positive way to upland farmers and communities having stronger claims to their land.

II. OPPORTUNITIES FOR LIVESTOCK DEVELOPMENT

A. Interventions Available and Prioritizing their Delivery

66. The Working papers on livestock describe the range of interventions that can be applied to improve livestock production in the target area. Following the technical options is a description of the 'development pathway' for each species. This provides a description of the entry point to promote change in livestock production systems. The 'entry point' is based on the premise that farmers, with a mind-set as 'livestock keepers', are initially less willing to increase their efforts to improve livestock production per se, but are more likely to be interested in interventions that reduce their time and labour inputs.

67. The development pathway provides only a general approach. The "Livestock Systems Survey" carried out during the PPTA showed there were differing levels of commitment and use of proposed interventions already being practiced in a significant number of villages. This is particularly so in the management of stock to reduce disease and to improve breeding efficiency. These villages could move ahead more quickly to more complex interventions for enhanced production. The "Livestock Systems Survey" will provide a valuable asset for the project to alert staff to these possibilities, and should also be used as a training tool.

[27] Northern Region Development Strategy (ADB TA 3969) Vol II, Table 7 p. 12

1. Village Pig Production Systems

a. Traditional Production Systems

68. Seventy seven percent of households in the project area raise pigs. The median number is about three breeding females per household together with farrowing offspring that are reared under scavenging or confined/partly confined systems. Farmers have two strategies (i) breeding with the sale of off-spring or raising until mature, and (ii) rearing to fatten. Two types of production systems are used; (i) scavenging, and (ii) confined with feed being supplied. These are often used in mixed systems, with confinement usually for short periods, during farrowing or the cropping season. A few farmers raise pigs on a semi-commercial basis with the pigs confined and feed supplied from their rice mills. Project interventions need to recognise the diverse management systems practiced both within and between villages, as many households restrict their pig raising activities to growing/fattening animals.

69. An increasing number of villages have introduced local rules requiring that pigs are penned to protect cropped areas and prevent disease transmission. Some raise their animals in remote locations, quite separate from other pig producers, the isolation providing opportunities for quarantining animals and for other health control measures. These households represent a significant opportunity for PLDP interventions.

70. Mortality rates, particularly for young stock, are high with mortalities amongst young pigs of about 10% per annum. Frequent epidemics of classical swine fever (CSF) have caused mortalities of up to 50% among pigs of all ages. Interventions that reduce mortality rates will have a major beneficial impact on numbers marketed and incomes. There is considerable variation in growth rates, both within and between smallholder systems, but they are generally low. This suggests that PLDP could realise substantial benefits just by replicating some of the better rearing practices amongst the less proficient producers. Appropriate best practices are likely to focus on effective feed management and parasite control.

b. Constraints to Increased Productivity

71. The major disease problems confronting pig producers are CSF and internal parasites. CSF causes frequent epidemics and is a major cause of mortality. Internal parasites retard growth rates and render pigs vulnerable to other infections. The limited availability of feed and lack of access to quality feed under extensive conditions, together with insufficient feed under confined conditions result in poor, unbalanced diets which tend to be based on rice bran, a by-product of household rice milling. Diets in all systems are deficient in protein, minerals and vitamins needed for optimum performance. Uncontrolled breeding imposes limits on performance due to inbreeding, poor timing of mating and use of low quality males and females.

c. Proposed Options for Intervention

72. The following technology interventions have been proposed which could generate significant benefit to pig raising households. Not all technology options can be applied in all situations but must be matched to the resource base of the household. The items detailed below are presented according to their effect on growth, survival, reproduction and management, the main topics addressed in designing project interventions.

Growth

- Introduction of **improved forages**, especially legumes, as a protein source to provide more balanced rations. The establishment of forage areas would be associated with training in forage management and systems for combining forages with other feeds.

- 'Smart' **feeding systems** - providing farmers with information on how to combine feeds to maximise the contribution of different feed sources for improved growth. These systems need to be simple enough to be taught by extension staff and flexible enough to allow for seasonal changes in feed resources. 'Smart' feeding systems generate a balanced ration of vitamins, minerals, energy and protein from existing and introduced feed resources.

- The **de-worming** of growing pigs will improve feed utilisation, increase growth rates and raise resistance to other diseases.

Survival

- **Limiting contact** among animals by shifting animals from village locations to production areas where they remain separated from other pigs will contribute significantly to the contraction and spread of disease - a trend that has already been observed in some villages surveyed.

- **Improved housing**. Confinement of pigs in pens will reduce the opportunity for the transmission of disease and worm infestations. There are already examples in the project area of pens built from local materials. Confinement of pigs requires some small capital investment but more important, a reliable supply of quality feed.

- **CSF vaccination** with quality vaccines delivered through an effective cold chain will provide good protection against CSF. Without the supply of effective vaccines, correctly handled or without the skilled technicians to administer treatments, the inconsistent results achieved have led smallholders to become sceptical of the value of vaccinations.

Reproduction

- Better **management of breeding stock** - routine management of breeding stock through their production cycle will enhance reproductive performance e.g. through the introduction of simple recording systems. Records of births, deaths, matings and disposal would be valuable to the producer and extension workers alike, so as to identify problem areas that require priority attention.

Management

- Improved **manure management** - manure collected from better designed pens can be composted then applied as a fertiliser on higher value fruits and vegetables. The motivation for this activity is more the need for fertilizer under upland farming systems. In some cases existing disposal of manure, such as into waterways, has an environmental cost that is not recognised. Composting of manure will break the life cycle of several parasites that affect pigs and humans.

d. Implementation Conditions

73. **Table 1** describes the implementation conditions for each of the above technology options. On this basis, the key initial interventions for the Project are the introduction of improved forages and improved housing. The options have been sorted with those simpler and easier to implement at the top of the table and these technologies should be the focus of training and technical support

in the early stages of implementation. The order is indicative only and there is no reason why a village could not start the vaccination of pigs early in the Project if a reliable source of vaccine was available and all pigs in the village could be vaccinated.

Table 1 : Implementation Conditions for the Pig Technology Options

Intervention	Inputs Required	Minimum Level of Farmer Organisation	Technology Prerequisites
Introduction of improved forages	Cuttings and seeds to get started	Individual	None
Improved housing	Mostly local materials with some purchased hardware	Individual	Improved forages and feeding system.
Improved manure management	None	Individual	Improved housing to collect manure efficiently.
'Smart' feeding systems and parasite control	Simple decision tools for combining feed resources. De-wormers	Individual	Improved forages as key component of system
Effective vaccination	Reliable ongoing source of good quality vaccine	Group of Farmers to make vaccine purchase cost effective	Improved housing to maximise benefits and improve handling
Better management of breeding stock	None	Village to agree on management of mating	Improved housing and movement control
Reduction of contact and movement control	Fencing. Policies for pig management, movement and trader control	Village or village cluster	Improved housing and a quarantine area

e. Development Pathway for Pig Production

Entry Point

74. While there are a range of pig production options (breeding and rearing) and systems (scavenging and confined), a common entry point is possible. The introduction of a forage legume supplement, (stylo) offers a significant reduction in time and labor compared to collection and preparation of pig feed from materials collected in forest. The high protein content of stylo added to current (unbalanced) diets, will lead to a more rapid weight gain. As a result, farmers will be more confident about confining pigs in pens, with forage providing an accessible (low labor) feed source.

Basic Improved Production Systems

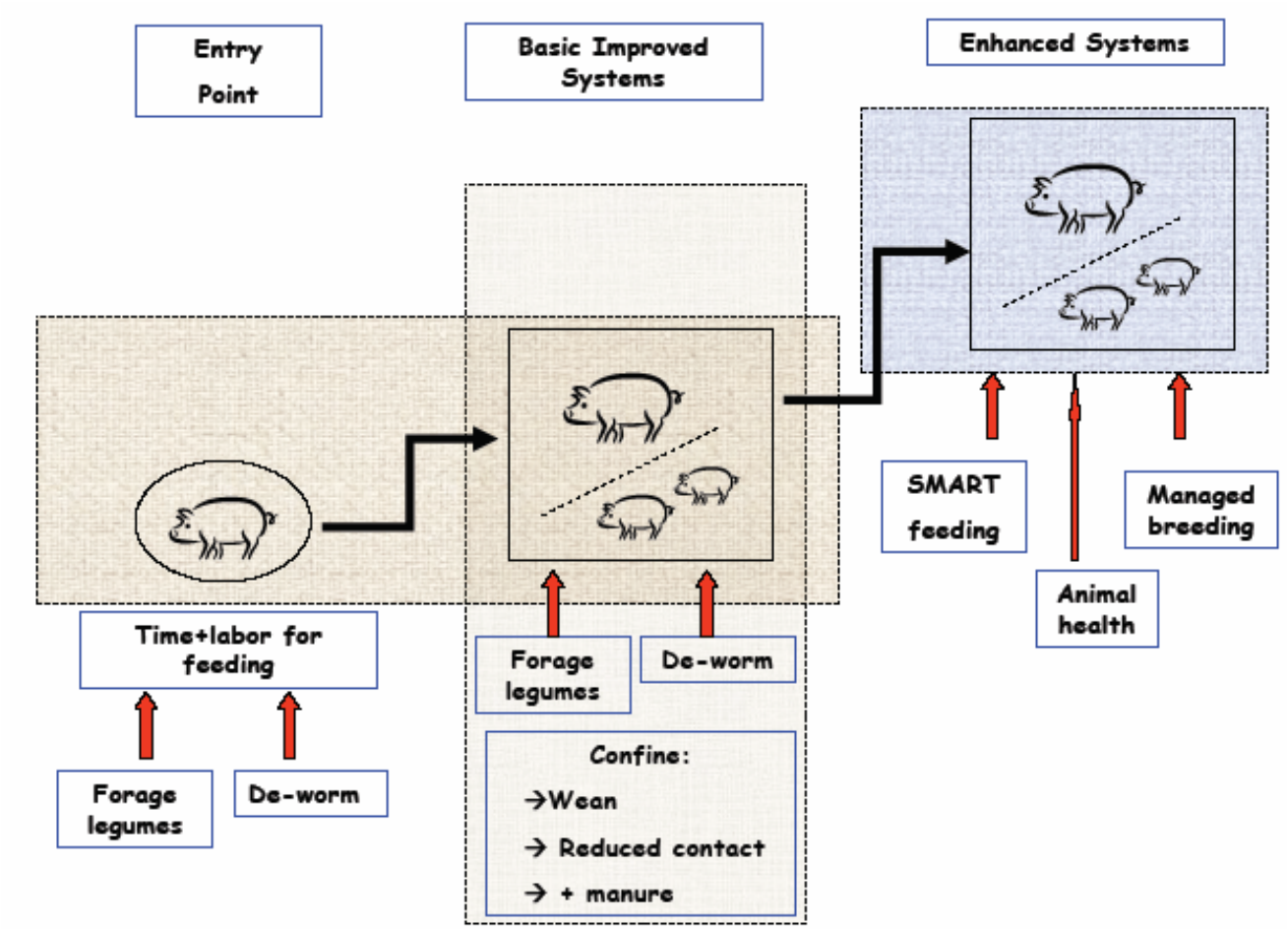
75. Confining in pens immediately allows farmers to achieve additional improvements: (i) de-worming will be effective without fear of re-infection, (ii) young piglet's can be weaned and segregated, to ensure their protection and allow specific feeding, (iii) reduced contact with other pigs will reduce the incidence of disease, without the need (at this point) to bring in outside inputs for vaccination. Confining will also enable the manure to be collected easily for use in home gardens.

76. The initial improved system is based on two interventions (i) forages as a supplement; and (ii) confining in pens. The combined increase in survival rate of piglets, improved weight gains, and reduced disease in the adult pigs, can transform pig raising from being a sideline activity to a creative enterprise. This systems change will not only affect households already raising pigs, and households that labor previously regarded pig raising as not worthwhile, may now restart pig raising. The resources needed to raise 2-4 sows is within the means of most households.

Enhanced Production Systems

77. Where there is a clear market demand, some farmers may wish to enhance performance of their pig raising enterprise to meet this demand. Technologies for enhanced pig production include (i) feeding; (ii) CSF vaccination where viable vaccines can be obtained and administered through a cold chain; (iii) breeder management to take advantage of seasonal price fluctuations; and (iv) employing animals with better characteristics for breeding, possibly with the use of cross-breeds. These will require considerable inputs of technical knowledge from DAFO staff and the services of animal health providers and boar mating services.

Figure 1: Development Pathway for Pigs



2. Options for Cattle and Buffalo Systems

a. Traditional Production Systems

78. Cattle and buffalo are raised under extensive systems with grazing patterns influenced by the cropping season. During the rainy season when crops are grown, large ruminants are either confined in makeshift housing near cropland areas where they provide draught power and manure or are otherwise sent to distant forests to prevent crop damage. The introduction of improved feeds in some districts has resulted in more intense and controlled management closer to villages with subsequent increased interest in health interventions and other associated benefits, such as improved body condition prior to sale. Buffalo numbers are evenly distributed across the target districts (28,800 head) while cattle are more concentrated in Xieng Khouang where 69% of all households rear cattle compared to the project provincial figure of 32% (where?). Although very visible and apparently suitable for extensive grazing, few cattle are raised in the grasslands of Xieng Khouang because of the phosphorous deficient soils and consequent poor pasture growth. The age structures of the cattle and buffalo herds are skewed towards older animals, indicating their primary function as a store of wealth. In the past, cattle were not raised in some communities due to cultural barriers banning the consumption of beef. With the growing trade between the Northern Region and urban centres of Lao PDR and other export markets, some of these communities see new opportunities in raising cattle in spite of cultural prohibitions.

b. Constraints to Increased Productivity

79. Production is constrained by poor nutrition, two epidemic diseases - foot and mouth disease (FMD) and haemorrhagic septicaemia (HS) - one highly pathogenic nematode parasite (Toxacara), and a range of non-lethal parasites. FMD outbreaks although rare, may become more frequent with the increasing trade in cattle across borders with neighbouring Viet Nam and Thailand. However, the control measures imposed at national or regional levels may have a greater impact on production and trade than the disease itself. Smallholders have very limited knowledge of health and production constraints and have limited skills and resources to implement interventions to overcome them.

c. Proposed Interventions to Improve Large Ruminant Productivity

80. There are many options for improving the quantity and quality of feed without adding significantly to the household labour burden. There are also specific interventions to prevent HS (vaccination) and Toxacara (de-worming), just as there are integrated approaches to controlling non-lethal parasites in large ruminants. The vaccine for HS and the de-wormer to control Toxacara are available in the region at relatively low cost, although the former requires an effective cold chain to preserve the vaccine's efficacy. All other proposed interventions require inputs that can be sourced within households, the village or adjacent district, but do require improved organization and knowledge by farmers and extension workers. In the latter stages of development, there is likely to be some small requirement for capital and carry-over or production credit.

- Introduction of **improved forages** - The introduction of forages will enhance overall levels of productivity and can be used in many strategic ways as a supplement to native grasses, rice bran or, in times of great feed shortage, as a complete diet. Feeding strategies can be most easily applied if cattle are segregated according to their feed requirements. The growth of heifers after weaning from 6-10 months of age through provision of forages and supplements during the dry season will increase their growth rate and they will be ready for first mating at a younger age. Dry season supplementary feeding of mature cows in late pregnancy will maintain or improve body condition, enhancing subsequent lactation and improving calf growth and survival. Dry season supplementary feeding of selected weaner

bulls from 6-12 months will increase testicular size and body growth and enhance bull fertility.

- **Advanced feeding** options - Segregation and feeding of cows with calves for two months prior to weaning, will promote better body condition of breeding cows, their earlier return to oestrus, earlier conceptions, higher lactation yield and better pre-weaning calf growth rates. 'Spike' feeding of heifers with small amounts of forages and rice bran during the last two months of their first pregnancy will induce earlier ovarian activity, earlier returns to oestrus and improved fertility at their second mating. This feeding strategy also helps to establish optimal mating time for the reproductive life of the cow.

- **Worm control** - Worm control in weaned heifers and castrated male weaners will increase growth rates. Worm control in buffalo calves will reduce mortalities and production losses associated with Toxacara infestation. A single dose of 'Pyrantel' given by mouth at two weeks of age provides lifelong protection against infection.

- **Vaccination** - Six monthly vaccinations against HS for cattle herds reduces mortality and morbidity of infected animals and reduces embryonic and foetal losses in animals which survive the disease.

- **Movement control** - Development of village movement control strategies will minimise chances of HS and FMD disease outbreaks through establishment of quarantine areas in a central location where animals are taken to traders for sale.

- **Calf weaning** - Weaning and separation of weaned calves will reduce lactation stress on cows, thereby synchronising returns to oestrus, ensuring conceptions occur at the optimal season/time of the year and enhancing cow fertility over its reproductive life.

- **Segregation of bulls** - Seasonal segregation of bulls from the breeding herd will minimise out of season conceptions and increase dry-season survival in pregnant and lactating cows. The time of first conception has a big impact on lifetime fertility of the cow.

- **Castration** of male calves that are surplus to breeding requirements can be performed between 4 - 9 months of age using a closed technique (Burdizzo). This provides for improved reproductive management, but also castrated males have a better temperament, are easier to handle, they can be more easily run in groups, and, in conjunction with segregation techniques, they can be controlled, managed and finished more efficiently.

- Night time **communal grazing** - When cattle are managed separately from those of other smallholders, it can be difficult for females in oestrus to have access to a fertile bull. Some smallholders may not own a bull, or may not be able to afford to pay a service fee. In other cases, bull temperament problems mean that some bulls are permanently restrained in pens and cows in heat must be brought to the bull. When only a small number of bulls are present, poor bull fertility can depress cow reproductive rates. Night time communal grazing allows good quality bulls, selected on traits such as growth, conformation, type and temperament to mate freely with cows in oestrus and enhance overall fertility levels. A further benefit is that manure can be more easily collected from communal grazing areas for cropping activities.

d. Implementation Conditions

81. **Table 2** describes the implementation conditions for each of the above technology options. On this basis the starting interventions for the Project are the introduction of improved forages and de-worming. The options have been sorted with those simpler and easier to implement at the top of the table.

Table 2 : Implementation Conditions for Large Ruminant Technology Options

Intervention	Inputs Required	Minimum Level of Farmer Organisation	Technology Prerequisites
Introduction of improved forages	Cuttings and seeds to get started	Individual	None
Worm control for cattle and buffalo calves	Reliable supply of de-wormers	Group purchase of supplies	None. Best with improved feeding
Vaccination against HS	Reliable cold chain and supply of high quality vaccine	Village to ensure all animals are vaccinated	Good movement control. Best with improved feeding.
Advanced feeding options	Fencing and secure shelters	Individual	Introduction of improved forages
Weaning of calves	Fencing and secure shelters	Individual but easiest with a group of farmers	Improved feeding
Village movement control strategies	Fencing. Policies for stock management, movement and trader control	Villages or village clusters	None
Segregation of bulls	Fencing	Village	Improved feeding
Male castration	Castration equipment	Group to ensure only good males left intact	None
Night communal grazing	Fencing and good water and feeding system	Village to share management and agree on bulls	High level of management

e. Development Pathway for Cattle and Buffalo Production

82. Of all the species farmed in the Northern Region, cattle and buffalo can require the least labour inputs for farmers. In cases of extreme free-range, where the animals roam the forest and are checked only occasionally, there is almost no entry point for any intervention, without first changing the production system. In such cases, it is recommended that farmers be encouraged to manage other species first. Farmers who have made a transition from being a livestock keeper to producer for another species will be more likely to accept the necessary system changes for initiatives with large animals.

Entry Point

83. In most free-range systems, farmers need to use significant amounts of time and labour to collect feed during periods that their cattle and buffalo are confined. Reasons for this vary, including: (i) when cows are calving; (ii) to prevent damage to crops; and (iii) when buffalo are needed for draft power, etc. Small (40 x 40m) plots of forage grasses can be introduced to reduce time and labour to meet the feed requirements during these periods.

84. In addition to saving labour, the forage grasses offer a higher value feed, and being accessible, will usually result in additional feed being provided. This will lead to an improvement the animals' condition; more milk for claves; reduced water requirements etc. Where farmers note these improvements, they will likely expand the area of forage and keep animals closer to the house for extended periods. This represents a new production system for raising cattle and buffalo.

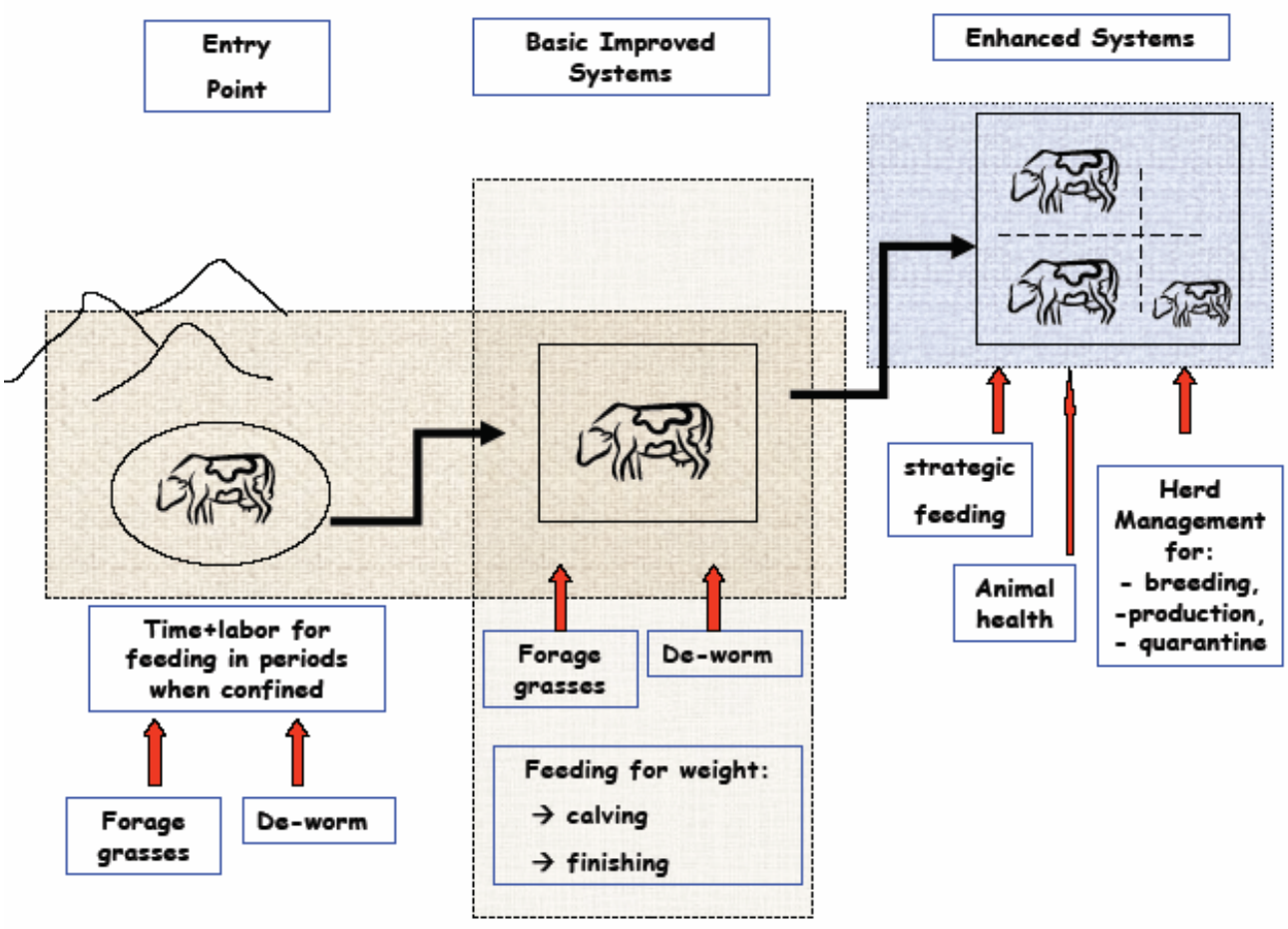
Basic Improved Production Systems

85. With cattle and buffalo being confirmed nearer the house, farmers can use the existing forage resource strategically for direct increases in weight ; (i) forages provided during calving (if this is not already being done) will result in stronger calves, higher milk production and more rapid initial weight gain and potentially a larger adult; and (ii) animals identified for sale can be finished for two months on forages with a significant increase in body weight. Both interventions can be carried out with the existing forage resource and without any significant changes in overall herd management.

Enhanced Production

86. Where farmers have begun to manage their animals, some may wish to enhance their production further by adopting advanced interventions, (i) advanced feeding options bring on and synchronise oestrous; (ii) herd management for weaning, control of young males for managed mating; and (iii) animal health interventions. These require understanding of basic principal of animals nutrition, access to services and joint action (such as quarantine) within the village and possibly other communities to control the herd.

Figure 2: Development Pathway for Large Ruminants



3. Options for Goat Production

a. Village Goat Production Systems

87. Goat production in the Northern Region is widespread but limited to small numbers of animals per household (average of 3.9 per goat producing household) with a low percentage of households (estimated at 9% in the project area). In the livestock system survey villagers reported mixed responses to the prospect of raising goats, some showing high levels of interest ("we would buy goats if we could raise the capital from selling chickens") while others had abandoned goats as "they were too much trouble". Keeping goats out of crop areas appears to be the main concern among most smallholders and restricts their numbers. Goats are managed in small groups by individual households with little communal herding. In isolated areas they are allowed to graze freely, or confined to a fenced area for browsing. At night there are housed in shelters made of local materials, usually with an earthen floor.

b. Technical Constraints for Goat Raising

88. High mortality rates and lost production from parasitic infections associated with free grazing and contaminated resting areas pose the greatest challenges to goat productivity. Presently most goats are allowed to roam the village to select their own feed. Parasitic infection is high under this system and many young kids die when grazing pressures increase. Both are consequences of the limited availability of suitable feed resources during both the rainy and dry seasons. Inbreeding is likely to be prevalent although difficult to detect obvious sign there of. Other diseases such as Peste de Petits Ruminants and goat pox may become problematic as systems intensify and as international movements of animals increase, e.g. with possible importation of new stock from South Asia where these diseases are endemic. Other likely constraints that were not well identified in surveys to date include the resistance of goats to certain feeds in the rainy season, lack of feed the dry season and inbreeding.

c. Proposed Technology Interventions for Goats

89. In many ways, goats and pigs are similar in that they require similar levels of investment, they have similar times to maturity / saleable weight and have similar reproductive cycle lengths. Being ruminants however, goats feed requirements are very different. Their browsing habit and inquisitive behaviour makes them very adaptable to a range of feed sources. In some ways, goats can be regarded as 'small cattle' provided that their feed is not restricted to pasture. In others, they can be regarded as 'ruminant pigs' that do not require easily digested feeds. The technologies identified for goats are

- **De-wormers** - The use of de-wormers in growing goats both strategically (for example at the beginning and end of the wet season) and to treat sick animals will increase growth and prevent mortality. The selection of chemical (active ingredient) and use of the correct de-worming procedure are important to achieve the desired outcome from the treatment. None of the de-wormers require refrigeration and are not dependent on a cold chain for effectiveness.

- **Increased and 'smarter' feeding** - Locally available feed resources such as tree leaves and cut forages can improve production but may need to be cut and carried to goats in their shelters. Tree legumes need to be planted well in advance (2-3 years) before they can be reliable feed source.

- **Housing and sanitation** - In areas where grazing space is limited or there is intensive cropping, goats can be confined completely, or only at night or only in the rainy season to provide good shelter from rain and wind. Shelters need to have good ventilation to prevent

build up of ammonia from faeces and to prevent infection from faeces and facilitate collection of dung for fertiliser. Sheltered goats must also have supplies of clean, fresh feed and water, and be able to be segregated to help management of breeding and young animals.

- **Manure and compost** production - Removal of manure prevents re-infection around housing and creates opportunities for applying the manure as fertiliser for higher valued crops, especially if composted.

- **Breeder and buck management** - Farmers can control breeding by restricting contact between males and females to times chosen by smallholders, who can also decide which male will mate with each female. Fewer males need to be retained and females are mated when they are in best condition, adding to overall system productivity.

d. Implementation Conditions

90. **Table 3** describes the implementation conditions for each of the above technology options. None of the options have very restrictive conditions in terms of farmer organization and 'better housing' is the only technical prerequisite. Overall this indicates that there are many entry points for goat production systems and an extension approach could be quite comprehensive. The options have been sorted in order of ease for implementation, with the simpler recommendations at the top.

Table 3: Implementation Conditions for Goat Technology Options

Intervention	Inputs Required	Minimum Level of Farmer Organisation	Technology Prerequisites
Increased and smarter feeding	Forages, tree legumes and other feeds	Individual	None
Housing and sanitation	Hardware to supplement local building materials	Individual	None
De-wormers	Regular supply of de-worming chemicals	Group of farmers	None
Manure and compost production	Simple tools	Individual	Improved housing and sanitation
Breeder and buck management	None	None	Improved housing to maximise benefits and improve handling

e. Development Pathway for Goat Production

91. There is almost no transitional development pathway for goats, as there is for pigs and cattle. If farmers wish to raise goats, they need to be managed, either under extensive grazing systems or housed and provided with adequate feed.

Entry Point

92. Wet season feeding is a major constraint in both systems, when farmers provide cut and carry feed. Forage grasses can be introduced as an alternative feed source in the wet season. Once forage grasses have been accepted, the opportunity for housing goats will follow, allowing strategic de-worming to be introduced.

Basic Improved Production System

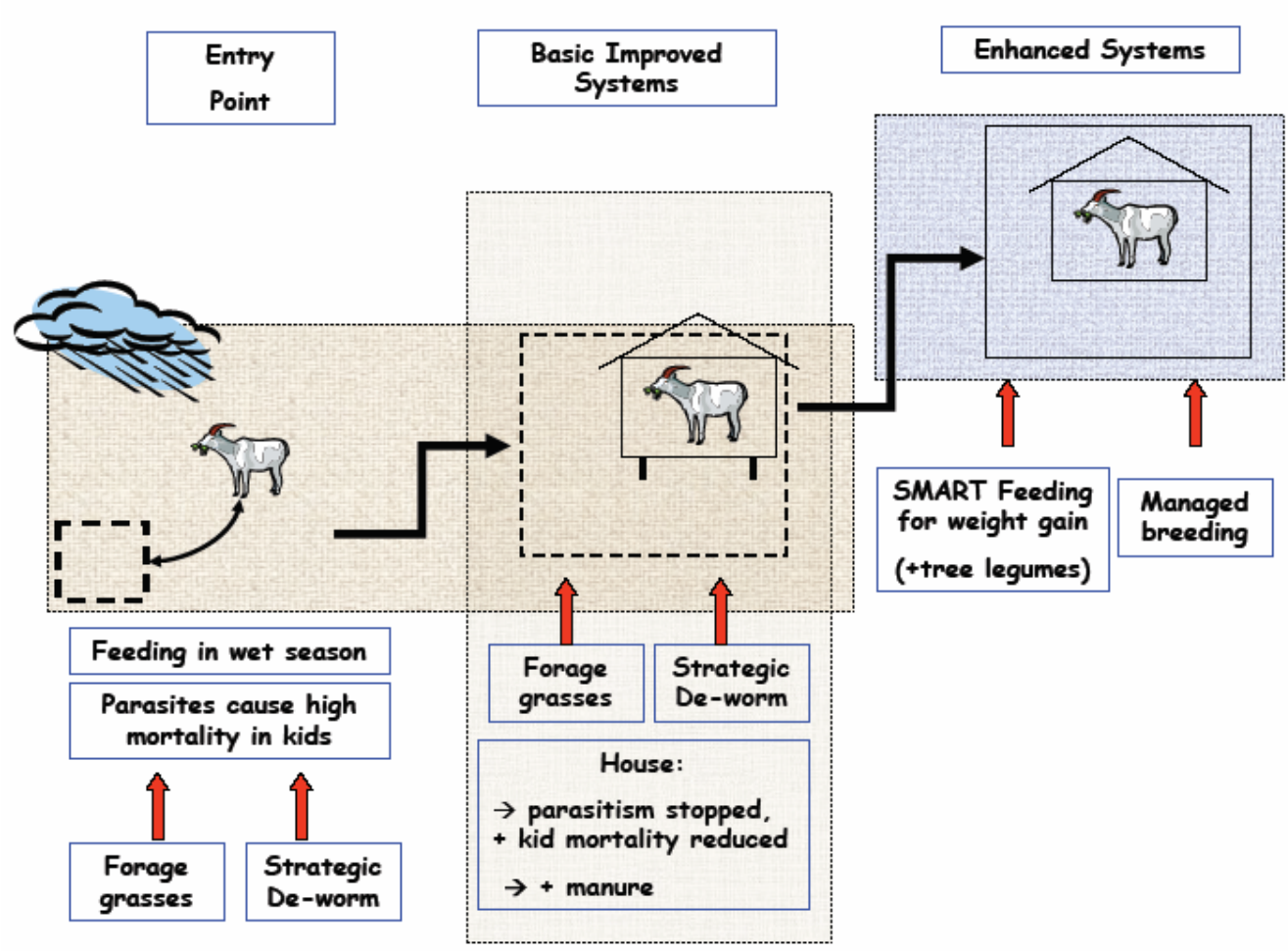
93. In confined systems, the parasite load within the browsing area becomes high, and can result in 50% mortality of kids. Where farmers are concerned about high mortality rates of kids, forages can be expanded to provide accessible feed resource which will allow the goats to be housed to avoid parasite infection.

94. Farmers who wish to house their goats will then be prepared to improve the housing so that it is clean, has adequate supplies of water and allows the segregation of young goats and bucks. Confining goats in clean housing combined with de-wormers will eliminate internal parasites.

Enhanced Production

95. Where there is clear market demand, farmers may wish to enhance their production further. This can include better breeding and buck management to provide animals for sale according to the specification of the market (size etc.) and when the demand is highest. Smarter feeding can include establishment of tree legumes, which will also extend production into the dry season when the growth of forage grasses is retarded.

Figure 3: Development Pathway for Goats



4. Options for Poultry Production

a. Village Production Systems

96. Extensive poultry production is widespread throughout the rural upland areas including in poorer households where poultry are sometimes the only livestock raised. Species raised varies from household to household and village to village but is dominated by the hardy and well adapted local village chicken. Chickens are raised by 93% of all households in the target districts. Other types of poultry raised include ducks, pigeons and geese (inc. Muscovy ducks), with turkeys, Yellow Chickens and quail being introduced relatively recently. Control over the disposal of birds and the proceeds of any sale varies according to the ethnic group to which the women belong. Village poultry are generally housed overnight and allowed to scavenge for feed during the day. In situations where smallholders have upland cropping areas, their flocks are frequently divided, with a significant proportion being held in the cropping areas. The design of poultry housing varies from village to village with few examples of good housing. Nests, but not perches, are generally provided and the removal of manure is rarely practiced.

b. Constraints to Poultry Productivity

97. Disease outbreaks appear to be a major constraint to chicken and duck production, especially in flocks raised in villages rather than in more isolated production areas. The clinical and post mortem signs described by farmers suggest that fowl cholera (in chickens and ducks) and Newcastle disease (in chickens) are the most common diseases causing mortality. Other problems of lesser importance include fowl pox and ectoparasite infestation. Poisoning of poultry through the consumption of poisoned rats is a problem in some villages. Overall, the constraints to poultry productivity include (i) endemic and epidemic diseases, (ii) smallholders limited knowledge of simple husbandry practices, including appropriate sanitary practices, (iii) inadequate access to veterinary support services and supplies, (iv) a lack of understanding of the concept of a balanced diet, (v) limited understanding of the need for chicken houses and nests, and (vi) limited knowledge of the principles of flock management.

c. Proposed Interventions to Enhance Productivity

98. The challenge for the technical specialists of the Design Team was to identify interventions that could be implemented successfully in the existing scavenging production system. However, scavenging, free ranging, unhoused poultry are susceptible to all the diseases and hazards identified during the surveys that make poultry production a high risk activity. The dilemma is not easily resolved and, as concluded in the following sections, a complete change in the production system to a small scaled commercial enterprise is the main opportunity for any income impact from poultry.

- **Improved sanitary practices** to prevent parasitic disease includes removing bark from housing timber, reduce bird densities, cleaning shelters and nests, applying ash to floors, smoking to kill pests and using insecticides as needed. A wide range of parasites can be controlled through these basic management procedures.

- **Improved biosecurity**, based on good sanitation, will broaden the range of diseases tackled, through regular cleaning, not introducing new birds of unknown origin or from a sick flock, separating introduced birds from the main flock for a quarantine period, and not buying chickens from locations where ND or fowl cholera outbreaks are thought to have been recorded, and generally avoiding contact between flocks.

- **Vaccination** against the major diseases of fowl cholera and Newcastle disease with commercial vaccines applied via the mouth, eyes or injections at regular intervals, will

prevent outbreak of the diseases. Both vaccines require an effective cold chain, to maintain vaccine integrity throughout the length of the chain including storage, transport, preparation and administration. It is essential that every person handling vaccine understands the need for maintaining the cold chain and their role in same. This aspect is more difficult in the isolated areas of the Northern Region.

- **Improved shelters**, water and feed supplies constitute an improved management package that incorporates elevated houses, day shelters for young chicks, increasing the quantity and quality and availability of water and supplementing the scavenging feed resource base with the production or harvesting of locally available feedstuffs.

d. Implementation Conditions

99. **Table 4** describes the implementation conditions for each of the above technology options. The first option is easily available but, as parasitism per se has not been identified as a major constraint on production, the benefits are not likely to be large. All other interventions have significant technology prerequisites - such as an effective cold chain for the supply of vaccines to villages. It is unlikely, therefore, that interventions can be progressively introduced and they may all have to be considered simultaneously, by moving directly to a more sophisticated production system. This may only involve small numbers of innovators who would need to increase their investment in housing, feeding and health control and have ready market access. To protect the interests of these 'producers' (in contrast to the many 'keepers' in the village) biosecurity measures would need to be implemented to prevent infection.

Table 4: Implementation Conditions for Poultry Technology Options

Intervention	Inputs Required	Minimum Level of Farmer Organisation	Technology Prerequisites
Improved sanitary practices	None	Individual	None
Improved shelters, water and feed	Local materials and some minor hardware	Individual	Vaccination, biosecurity and improved feed resources
Improved biosecurity	Regulations for movement control	Village	Improved shelters water and feed
Vaccination	Regular supply of good quality vaccine	Village or cluster	Biosecurity and improved shelters water and feed

e. Development Pathway for Poultry

100. As poultry are extremely susceptible to fowl cholera and Newcastle disease, and the integrity of a cold chain from the capital. Vientiane to northern villages cannot be guaranteed, thus limiting protection against these episodic diseases. Poultry can be confined to reduce contact and decrease the chance of infection. However, this will deny the birds the feed they gain from scavenging. It is considered there is no transitional system for poultry other than to shift directly into a semi commercial production that depends on, the use of commercial supplementary feeds. Such a level of production can be envisaged for only a few households in villages close to urban settlements.

101. While not concentrating on poultry the Project will be able to support poultry production for interested farmers. The interventions will be those that are consistent with work being done with the other species, and include;

- Day shelters for young chicks to increase their survival,
- Reduce contact between flocks by housing the flock outside the village,
- Introduce village quarantine arrangements to prevent introduction of birds from unknown sources.

102. These interventions can be carried out with the existing resources available to farmers, and where animal health service providers are active, advise on the use of vaccine to prevent disease.

5. Summary of Production Systems, Constraints and Priority Technology Options

103. **Table 5** provides an overview of the current production systems, the major constraints and the priority technology options for the start of the Project, based on the technologies outline above and the conditions under which they will be effective during early implementation. These priorities will be refined as additional criteria, based on understanding of the social conditions, the capacity of district, provincial and national extension staff and market access, are applied in subsequent sections.

Figure 4: Development Pathway for Poultry

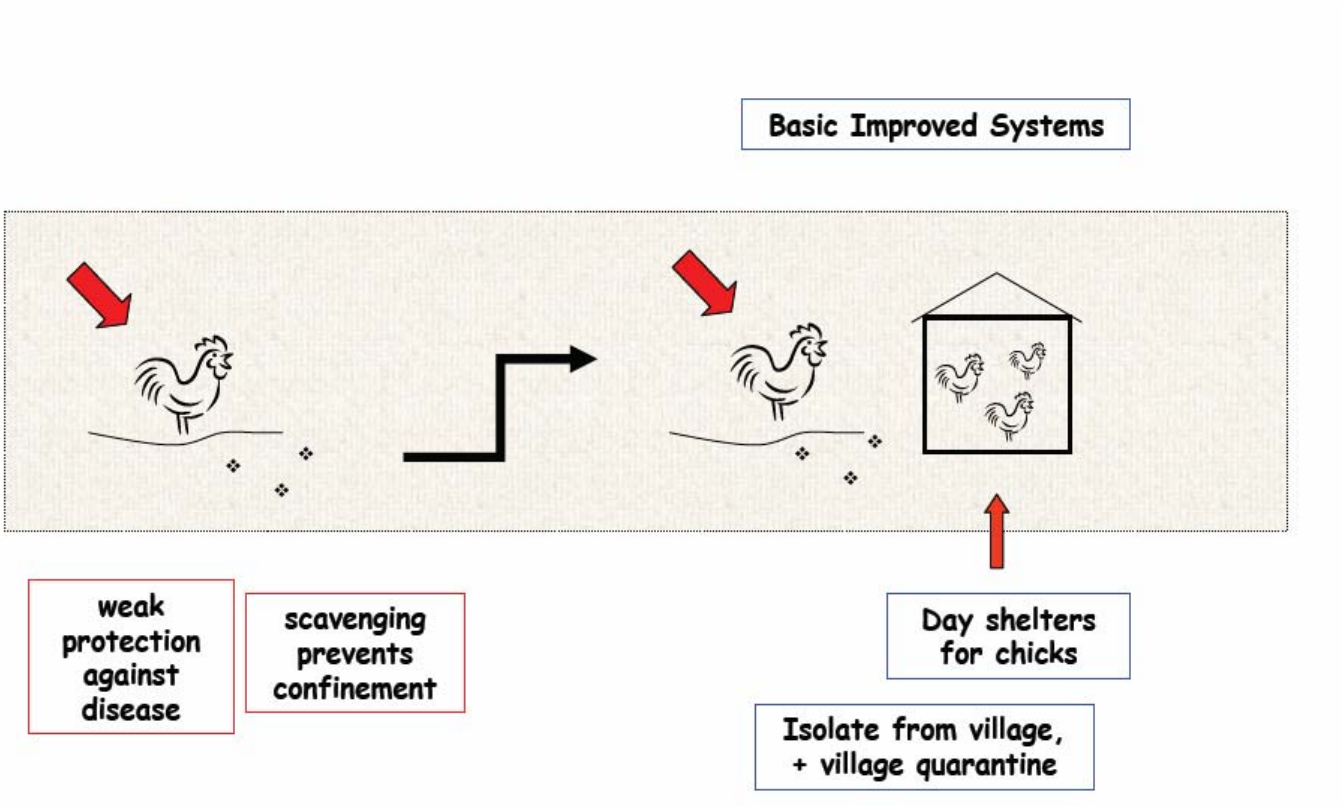


Table 5 : Overview of Production Systems and Technology Options

	Current Situation	Constraints	Priority Interventions	Situation with Project
Cattle and Buffalo	Low efficiency of breeding herds, slow growth, low quality of animals being offered for sale, and poor marketing	• Labour to collect feed • Quality of feed • Endemic and epidemic disease • Difficult access to markets • Predation and theft	• Introduction of improved forages • De-worming of buffalo calves at 2 weeks and all calves while growing • Vaccination against HS	More calves produced per breeding cow, shorter time to sale weight and increased price per kilo liveweight. Greater number of households with cattle maintained mostly around the village, with forage gardens for cut and carry, grazing areas of forage grasses and legumes and other feed resources
Pigs	High mortality of piglets, occasional mortality of all ages, slow growth rates, strong local and provincial markets	• Epidemic and endemic diseases • Quality of feed • Poor housing • Poor management of males and females • Labour to collect and cook feed	• Introduction of leguminous forages • Improved housing • Improved manure management	More efficient breeding herd, faster growth and sale of young pigs, more effective use of boars. Better hygiene in village and reduction in diseases transmitted from pigs to humans. Better crop production from use of compost from pig manure
Goats	Small total numbers in small herds with good productivity and increasing strong demand for live animals for meat	• Damage to own and neighbouring crops • Parasitism when grazing management and housing is poor	• Increased and Smarter feeding • Housing and Sanitation • De-wormers • Manure and compost production • Breeder and buck management	More goat keepers and producers with moderate increases in productivity and fewer problems with goat behaviour
Poultry	Chickens - ducks, and other species raised in varying numbers. High mortality in all age groups, scavenging feed resource base supplemented by rice bran and broken rice, strong local market, consumption by households	• Endemic and epidemic disease • Poor farmer knowledge on housing, feeding and sanitation • Inadequate access to veterinary support and supplies • Lack of knowledge about simple sanitary practices	• Improved sanitary practices • 'Improved shelters, water and feed supplementary feed and management of young birds • Improved biosecurity • Vaccination to improved control of Newcastle disease and fowl cholera	More birds raised to maturity per clutch and more birds and eggs sold. Poultry meat and egg consumption at household level increased. Improved farmer, extension worker understanding of nutrition, biosecurity, disease control, flock management and marketing, increased linkages with input providers and traders. Small but significant numbers of commercial producers

III. PROCESS OF CHANGE

A. Intensifying Livestock Production

104. There are a range of technical interventions that can significantly increase the productivity of livestock production. Extension staff will be working with a wide range of livestock: cattle, buffalo, pigs, goats and poultry, across a diverse production environment. Whilst important to farmers, livestock are curre4ntly raised in low input systems. Farmers are unlikely to accept technology packages of improved inputs while raising livestock under these conditions. The extension approach adopted must respond to farmers' felt needs, across all conditions at different sites, and recognize that farmers systems range from traditional to more intensive production ones. Animals are not sold at regular intervals or at optimal times, but on occasions when the households need cash. Generally, livestock production has not been regarded as an enterprise, but as a mechanism for wealth accumulation, The low productivity of livestock rearing precludes farmers from envisaging livestock as a means of regular income. This low starting point, and simple changes, does, however, provide opportunities for significant productivity benefits to be gained.

105. Interventions to improve animals health, have been a common starting point for many livestock projects. The effectiveness of this intervention given (i) farmers' reluctance to 'invest' in preventive vaccination while livestock remain a means for wealth accumulation, and (ii) free-range systems makes it prohibitively difficult[28] to carry out vaccination. Thus farmers are unlikely to accept interventions until they perceive their livestock as a means for generating income and wish to secure that income

106. It is possible to identify technology packages for improved livestock production. These all involve a 'systems change' requiring farmers to reorganize their resources of land, labor and time. This will affect other production activities and farmers are naturally reluctant to do this. Furthermore, the highland areas are quite diverse. This diversity occurs both with the physical environment, and also farmers' resources of land, labor and funds. Thus not just one technical package is required, but a range of models for the different conditions that individual households must face.

107. The PLDP extension strategy identifies entry points' that will engage farmers, and lead to system changes where significant impacts will become obvious. While the technology options might promise substantial benefits, farmers' concerns focus on the difficulties they face on a day-to-day basis. Thus the initial interventions should address the 'immediate problems' that farmers identify. All livestock species have periods of high time-and-labor demands which provides an entry point for the introduction of forages as small forage banks. As farmers note improvements in the condition of their animals, some will respond by expanding the area of forages as well as managing their animals closer to the house. At this point, farmers have made a systems change and intensified their livestock production. They will also have made a shift in mind-set from being livestock 'keepers' to becoming livestock 'producers'. While the use of forages involves a systems change, its use is simple and has few entry barriers to widespread adoption. Once these impact-yielding systems have been identified they can then be disseminated directly to other villages for accelerated expansion.

108. Additional interventions are also available to enhance productively above this initial impact and include feeding management of animals for breeding, production, and animal health. These interventions require a higher level of technical knowledge, external inputs or a degree of

[28] Considerable effort is required to collect free-range grazing stock to administer vaccines. Coupled with this is the technical difficulty of ensuring viable vaccine due to unreliable cold chains in rural areas with poor services.

community organization to develop. These will not flow on automatically. Farmers will need a further shift in mind-set to want to become 'good livestock producers'. Associated with this will be a shift in farmers' objective for livestock production, from being for wealth accumulation to being an enterprise for income generation. In other words, farmers must develop a market orientation for livestock production. They will then require and seek enhancing technologies to maximize the productivity of their livestock.

109. While some of the technologies will be applied by farmers as individuals, there are others which can be better provided as services, e.g. improved mating services, feed supplies, animal health and veterinary services, etc. Indeed if these services are not available, farmers will not be able to develop enhanced livestock production. In order to support market orientated livestock production, the Project will need to facilitate the establishment of a range of new enterprises such as those listed above. These small enterprises will actively promote their services and in turn, stimulate enhanced livestock production over an expanding area.

Core Activity Over for Livestock Development:

- Intensification of livestock production through the use of forages. Forages will be introduced to address immediate problems of high time and labor requirements for providing feed to livestock. Incremental gains in productivity will lead to farmers managing their livestock with large areas of forages, the main feed resource, resulting in impact-yielding systems. These can then be disseminated to others who can gain positive impacts.

- Market orientation leading to enhanced production. Farmers application of more complex set of interventions (i.e. wanting to be good livestock producers) will be driven by a desire to meet market demand. The development of a market orientation will be facilitated to generate farmers' demand for enhancing technologies. To further stimulate market driven livestock production, establishment of small enterprises will be supported to provide the necessary services for enhanced livestock production. These small enterprises will function independently, and so continue to stimulate production beyond the life of the Project.

110. These core strategies will thus respond to inherent demands of farmers' rather than being a set of composed technologies. Their phased introduction in response to farmers' needs provides an internal dynamic that will drive their adoption.

111. The core extension strategies will be implemented by DAFO in three phases (i), establishment of impact yielding systems; (ii). expansion; and (iii) enterprise development and enhanced production. Activities in phase three, will also allow DAFO staff to begin to reduce their inputs to target villages, by relying on the small enterprises to provide on-going stimulation.

112. In addition to the core activities, there will be two further opportunities to stimulate livestock development on a broader scale; (i) once the impact yielding systems have been established employ strategies for widespread dissemination, such as radio, posters, market days, etc. and (ii) engage other agencies implementing development activities to include the interventions and extension process defined here as part of their own programs in other target areas. The details of these strategies are described in the following sections.

1. Establishment of Impact-Yielding Systems

113. This Phase aims to facilitate impact-yielding systems for various livestock at a new site. The identification of impact-yielding systems is a crucial step that forms the basis for accelerated expansion in the subsequent phase.

114. Time and labour of farmers to provide feed for their livestock is a issue for rearing all the livestock species, even under free-range conditions. In the case of cattle, there are periods when animals are kept close to the house (i.e. when calving, suffering from an injury, to prevent damage to crops, etc.). During these periods, farmers collect native grasses, for about 2-4 hours per day and this still provides only limited feed. Similarly for pigs, green feed is collected from the forest and cooked to provide feed in the mornings and evenings. For goats, with their reputation for being 'covered' roaming feeders, they do not feed well under wet conditions and are better kept in stalls requiring the farmers to cut-and-carry feed. The heavy burden of time-and-labour for raising livestock provides the entry point for the introduction of forages in small plots as an accessible feed resource. These periods of feed collection are not always obvious and need to be identified in each system. To identify these periods in each upland situation participatory tools of livestock focussed PRA can be employed that focus on the feed issue.

115. To reduce time-and-labour inputs for feeding, farmers need grow only small areas of forages (20 x 20 m) requiring minimal. As forages are of higher quality than native grasses, together with the fact that more is fed when suppose are more readily accessible, improvement in the condition of the livestock will occur; (smoother coats, reduced water requirement, stronger calves, more milk produced, etc.). Where farmers note this change, they may decide to continue confirming the animals after increasing the forage area. At this point, farmers have made a systems change and significant impacts result: increased number of stock managed, shorter time to sale, better prices, etc. As livestock production is complex in the diverse highland environment, a range of impact-yielding systems suited to local conditions will be needed. The emergence of these will depend the innovation of farmers and the problem solving attitudes initiated by the participatory processes facilitated initially by DAFO staff.

116. While the introduction of forages provides a pathway to impact yielding systems, this recognition does not occur automatically. As farmers resolve their problem of time-and-labour for feeding livestock, they may turn their attention to other household issues and not notice improvements. Farmers may fail to see the causal linkage between livestock the improvement and the use of forages. This link may need to be facilitated and consolidated by the extension staff carrying out follow-up activities. This follow-up will need to go beyond technical support and involve dialogue with farmers to identify impact yielding systems.

2. Phase 2 Expansion

a. Managed Expansion

117. Following the establishment phase, farmers at new sites may by-pass the identification of immediate problems and move directly towards systems change to achieve impacts. These can be introduced to new sites through a variety of approaches

(section xx). The rate of adoption in new sites should be accelerated, with greater numbers in the first year, larger areas of forages planted to enable impacts to become clearer in the second year. Expansion during this period will still depending on DAFO extension staff to select new sites, and provide support for planting materials and technical advice, hence the name 'managed' expansion.

118. With the possibility of accelerated adoption, there comes a risk that this phase may revert to a promotional activity given the diversity, there are significant differences between households that can affect the ways in which forages can be integrated into their system. If farmers at new sites are encouraged to simply 'copy' an impact-yielding system from earlier sites, on-going adaptation to gain further efficiencies may not occur. It is important to promote a problem solving attitude among farmers. The same participatory tools should be employed to identify immediate problems and provide options, but be combined with exposure (cross-visits) to impact-yielding

systems at sites with similar conditions. This will encourage accelerated adoption, and assist farmers to integrate forages into their production system.

3. Widespread Dissemination

119. Once impact-yielding systems have become well established, it will be possible to conduct actives for widespread expansion. This is un-managed in the sense that planned activities will not target specific villages but disseminate information widely, so that interested farmers can apply the new technologies where they have access to planting materials.

120. The effectiveness of this approach will be helped by the fact that forage establishment and management to do will not require advanced great technical knowledge and can easily be transferred from farmer to farmer. There may be a temptation to do this as soon as impact-yielding systems have been established. However, unless interested farmers are able to obtain planting materials and some technical advice, their interest may not result in sustained adoption. Thus, before launching into activities for widespread expansion, small enterprises to supply services of planting materials and technical advice must have already been established. This is not likely to occur until after the next phase has been initiated.

4. Enterprise Development and Enhanced Production

121. This phase requires the concurrent development of a market orientation, the introduction of enhancing interventions, and the development of enterprises that support market driven production. The impact-yielding systems are based on the use of forages with some simple management adjustments. More complex interventions can enhance productively further, including advanced feeding management of the herd to increase productivity, or providing quarantine protection against disease and animal health interventions. Entry barriers exist for each of these technologies. They require either greater technical knowledge and skills, e.g. purchase of external inputs, and more complex management of the herd, which may involve establishment of community agreements either within or across villages. These will require a higher level of commitment by farmers to overcome these barriers, and farmer adoption cannot automatically be assumed.

122. The development of a more market orientated production system will provide the incentive for farmers to overcome these entry barriers and demand additional enhancing technologies.

123. Some of the enhancing technologies will be best introduced through the establishment of services provided by small farmer-operated enterprises. These include interventions such as supply of planting materials, feed supplies, mating services (boars and bulls), animal health and veterinary services, etc. It is not possible for each household to learn and perform all these interventions, given their small number of animal farmers may be unable to move to the level of enhanced livestock production.

124. This approach differs from the common strategy employed by many projects in the past where greater effort was given to the establishment of village veterinary workers (VVWs) in target villages. This was based on a community development approach well being but has often not been sustainable due to waning commitment of the VVW, or limited market volume of business to make the activity worthwhile for potential VVWs. The approach recommended here is in line with the finding of the EU project towards the end of its life, that animal health services should be a small enterprises, providing a service to a cluster of villages, so as to ensure there is a substantial demand.

125. The development of small enterprises will have an additional stimulating effect on livestock production by virtue of providing farmers with increased productively potential. It will be in the interests of farmer service providers to promote improved livestock production beyond the initial village-cluster, at the same time providing technical advice as part of the service. As they continue providing on-going services moving from village to village, they will introduce new developments from farmers in other areas, and so be a source on-going stimulation for change amongst their clientele within a village-cluster.

B. Enabling Factors for Change

1. Marketing Inefficiencies

126. When traders move stock across district and provincial boundaries, they can experience difficulties from processing of paperwork and collection of fees, for example total fees paid for documentation to transport cattle from Phonesavanh to Vientiane is Kip 60-90,000 -compared with Kip 100,000 and 162,000 per head for the actual transport of cost cattle and buffalo respectively. In other words the fees (i.e. no value added in the eyes of the trader) and can amount to about 60% of total transport costs.

127. The time/inconvenience taken to visit at least three different offices at the district and provincial levels can amount to a full day, and provides addition opportunities for unofficial payments to accelerate processing. Ways to streamline the procedures for processing of permits and revenue collection, as well as mechanisms to facilitate the trade and movement of livestock are being actively examined in the SADU project GPAR projects in Xieng Khouang. PLDP could benefit from improved mechanisms that may be derived from this work, and apply them on a broader scale throughout the Project.

2. Service Providers Functions and Availability Across the Project Area

128. Farmers regard the market for livestock as being secure, i.e. that there is always a market for their product. However a great deal could be done to improve the interaction between farmers and the market sector.

129. The market chain for purchase of cattle and buffalo has many variants. Collectors purchase from farmers and sell, in some cases, to retailers in local district and provincial markets. Retailers in these markets also purchase directly from villagers, and farmers may themselves herd their animals to sell to known retailers. In some cases farmers will act as collectors, purchasing animals in their own right and selling on. Where animals are sold to larger markets in Vientiane, they will pass through a provincial trader. The number of traders has increased visibly in recent years, due to better road systems and the availability of small one ton trucks (which can be purchased for ($ Kip XXXX). It was only two years ago that farmers and traders would herd cattle long distances taking many days to road herds to the larger traders.

130. All provinces have registered slaughter houses providing a slaughtering service for a fee, that is paid by the owner of the animal prior to slaughter. Slaughterhouses do not play any role in demand, prices paid to farmers or quality requirements.

131. Farmers generally are at a disadvantage in selling their animals, as they usually sell when they require cash and are under some compulsion to sell. Farmers are guided by recent sales in the area. They attempt to bargain up, but if their prices are rejected by 2-3 traders they then accept the lower prices offered. Collectors and traders buy animals based on their estimation of the dressed weight. Farmers are not able to do this, and at the same time often not confident about the condition of their animals, and so not able to negotiate in an informed manner.

132. There are a number of opportunities to improve the marketing of cattle and buffalo. If farmers had a better ability to estimate the dressed weight they would certainly be able to negotiate better. More important is that farmers negotiate from a position of confidence/strength. This can be derived through a number of ways (i) use of forages will inevitably lead to animals of better condition, and extend this into the dry season, creating a demand for their animals, (ii) management of their animals so that they sell at optimal times of their choice, rather than in time of need, and (iii) sell collectively. This last option can be a win-win situation for the farmers and traders as this will be more efficient for traders to buy a truckload at one site rather than having to travel to many villages. Traders will be able to move stock without suffering weight loss of animals purchased earlier and waiting for shipment. The attraction for traders to buy a full truck load as a single lot will give farmers a greatly strengthened bargaining position.

133. Service provision by the private sector has played a minimal role within the livestock sub-sector, in comparison, to that of crop production, and thus by definition without purchase of inputs. The one area where the private sector has played some role is in the supply of medicinal items. Veterinary supply outlets are excluding found only at provincial level, either in shops selling chemicals for crop production or human medication. The range of supplies includes only those medicines with a long shelf life, i.e. not vaccines that require refrigeration. This is not surprising given the limited number of farmers raising livestock as an enterprise who would probably purchase these items if they were available.

134. This area is likely to change because the Project should result in farmers producing for markets and thus needing inputs to enhance their production. Indeed for this to be achieved it will rely on the development of small farmer-operated enterprises. Areas that are expected to emerge are (i) veterinary services (basic vaccination and limited treatment); (ii) planting materials, mainly seed for stylo, (iii) feed supplements, which can include stylo leaf-meal, but also milling of soy beans, etc as a feed supplement. The Project will actively promote and support this development, through providing technical and business skills, and implicitly developing a market demand and distribution networks.

IV. OPERATIONALIZING EXTENSION

A. Extension Methods and Activities to Achieve Change

135. In any village, extension staff will find villagers raising a range of livestock species (cattle, pigs etc.) in a variety of productions systems (breeding, paltering etc.) employing different management systems. The technology interventions associated with feed, animal health and management require different extension methods for their introduction, and need to be applied at different stages as villagers develop their productions systems. These interventions cannot be introduced as a standard package, say for a model pig or cattle producer, but will need to be provided interactively, as farmers intensify their livestock system.

136. A unifying extension approach is needed for staff to manage this response. The overall approach will be similar to the Farmer Field School, in that villagers are asked to identify constraints and opportunities and then examine a set off interventions to address these. This problem solving approach to extension will provide staff with an ongoing extension interaction with farmers that can deal with any species and respond progressively as farmers commitment to livestock increase.

137. This section describes the main extension thrust, including interventions to improve the fertility, growth and survival of the animals in three phases establishment, expansion and

enhancement. It also proposes activities to provide greater market orientation and the generation of smallholder enterprises that will stimulate farmers interest in improved productively.

1. Establishment of Impact-Yielding Systems

138. The extension approach proposed during this phase will

- Identify immediate constraints which farmers face. In most cases this is expected to be the amount of labour to provide feed, which the introduction of forages will resolve, followed by;

- Supportive follow-up, to identify farmers who are beginning to adjust their system and gaining impacts.

139. The impact-yielding systems that emerge are expected to be a variation on a theme of the management of livestock enabled through the use of forages as the main feed resource. In some cases it may also be appropriate to introduce simple animal health interventions such as de-worming, which will have a rapid and demonstrable effect to gain farmers interest and confidence. Animals health interventions will be delayed until farmers have become livestock producers and begun to manage their animals.

140. The emergence of new impact-yielding systems takes place over 2-3 seasons, based on the experience of the FLSP. However the experience gained from this project and the forthcoming Capacity Building for Smallholder Livestock Project (ADB TAR LAO 38084) should see this time reduced. This will include (i) increasing the initial areas of forages to about 20 x 20 m, so that farmers will have enough forage to use to gain significant results in the first year; (ii) the use of case studies from other sites; and (iii) greater capacity of staff to identify and support champion farmers who begin to use forages effectively.

The First Year – This is a Crucial Period - Extension Activities are Described in Some Detail

Y1 - 1 General Problem Diagnosis or PRA. (Village Activity)
This will provide a general idea of the production activities of the village, the resources, and constraints. The tools use for this include; village resource maps; historical and seasonal; historical calendars, village walks. This should involve members of all households in the village.

Y1 - 2 Specific Problem Diagnosis. (Interest Group Activity)
This will focus specifically on identifying the main constraints of livestock production in the village, and the root causes for these. This will be conducted with those interested in livestock and should be carried out separately with two groups (i) large animals and (ii) small animals. This separation will also implicitly enable women to gain direct attention as they will generally form the core members of the small animal group. The tools for this include: seasonal calendars for livestock; village resource maps; and problem-cause diagrams.

Y1 - 3 Village Planning Meeting (Interest Group Activity)
This step will work through the interest groups formed in the previous step. Staff will introduce a range of interventions (in the case of forages there will be a range of species) in response to the issues identified in the Livestock PRA. ‘Cases’ of champion farmers will be introduced to illustrate where other farmers have begun to use these interventions on a substantial basis. Tools for this will be flip charts of the interventions and photo stories of case farmers.

Each interest group will then self-select a 'focus group' of 4-6 farmers, who will apply the interventions on a trial basis. The small number of farmers is important to enable staff to follow-up activities well. This will also emphasise to farmers that this is not a promotion of the technologies but a trial use which they should assess before expanding. Inspection will be made of the proposed sites for the forage banks and the focus group will be requested to prepare these for planting.

Y1 - 4 Introduction of Intervention (Focus Group Activity)
DAFO staff will work directly with farmers in each focus group. The interventions, i.e. forages, will be introduced This will involve a practical demonstration of planting forages and constitutes a direct training function for farmers.

Y1 - 5 Follow-Up (Focus Group Activity)
Staff carryout follow-up activities with each group within two weeks of forages being introduced, to ensure planting and maintenance practices have been followed correctly. Follow-up will focuses on farmers in the 'focus group', but other interested farmers should be encourage to participate. Where there is an opportunity, these follow-up visits should meet with the focus group, so that farmer-to-farmer can exchange occur. Where it is not possible for the focus group to meet on all occasions, it is vital this be achieved on strategic occasions.

The follow-up will initially have a technical focus, focused on the establishment of forage plots. As farmers begin using the forages as a feed with their livestock, follow-up will shift to being 'supportive' follow-up, i.e. engaging with farmers to assist them observe the effects of the interventions on the condition of their animals, and then linking this to use of forages.

Y1 - 6 Village-Cluster Exchange Meetings (Focus Group Activity)
Farmer-to-farmer exchange should be arranged in the first season, so as to ensure that lessons are shared between villages. This will begin to establish a local farmer-to-farmer and village-to-village networking at an early stage of the project. Preparation will need to be made in each village prior to these meetings, i.e. selecting representatives, drawing flip charts, etc., to assist them to report on their findings. During these meetings DAFO staff need to ensure there is adequate time for exchanges and discussions between farmers, as this is the central focus of this activity.

Y1 - 7 Village Feedback Meetings (Village Activity)
The focus group reports back to the interest group and village on their discussions, experiences and results of applying the interventions. Where these have not been so significant they can call on the results achieved by other villages, as reported in the Village Cluster Exchange Meetings. Flip charts should be prepared with the focus group to assist them to report back. Where practical, actual (live) example of forages or livestock should be used in these meetings. Where necessary, the meeting should be moved to the outside to examine the forages or animals!

141. The emergence of new impact-yielding systems will require varying degrees of innovation by farmers, and the use of 'participatory approaches' serves to foster a 'problem solving attitude' with farmers. This is achieved through (i) Livestock- PRA to facilitate farmers working together to identify issues and then seek solutions; (ii) providing a range of interventions, that implicitly requires critical assessment by farmers and villagers, and (iii) supporting active farmer-to-farmer exchanges. Staff themselves need to be trained to adopt a 'participatory' attitude, as they shift from providing technical advice, to enquiring from farmers how they are applying the interventions and what result they are receiving.

The Second Year

Y2 - 1 Consolidation of Emerging Impacts (Village Activity)
The activities in the second year in a village will focus on consolidation of the emerging impacts from Year 1, in particular identifying management practices which to exploit the opportunities provided by forages further. Key activities for this will include: 'village planning' at the beginning of the (agricultural) year, and cross-visits for selected farmers to

sites where forages have already been established. When starting in a new district, this visit will probably be outside the district and in some case outside the province. In later years it should be possible to make similar cross-visits within the district.

Y2 - 2 Village Cluster Exchange Meetings
In the first year the extension workers work directly with members of the Focus Group, from Year 2 on they shift to working with Interest Groups. This means that planning is made on a village basis and different level of progress by different farmers are used as a basis for exchange of experience within the village. The Village-cluster Exchange Meetings will provide mutual support through seeing farmers from other villages who are addressing similar issues. The work with Village-clusters has a strategic role. In later Phases, extension workers will need to plan activities on a cluster basis and ensure that the different, emerging experiences are actively shared between villages. This is particularly important, as some villages are likely to progress quickly with one species of livestock, while another village may be progressing well with another species. Information on the relative strengths and weaknesses of the different impact-yielding systems can then be shared between villages within the village-cluster.

The Extension Effort for the Establishment Phase can be Summarised as

Intervention Focus:	- Forages, to reduce time and labour - Prophylactic medicines for quick results (de-worming)
Extension Activities Year 1	- PD to identify immediate constraints - Follow-up to identify impacts and Basic-LPS
Extension Activities Year 2	- village and focus group planning - cross-visits
Interface	- individual household in each village in Year 1 - focus groups and village in Year 2
Inputs Required	- Planting start-up packages (range of forage types for 20x20 m) - Extension pamphlets, - Flip charts; technologies and case studies - Staff time and mobilisation
Outputs	- Forages Established with increasing number of farmers - Impact-yielding systems identified (cf. Basic Livestock Production system).

2. Phase 2 Expansion – Years 3 and 4 ???

142. The extension objective for this phase will be the further expansion of impact-yielding systems established in the previous phase. This will occur through extension staff working in new villages and consolidating and spreading the impact-yielding systems in established villages.

143. The goal is that the establishment of impact-yielding systems will spread more rapidly. New farmers both in new and existing villages can begin to use forges without having to progress from addressing their immediate problems, but begin to work directly towards improved systems. The acceleration of up-take will occur with a large number of farmers beginning to plant and the areas

planted initially being larger. The key difference for extension activities for this phase will be: (i) new villages - study trips to villages where the impact-yielding systems have already begun to be established, and (ii) established villages, which consolidate/refine the application of impact-yielding systems, and their spread within the villages through focus group activities.

144. A significant volume of planting material for the increasing number of villages and farmers will need to be supplied to new farmers. Primarily this will be in the form of seed, but can also be through purchase of cuttings from established farmers. The study-trip for new villages to established villages can be used to obtain cuttings for quick establishment of forages and their early use for feeding. Similarly, expansion of planting stock production within villages will be supported by the project, primarily by purchases of seed and cuttings.

145. The establishment of impact yielding systems provides an opportunity for rapid expansion, but care will still be needed that farmers from new villages do not copy blindly from one site to another. Given the complexity of livestock systems, some degree of adjustment to integrate the system into each farm site will be needed. Thus participatory tools such as Livestock-PRA and providing a range of forages to test will still be used in this phase, so as to continue to engage farmers in a problem solving approach.

146. Piloting more complex interventions designed for the sub-sequent phase may be carried out in villages where farmers are actively interested in further improving livestock production. These will include (i) introduction of a second round of interventions for Enhanced Livestock Production Systems, and (ii) development of a market orientation and livestock enterprises. The process for these can be seen in the subsequent phase.

The Extension Effort for the Expansion Phase can be Summarised as

Intervention Focus:	- Expansion of Basic-Livestock Production system within villages and to new villages
Extension Activities	- cross-visits for new villages to established villages - focus group activity to consolidate and spread impact-yielding systems within established villages
Interface	- continue with village interaction, but enable expansion to village within a village-cluster
Inputs Required	- Planting start-up packages (cuttings and seed for 20x20 m) - Extension pamphlets, - Flip charts; technologies and case studies - Staff time and mobilisation
Outputs	- Expansion of new villages + farmers using impact-yielding systems - Impact-yielding systems consolidated, with variations identified

3. Phase 3 Enterprise Development and Enhanced Production

147. This phase will require a combination of integrated initiatives: (i) development of a market orientation; (ii) introduction of enhanced interventions; and (iii) establishment of small enterprises.

148. The DAFO staff will continue to be responsible for introduction of enhanced interventions to villages. However, work on ‘market orientation’ and ‘enterprise development’ generally lies outside

of the expertise and mandate of the DAFO. These activities will be sub-contracted to an outside organisation, most likely an NGO with proven expertise in this area, the staff of which will work alongside the DAFO.

149. The development of a 'market orientation' will be achieved by facilitating farmers being assisted to gain an understanding of the supply chain for livestock. With a clear understanding of;: (i) the actors and their roles in the chain, (ii) requirements at each level; and (iii) market demand, particularly seasonal demand, farmers will be assisted to identify the enhanced technologies needed to take advantage of these market opportunities. The DAFO will carry out a second round of Livestock-PRA type activities to identify how villagers might wish to further enhance their livestock production. This will include a wide range of interventions, which would be introduced according to the needs and perceptions of each village. This would be piloted within just two villages in any village-cluster, i.e. in those which are assessed as most ready to develop a market orientation. Where enhanced production becomes well established the process can then be disseminated through the Village-cluster Exchange meetings.

150. Various services will be required for developing enhanced livestock production, including: planting materials for forages (cuttings and seeds), improved mating, animal health interventions, and mineral blocks and other feed supplements, etc. These can be provided by farmer operators from within village-clusters. As these small scale enterprises emerge, it is anticipated that their farmer owners will further stimulate production as they expand their businesses. The sub-contractor engaged by the project would be responsible for stimulating these through market analysis and training, both in the techniques identified as being required and in small business operations (as appropriate to the scale of the enterprises). No credit services are planned, as the particular farmers who start these enterprises are expected to be those with the means to self-fund the small materials costs involved.

151. As noted above, a strong emphasis will be placed on DAFO working with village-clusters. This approach will also serve to help resolve one of the key difficulties that small entrepreneurs face: taking a good idea and building it into a profitable enterprise. This is the identification of a market and a distribution network. By working with clusters of villages this will automatically define a reasonable market area, and the network established by this will also serve the small entrepreneurs.

152. In the context of developing a market orientation the sub-contractor will also be responsible for two additional support activities:

- Village Development Fund: In each district, funds will be provided for infrastructure that will assist villages better manage their livestock. This infrastructure would include: improved water supply and distribution facilities for both human and animal consumption; loading ramps; crush yards for animal vaccinations, mating pens, etc; these would probably be first demonstrated in one site. Villages which have begun to successfully manage their livestock will be able to apply for grants for their own villages. This would begin in Year 3 with funding for two villages/cluster.

- Livestock Revolving Fund: These funds would be made available to poorer households, so they can begin livestock production. These will become available from Year 3, by which time impact-yielding systems should have become well established. The fund will be limited to purchasing pigs and goats, which have a rapid turn around time (so the funds can be rotated quickly).

The Extension Effort for the Expansion Phase can be Summarised as

Intervention Focus: - Developing a market orientation for livestock production

	- Continued expansion of Basic-LPS - Piloting enhanced LPSs
Activities	- Plan and implement on a village-cluster basis - Study Trips for new villages to established villages - Market orientation: (i) supply chian surveys and stake holder meetings - enterprise development: (i) market identification, (ii) training for operators
Inputs Required	- Planting start-up packages (cuttings and seed for 20x20 m) - Extension pamphlets, - training for enterprise operators - Flip charts; technologies and case studies - Staff time and mobilisation
Outputs	- Continue expansion of village and households using Basic-LPS - Selected village using enhanced interventions, including animal health and management of livestock - supply chains surveyed and constraints analysed - small enterprises developed

153. It is anticipated that by Year 3 the distinction between new and established villages will begin to disappear, and the focus of extension activity will be the village-cluster. Some activities, such as village planning and follow-up visits will still be conducted on a village-by-village basis, while other activities will work between villages in a cluster. As numbers of the farmers and villages involved increases, it is expected that farmers will come to depend more on services from within the village cluster. This networking will be driven first by project activities, (market chain survey, training, etc.) and later by the expansion of market related activities.

4. Phase 3 Sustainability Mechanisms – Years 5 and 6???

154. The driving force for the first 3-4 years of the project will be the DAFO staff working to introduce technical interventions - first with the simple forage based interventions, and later more complex interventions for enhanced production. This will involve consistent and relatively intensive visits by DAFO staff to the participating villages. While this can be supported during the life of the project, it cannot be maintained indefinitely. Continuing from Year 3 enhancing interventions will be introduced. Not all villages will be ready to implement these according to a predetermined schedule, and most villages are likely to implement them progressively, with many adjustments occurring over a number of years. The project will need to develop mechanisms that are capable of providing on-going support and stimulation to maintain steady development of livestock in each district.

155. During Phase 3 a number of strategies are proposed to ensure there is continuing support and stimulation for livestock development:

- The basis for the initial change was the introduction of interventions by the DAFO staff. This will shift towards staff assisting villagers to self-monitor their livestock production activities through; (i) introduction of VLIS systems, along with procedures for checking of weight grain rates, and breeding books.

- Regular one and two monthly visits by DAFO staff will be reduced to strategic visits to each village twice a year for: (i) planning by interest groups at the beginning of the year and (ii)

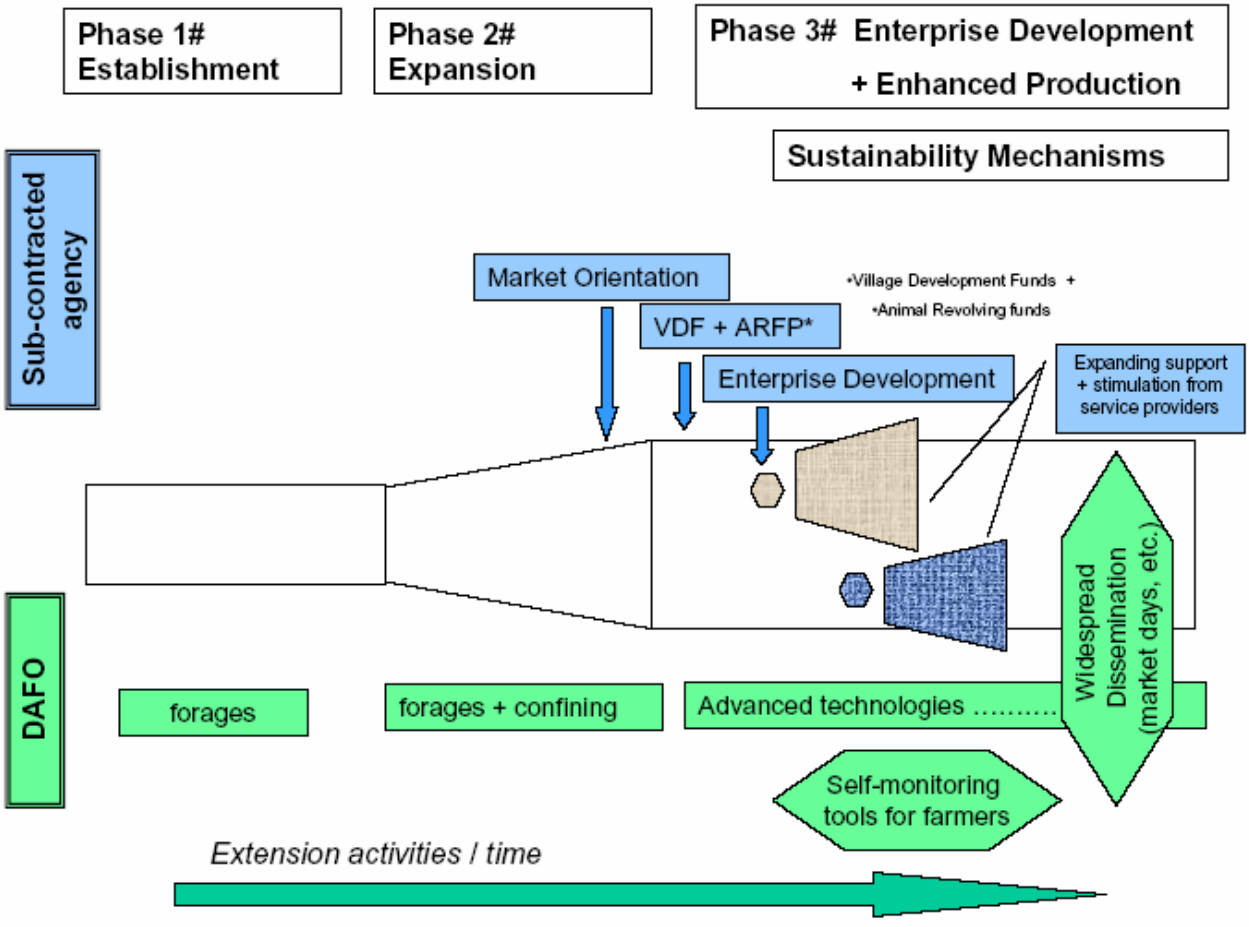
mid-year to prepare for village cluster exchange meetings. Interest group planning will also be used to carry out hand-ons activities that will attract interest, such as 'ear tagging' and review of the self-monitoring mechanisms[29].

- Widespread dissemination methods will begin to be employed across the district, so that all villages are informed of the opportunities for forages and the enhancing technologies

- During the project staff interaction with villages will shift to working with village-clusters., but it is anticipated that Village-cluster Exchange meetings are unlikely to persist beyond the project. Hence the project will need to identify other mechanisms will to foster continuing exchange within and between village-clusters: e.g. (i) 'group marketing arrangements' which require farmers to co-ordinate sale of livestock within the village-cluster to obtain premiums for sale in bulk; and (ii) the activity of the small farmer-entrepreneurs providing service for animal health, mating, etc. will help to ensure exchange, comparison and develop new ideas.

156. The internal exchange within clusters, through collective marketing and farmer service providers, is likely to have the greatest stimulating effect; these will rely on the private sector. The other mechanisms supported by the DAFO staff, e.g. self-monitoring and strategic visits, will also play a facilitating role.

Figure 5 : Phased Extension Process



5. Cross Cutting Issues

a. Provision of Inputs

157. The provision of various inputs has been noted in the description of the extension process above. This now needs to be described in more detail, so that functions and mechanisms for provision are clear. In particular it is important that provision of initial inputs does not conflict with the strategy for encouraging market orientation and enterprise development.

Planting Materials

158. The main mechanism for provision of planting materials for forages will be through (i) self-expansion by households, through transplanting cuttings from their own plots to larger plots, and (ii) development of farmer-enterprises to supply larger amounts of materials to other farmers who wish to expand rapidly and for forages which must be planted as seed, (e.g. Stylo and species of legumous trees). However the project will need to 'prime the pump' and provide the initial materials on which expansion can be based.

159. Planting materials for forages will be supplied as 'starter pack' of six main varieties to farmers in the first two years of introduction to all villages. Sufficient material will be provided in the first year to establish a forage bank of 20 m x 20 m. This will be large enough to provide sufficient forage for a significant effect on the livestock growth, but not be too great a burden for farmers to establish. The starter pack will ensure that farmers are exposed to the range of forages known to be suitable for most conditions the project will encounter. This will allow farmers to make their own selection(s) according to their local conditions. The bulk of the planting material provided will be as seed, but where possible a small quantity cuttings will also be provided, so that farmers can see forage quickly established in their own fields and can begin feed them to their livestock within about a month. It is anticipated that this rapid provision of forage for feeding will stimulate farmers to maintain their main forage bank planted from seed.

160. In the second year in each village, the number of farmers using forages and the area planted should have expanded, and cuttings from these plantings will now enable farmers to expand without reliance on outside agencies. However, in the second year it is unlikely the initial group of farmers will have planted a sufficiently large area to supply their own stock for expansion and also that of new farmers. Thus, in year two, seed will provided to both initial farmers who want to expand and to new farmers. The amount of planting material supplied could be more substantial than in year one to facilitate rapid expansion, but need not be overly generous. It is judged that seed for plots of up to 40m x 40 m will be sufficient to accelerate expansion, without undermining the establishment small enterprise producing planting materials.

161. In the first year, the project will establish a forage nurseries in each district, by working closely with 3-4 selected farmers. These nurseries will be 1 rai each, preferably established with farmers from within the village-clusters. Their function will be (i) in the first year to provide a demonstration of well-established and maintained forage banks, (ii) provide small amounts of cuttings to be included in the starter packs (new farmers can be taken to the nurseries to dig up and collect the cuttings for their village), (iii) become the source of seed as the project begins to purchase planting material for other new villages.

162. A careful balance will need to be achieved between using these nurseries as sources of planting materials, and limiting the emergence of a market for supplying them. Judgement will need to be made for both the phasing out of the project purchases and the prices the project pays for seed and cuttings. The price should be attractive to the farmers operating the nurseries, but not above what farmers are likely to pay without project support.

Village Development Fund

163. The Village Development Fund will provide funding for community based facilities related to livestock production. Primarily, this will include clean water supply and distribution facilities for both humans and livestock. Water is an often neglected element for management of livestock, and currently natural water resources are used. As the number of animals managed in villages increases, the demand for additional water supply will increase significantly. There is also the possibility that this demand will conflict with availability of sufficient water for human use, especially during the dry season. The specific water facilities to be constructed, (incl. gravity fed, tube wells, etc.) will depend on the local conditions; this could also include building of troughs and other means for the convenient delivery of water to livestock. Other community facilities might include crushes, loading ramps, and other restraining means for livestock. Some of these facilities can be installed in villages at strategic locations in the district to be used for demonstrations.

164. The Village Development Fund will begin operating only once villages can clearly show that they are now managing their livestock so as to move towards market orientated production. It is judged this is unlikely to occur before Year 3 of the project.

165. The funds should be for purchasing materials which cannot be readily supplied by the village, and also to compensate for some village labour contributions. Procedures for installation of clean water facilities are well established by the xxxxx in Lao PDR and these would be applied - if possible in direct coordination with this agency. In the case of crushes, loading ramps, etc. the material for these can usually be sourced locally (rather than using importing materials) so that they can be maintained and repaired by villagers themselves when necessary. Funds for this can be provided in the form of 'food-for-work', to initiate community activities; procedures for this have been developed by many development agencies.

Animal Revolving Fund

166. This funding will be provided to poorer households in the village to enable them to purchase livestock and enter into production.

167. These funds will not be made available until basic improved technologies have been demonstrated and adopted in the villages. The reason for this being that the productivity of livestock under traditional methods can be so low that providing livestock to poorer households is not likely be effective in assisting them substantially increase their income. For example, using traditional practices it takes over a year fatten a pig, in addition to requiring additional labour; with the improved methods offered by the project this can be reduced to about six months.

168. The introduction of revolving funds in rural communities is almost always problematic. The following points should be kept in mind: (i) each amount of the funds provided per family should be limited to enough to purchase two pigs for fattening, or two goats and a buck for breeding (this may serve to reduce jealousy from better off households not be eligible for the funds); (ii) have the poorer households work in groups of three and for the funds to revolve within this group, as self-formed groups can manage disbursement and repayment of funds without complex management mechanisms needing to be initiated in the village; the group will decide how to dispose of the final repayment.

b. Gender, and Poverty

169. Improvements to livestock production, based on forages and leading to new management systems, is essentially an exploratory and innovative approach, and is almost certain to be unfamiliar for people in most of the villages the project will work with. Thus the project will need to identify and work with those farmers who are most willing and able to try new methods. As these

pioneer farmers develop and apply impact-yielding systems, it is anticipated that other less adventurous or more at-risk groups will be willing to adopt the new approach.

170. Importantly, the forage-based technology is ideally suited for application by women, especially as pigs are one species that are almost fully under control of women.[30] In the initial stages of working with villages, the project will form 'interest groups' for large and small animals, and it is anticipated that even without explicitly targeting women, this will lead to working with women. The use of stylo as a supplement for feeding pigs will reduce labour requirements as well as significantly increasing the productivity of this system. Thus women might well be in the first ranks of villagers to gain benefits from the project.

171. As the project works towards development of small enterprises, another set of opportunities will open for women. These include the production of stylo leaf-meal (by sun-drying and bagging stylo leaf), collection and sale of cuttings and seed. These activities only require small amounts of land and labour. It could well be that these enterprises become the provenance of women.

172. It is anticipated that the project may well have difficulties defining effective ways to work with the poorest families in the village, who by definition will have very limited access to resources of material and spare time. However, it is thought that forage technologies will increase opportunities for them in a number of ways. Stylo production will reduce both time needed for collecting feed and the amount of rice bran required, thus making pig raising more feasible for the resource poor. Within most communities there are traditional support systems, in which animals are lent or shared to be raised by the poor.

B. Dissemination Means and Methods

1. Dissemination Within Managed Extension

173. The PPTA will produce an Extension Manual in Lao and English. This will provide guidelines for the PDLP training team to conduct training, as well as providing reference materials to motivate, inform and support extension workers regarding working approaches and essential technical information. The training consists of nine modules for the core training workshops described in V 1b. Each module corresponds to approximately a four month period during which there will be a number of informal training events and at least one formal workshop. The manuals will be illustrated (suitable for enlarging to poster-size for training) and accompanied by teaching notes for the trainer, and references to additional material. An outline of the manual is attached as Annex ???.

174. During the Establishment and Expansion phases, the introduction of technical interventions will primarily be through exploratory learning with farmers. Extension staff will visit villages to introduce technologies directly, working through demonstrations with farmers. Staff will then carry-out regular follow-up activities, where they will work with farmers in the field.

175. Activities during phase 3 (Enterprise and Enhanced Production), will require a range of materials for different framer groups: (i) the 'enhanced interventions' are technically more complex and farmers will benefit from simple materials; (ii) technical materials used to assist training small entrepreneurs in the specialised areas in which they will be providing a service (e.g. production of seed for forage production); and (iii) promotional materials for farmer enterprises to hand out to about the correct use of inputs. The books, brochures produced by previous projects will be used either directly (reprinting co-ordination with EU?) or with some re-packaging. This might include the use of video material, that villagers can replay as required.

[30] "Gender roles and relations in livestock management: the Hmong communities in Nong Het, Lao PDR", Oparaochoa S. N., M S thesis AIT, School of Environment, Resources and Development, Bangkok, Thailand

2. Dissemination for Widespread Extension

176. Printed materials used in the 'managed extension' phase will continued to be used with farmers and small enterprises for widespread dissemination or un-managed extension. Some additional printed materials such as posters, etc. will also be needed (literacy?). Distribution should (make u) take advantage of dynamic community events such as 'field days' and 'market day' exhibitions and activities. From the third year on, such events should be conducted at strategically selected locations but these events are `random or according to local or lunar calendars... (But extension process indicates that some structure and rewal is needed)

177. Local media should also be involved in this Phase for broadcasting extension (and market) information. Materials for this can be provided from the (available) printed material and also any videos that have been produced. Various forms of popular media are beginning to emerge in Lao PDR, some of which include interviews with farmers, radio competitions, etc. and these could be employed in Phase three or earlier.

C. Models of Change

1. Household Model

178. To-date crop-related activities have been central to the majority of family livelihood with other production activities arranged around this. Livestock productivity has been low, and has remained a supplementary activity for most households, with the number of livestock owned partly determined by the funds available, but, ultimately, by family capacity to manage them. The introduction of additional forage crops will improve both the productivity of livestock and (in most cases) reduce the amount of labour required for animal upkeep. As households take advantage of this those with livestock will be able to increase the number they raise, and other households who have not so far raised livestock, may well begin to consider them attractive.

179. A good example of the latter is goats, which villagers have not raised in the past due to the difficulty in managing them. More households can also be expected to move into pig production, as the higher productivity associated` with impoved forage provides incentives. The recruitment of 'new farmers' is not expected to be as strong for pigs, as a high proportion of households already raise pigs, while higher unit costs, and other factors such as failing shifting cultivation systems and market demand for cattle, are already influencing farmers to begin raising cattle.

180. The upper level of the number of animals raised will be determined by the resources of each household, for instance funds to purchase animals. But ultimately the number of livestock raised will be determined by the household labour and land, and crop production will continue to be the core livelihood strategy. Estimates of the upper level of livestock to be raised is based on the expectation households will do this without compromising their crop based livelihood. These are provided below in Table 6.

Table 6 : Estimated Changes in No. Livestock Raised due to Project Activities

No. of animals: "Livestock keepers"	No. of animals: "Livestock Producers" (using forages)	Adoption rate (estimate %)
Pigs		
2-4 breeding pigs	6-8 breeding	40% household of existing
0	6-8 breeding	10% household of non-producers

Cattle		
2-3 cows	5-7 cows	25% household of existing raisers
0	5-7 cows	5% household of non-raisers
Goats		
2 does	8 does with	30 % of existing raisers
	8 does with	10% of non-raiser

181. This table does not imply that any one household would necessarily have all species.

2. Village Model

182. Extension activities will be planned and implemented on a village basis, and thus the village is considered to be the unit of extension.

183. Activities will be initiated in each village without prescribing which type of animals villages will give the most priority to improving. It is likely that, following the existing pattern of livestock being currently raised, the preference will be for pigs, followed by large animals and then goats. As progress is achieved with the first species, villagers may become motivated to improve production of other species.

184. The core number of farmers initially growing and using forages during the Establishment Phase is expected to be five. As impact-yielding systems become available, it is anticipated that they will spread to other households through farmer-to-farmer extension activities.

185. The number of applicable villages varies according to the species and level of technologies. It is expected that the use of stylo for pigs could easily be accepted across all villages in a district, if news of success is widely known. Activities for improving cattle/buffalo and goat production, will probably need more support from DAFO staff. The transition to enhanced' technologies will depend even more on DAFO support and thus likely to be introduced in fewer villages.

Table 7 : Households Within a Village Adopting Forages and Enhanced Technologies

	1	2	3	4	5	6	Villages Applicable (% Households in District)
Pigs							
Phase 1	5 psn	7-8 psn	15%	20%	25%	30%	
		15%	20%	25%	30%	30%	
Phase 2 (Expansion villages)			15%	25%	30%	30%	100%
				15%	25%	30%	
					15%	25%	
Phase 3 (enhanced technologies)				2%	5%	10%	60%
Cattle+buffalo							
Phase 1	5	7-8	12%	15%	20%	25%	
		12%	15%	20%	25%	25%	
Phase 2 (Expansion villages)			12%	15%	20%	25%	60% /c
				12%	15%	20%	
					12%	15%	
Phase 3 (enhanced technologies)					2%	5%	20 /c
Goats							
Phase 1	5 psn	7-8 psn	12%	15%	20%	25%	
		12%	15%	20%	25%	25%	
Phase 2			12%	15%	20%	25%	30
				12%	15%	20%	
					12%	15%	
Phase 3 (enhanced technologies)							5

186. The figures above indicate the anticipated or possible levels of adoption following the years of project intervention. (Villages will tend focus more on one species of livestock than another at first. As they use forages and begin to manage their livestock for one type of animal and gain impacts, they will be likely to want to apply similar improvements to other types of livestock they raise. Enhanced production will represent another period of 'establishment' for the more complex interventions.

3. District Model

187. The District model for expansion of livestock production depends on the key involves the identification of important strategies for all phases. These (which??) strategies will have a significant effect on the rate of expansion and achievement by the project.

188. The District model is based on the assumption that four technical staff assigned as pairs for field work. This pairing is long accepted part of the strategy as in all districts, staff will learn and support each other in the field. It is opportunistic to buffer against weak staff by pairing complementary skills and ability levels

189. The DAFO will need to select clusters of village strategically, so that once effective systems have been identified and trialed, staff can begin to shift from working village-by-village to working with a cluster of villages and ensuring exchange between villages within the cluster. For the purposes of estimating impacts, it is assumed that there will be six villages in a cluster. (who will backstop/mentor field staff and update knowledge as necessary?)

Phase 1. Establishment

190. The objective in this phase is to identify effective and efficient systems which can be used for accelerated expansion in subsequent phases. Each team will initially work in two villages in a village cluster and increase by a second (village or cluster?) in the second year. The relatively small number of villages is due not only to the necessity to identify effective technologies, but also in recognition of the staff's need to feel familiar and comfortable in their new role.. (This is discussed further in Section V a 1).

Phase 2. Expansion

191. Extension activities in this phase focus on the introduction of the impact-yielding systems to additional villages. The Extension Teams will introduce these to two strategically selected additional villages (each one?) from a different village-cluster, so as to allow future expansion.

192. Extension in this phase will still be 'managed', and dependi on staff selecting villages for expansion, providing the initial inputs and guiding activities. The rate of expansion will still be moderate, as staff will continue to work in the established village to consolidate and expand the Basic-LPS and begin to pilot activities for Enhanced LPS. Thus staff will need to manage activities at different levels of development, i.e. initiating activities in new villages and supporting further development in established villages. To manage this more effectively planning, logistics and staff will need to shift from having a 'village focus' in planning to having a 'village cluster' focus.

Phase 3.Enterprise Development and Enhanced Production

193. Staff will continue to plan and implement extension activities on a village-cluster basis. Thus, irrespective of the stage of development of a particular village, it is anticipated that it will begin to have similar extension needs, receive similar inputs and rely on information exchange between villages within the cluster for support. The numbers of village in which the project is working at this stage will depend greatly on the structure of different village clusters. If we assume six villages in each village-cluster and each team works in two village clusters, then each team will work with a total of 12 villages, making a total of 24 villages in each district. It is hoped that the supportive interaction between villages in each cluster (and possibly between clusters) will mean that villages beginning later will benefit from the experiences of their neighbours and move towards later phases of development more quickly.

V. INSTITUTIONAL CONSIDERATIONS

A. Actors and Opportunities for Synergies

194. The main extension efforts will be provided by DAFO staff through managed extension activities, identifying villages that want to participate and providing support and technical interventions. In many or most of the participating villages (depending on location) there are likely to be various agencies also carrying out development activities; these may not include livestock development. The development objectives of these projects commonly include poverty alleviation, reduction of shifting cultivation, rural development, etc. It is anticipated that this project's approach to livestock development might illustrate another pathway to achieve general development objectives. Where projects are interested in including livestock in their own programs, a formal or informal working partnership might be formed with PLDP, e.g. with PLDP providing training and

initial planting materials and the project implementing village level activities with their own funds. Optimistically, in many districts will accelerate the spread of the PLDP approach, in addition to reaching more isolated villages that DAFO staff have difficulty working in.

195. The encouragement and support for a farmers adopting a market orientation and establishment of small enterprises in Phase 3 will play a key role in stimulating a shift to enhanced production systems. The activities and inputs for this will include: participatory market chain studies, grants for village development funds, and small revolving funds to enable the poorer households to take advantage of improved livestock practices. The delivery of these inputs will require special skills for community organisation, enterprise development and the introduction of micro-finance. This is an area of work that is not within the direct mandate for the DAFO staff, it also requires well developed skills. Thus these inputs will be provided by external agencies, including NGOs or consulting companies with proven expertise. These agencies would need to plan and work closely with the DAFO staff, so as to ensure that technical support and the enterprise development work are mutually reinforcing; joint (annual and quarterly) planning to ensure coordination of schedules, field activities and logistics will be essential.

1. Specific Projects

196. In addition to projects which may incorporate livestock development as part of their own activities there are a number of other projects where some exchange of resources and experiences will be valuable for PLDP during implementation. Some of these are noted below.

197. Capacity Building for Smallholder Livestock Systems Project (ADB TAR: LAO 38084). This was conceived as a means to continue the capacity building work of the FLS Project in some districts , specifically Khoun in Xieng Khouang, Phonxay in Luang Prabang and Viengxay and xxxx in Huaphanh. Several aspects of PLDP are novel, i.e. using forage as the entry point for intensification of livestock production and participatory approaches to extension. The Capacity Building Project will begin to work with local DAFO staff to establish these new approaches at an early date, and so assist preparing attitudes and mobilising resources for implementation of PLDP.

198. This capacity building will be based on peer interaction with experiences staff in FLSP districts, i.e. staff from new sites working alongside experienced staff, then applying these lessons in their own districts and being mentored by experienced staff. This may also provide insights for accelerating capacity building for PLDP, as more staff experienced develops in some districts of each province. To-date the FLSP sites have developed slowly, but are now ready for widespread dissemination application of new extension approaches, and the introduction of enhanced technologies for market orientated livestock production. These will be piloted in the FLSP Districts and, it is anticipated, provide practical guidelines which can be used by PLDP.

199. JFPR (Japanese Fund for Poverty Reduction). This fund normally provides funds to ensure disadvantaged groups within participating communities gain benefits from a loan project. In this case the JFPR has identified ethnic minority women as the disadvantaged group, and in cooperation with PLDP has the aim of reducing livestock-related labour demands on women and improving their access to resources. These activities are expected to be implemented by a group of NGOs working in selected areas. The draft of this document is specific about the links between it and the PLDP, however the timing of planned JFPR sponsored interventions may make it difficult to achieve the desired effect; there may still be an opportunity to interact with the agencies concerned and provide technical support.

200. GPAR[31] Xieng Khouang - Strengthening Public Administration for Poverty Reduction and Equitable Growth (UNDP 00041021): The Governance and Public Administration Reform (GPAR)

[31] Governance and Public Administration Reform

project will begin working in Xieng Khouang province in mid-2005, with a particular focus on agriculture. A key area to be addressed is the administration and management of agricultural extension, including bottom-up planning, Monitoring and Evaluation (M&E), and funding. This is potentially of great importance to PLDP, which will require the PAFO and DAFO to manage activities in a large number of villages. The GPAR project is also expected to examine procedures for sale and transport of agricultural goods. PLDP can interact with GPAR-XK by identifying issues, and by assisting to pilot possible solutions. Where these prove effective, PLDP could provide to be an important avenue for disseminating and introducing these to the other four project provinces.

201. Small-scale Agro-enterprise Development for the Uplands (SADU) project. The SADU project is working in Xieng Khouang and Luang Prabang on the development of small scale enterprises in the agriculture sector, including input and service providers. The project has already begun some work on the supply chain for meat in Xieng Khouang, and it will be focussing on supporting small enterprise development in Pek District in 2005. The process employed by SADU may provide guidelines which can be used within PLDP.

202. Lao Extension for Agriculture Project (SDC funded). LEAP (described in section I B V) will be providing training for PAFES and DAFO staff throughout the country as part of developing a national extension system. In 2005 LEAP will train two generalist extension staff in Khoun district of Xieng Khouang, the training incudes an introduction to extension; however, it is judged that additional training will still be needed for DAFO staff to implement PLDP activities. As it expands, it is likely that staff in other districts where the PLDP is working will also receive training; further interaction with LEAP and NAFES should be investigated, so as to identify mutually supporting and reinforcing activities.

2. Capacity Building for DAFO

a. Training Needs for the DAFO

203. The bulk of the capacity building will be focussed on the DAFO and PAFO (see below). DAFO (and PAFO) staff are still generally weak in both extension methodology and technical knowledge, as the bulk of their work in the past has been administrative e.g. collection of data, mobilisation for public works and provision of livestock vaccination services. DAFO staff have come to regard their activities as fulfilling government directions, and not activities directed to meeting village agricultural extension needs. In general, activities have been limited to conducting meetings (where villagers were informed of improved technologies), or training events (in which villages have supplied as trainees, almost at random); generally, these events have been conducted without assessment of what the village needed and without any follow-up. In practice this means (i) that the activities have been conducted as isolated events i.e. a training , a demonstration, without these events being linked and mutual supporting, and (ii) the gradual process of adoption starting with a few farmers and then increasing over a number of season has not been understood. As a consequence, DAFO staff have not been able to develop a sense of the actual social processes needed for successful extension. Extension skills such as communication, meeting facilitation, use of media and other tools such as flip charts, demonstration, field days, and when to use these tools has not been developed.

204. This fairly negative picture of the DAFO staff needs to be placed in context. The culture of the organisation has been that they provide administrative functions, and the flow of funds to the DAFO has been minimal and unpredictable. for example, when funding for the next three months is in doubt, it has been impossible for DAFO staff to commit themselves to a process which will span a number of seasons. In effect, they have had no choice but to attempt one-off events. The sectoral structure of the DAFO has also contributed to dysfunctional working approaches, e.g. with one or two staff assigned to crop production and responsible cropping activities for all the 60-100 villages of a district. Furthermore, their responsibilities have include enforcement of regulations,

something which completely compromises their extension relationships with farmers. The same assessment applies in an equal, if not greater measure, to the staff of the PAFO.

205. This historical picture is changing. Project activities in almost all districts of the country have now begun to provide an alternative vision of how effective extension can be carried out. These projects have also shown that DAFO staff do respond to pragmatic and consistent training and support. In PLDP, training will be provided to DAFO staff in: (i) extension methodologies; (ii) technical knowledge and skills for livestock production; (iii) management of extension activities. PLDP will provide significant training inputs in technical areas of livestock production (nutrition, management and health). It is not considered that this will conflict with the concept of DAFO staff as generalist extension workers, but be regarded as further development of technical skills. Training for extension methods will be consistent with the Lao Extension Approach.[32] The training topics are listed in **Table 7** below, and the characteristics of the training program are described in the next section.

206. The management of agricultural extension is an area often forgotten or taken for granted. It involves the areas of planning, M&E, and management of funds. Many projects in the past have contributed to training of technical staff, while retaining management functions. Thus extension administrators, such as the DAFO heads, have received little training and gained only limited experience in understanding extension dynamics or in day-to-day and strategic management of extension activities. Change within the agriculture sector is beginning to accelerate, and it is important that DAFO management and staff are provided with the opportunities to increase their capabilities. Individual technical staff need to be able to formulate activity plans and to report on them, and DAFO heads need to be able to use systems for planning, M&E and accounting for expenditures. PLDP will provide training in extension management to the technical staff and the administrators of the DAFO.

[32] Consolidating Extension in Lao PDR, Dec 2004, NAFES, p.52.

Table 7 : Training Needs Assessment for the DAFO Generalist Staff
[This looks more like a plan for competency based training, rather than a TNA?]

	Year 1	Year 2	Year 3
Extension			
methods	Knowledge: - extension process, methods (Y1) - pathways for livestock dev. Skills: - to conduct PRA , L.stock PRAs, with support	Knowledge: - F2F extension processes, i.e., focus groups, cross-visits - structure of groups and group dynamics Skills: - conduct PRA , L.stock PRAs, independently - facilitate focus group mtgs, cross visits	Knowledge: - F2F exchange within Vill. Cluster - communication skills Skills: - present interventions using simple tools; figures, charts, etc. - formulate training needs based on field requirements
Management	- to perform basic administration for extension (forms for reporting etc.)	- formulate and report on monthly plans	- formulate and manage annual plan based on field requirements,
Technical skill (livestock)			
Animal Feed	Knowledge: - forage types, characteristics, uses and planting (6 core species). Skills: - to select suitable sites, and plant forages using both seed and cuttings.	Knowledge: - forage requirements according to; livestock species; age of animals and across seasons. - management of forage plots Skills - advise on forage requirements; volume and type for livestock species -advise on seed production for stylo and grasses.	Knowledge: - basic animal nutrition - SMART feeding - strategic nutritional opportunities Skills: - assess available resources for SMART feeding - assess strategic nutritional opportunities
Livestock Systems and Management	Knowledge: - livestock production systems (i.e. fertility, growth and survival) Skills - able to identify periods in production cycle where feed will plays a key role and where forages will have an effect.	Knowledge: - livestock production systems in more detail (inputs and outputs) - specific opportunities for production improvement Skills: - write description of local livestock production systems and identify main constraints,, incl. management and inputs/outputs. - advise on pig housing and piglet management, cow+calf care, goat housing and management.	Knowledge: - management of livestock to improve production, fertility, breeding, access to market etc. - application village level livestock management tools (wt. gain, breeding books, etc.) Skills: - identify management changes to improve growth, fertility and breeding - apply interpret and report on the VLIS and AHIS
Animal health	Knowledge The main causes of mortality and 'big 5' ways to prevent mortality. Skills Able to administer de-worming to pigs, large ruminants and goats	Knowledge Understanding of disease transmission and factors that make animals susceptible to disease Skills Design disease prevention for farmer group	Knowledge: Key diseases, symptoms, treatment and strategies for each livestock species Skills: - Identify core diseases - recommend strategy for prevention and treatment - administer basic animal health interventions effectively
Supplementary Skills			
Market orientation		- role of market chains and function of actors - survey of market chains and	- role of private sector service provider to stimulate production

identification of critical points

Table 8 : Capacity Building Needs for the DAFO Heads
[This looks more like a plan for competency based training, rather than a TNA?]

Extension Methods	Knowledge - the concept of the 'development pathway', using an entry point to lead to improved production, and this will take a number of cycles to achieve. - that farmers will play a role in innovating or integrating the technology into their own system, in other words that there is not a set package for all farmers - the use of participatory tools to engage farmers in solving their own problems, including PRA, village planning, etc - the role of enterprise development to stimulate production Skills - Review staff skills in conducting village activities, both mythologically and technically - Able to articulate methods used for extension initiatives in the district - Able to assess whether extension activities are appropriate - Able to articulate job descriptions and staff requirements for effective extension staff
Planning	Knowledge - Understand the project cycle, with annual objectives contributing towards larger objectives and requiring different activities to be planned for reach year. - appreciate planned activities in the context of the NPEP - understand 'tools' such as data collection etc in the formulation of plans Skills - able to construct coherent annual and strategic plans - able to review annual plans in terms of objectives, activities, schedules and budget. - effective costing tools and financial management - Use computer effectively (word and Excel)
M & E	Knowledge - understand the functions of M+E; the difference between M and E, the function of indicators, SMART indicators, - methods for collection and recording of M+E Skills - able to specific suitable data and method for their collection taking into consideration the purpose, time and costs involved - able to write review of progress - able to review staff progress reports - Use computer effectively (word and excel)
Leadership	Knowledge - appreciate the difference between administration and leadership, (i.e. inspiring and helping functions) - appreciate strategic goals for the office - appreciate the process of personal development and how this can be supported - appreciate organisational structure to facilitate delegation of tasks. Skills - able to provide support staff in their work - able to communicate and facilitate discussion, good active listening skills - able to assess staff performance and provide constructive feed back

b. Characteristics of the Training for DAFO 'Generalists'

207. PLDP capacity building will follow two strategies; (i) formal training inputs and (ii) on-going mentoring and peer exchange through 'extension management' to engender a commitment and a team spirit.

208. The formal training component will be separated into core training and supplementary modules. The core training modules will be delivered to each cohort of DAFO/PAFO staff over a period of three years. Within each of these years, staff will attend three workshops which will provide incremental training modules directly linked to work about to be implemented in the field. Following the completion of this training, supplementary training inputs will be provided for all active DAFO staff on an on-going basis. Training activities will be provided each year, allowing staff to make some selection of topics. These workshops will continue to provide the opportunity for DAFO staff to interact and share experiences across the project.

209. Extension is a progressive activity which cannot be implemented in a prescribed manner. The diversity found in upland farming systems and in household resources, requires that staff must be able to exercise judgement and have developed problem solving abilities, so as to ensure activities are appropriate and effective. This will likely require considerable changes in approach and attitude on the part of staff; the volume and intensity of project work will probably be considerably greater than DAFO staff are accustomed to. For staff to 'make the effort' and 'go the distance', will require that there be a strong team sprit developed across the project.

210. The formal training sessions will not generate a team spirit in themselves, but can be structured by other attributes. These are as follows:

- Incremental training workshops: Spaced over a period of time and provided just prior to the time when the new set of skills and knowledge are required in the field. This ensures that the staff will see training as relevant to activities they are about to perform, with respect to both technical knowledge and extension methodology. Incremental training also allows staff across districts and provinces to meet at regular intervals and thus provide peer support.

- On-the-Job Training: Staff will be fully engaged in carrying out extension work in participating villages as they are progressively trained. There will be no delay in achieving outputs due to absence for training, and the field work will ensure that the training is relevant to local requirements

- Exploratory Training: This will assist staff learn from experience, and not just from formal training sessions. Practical sessions will be a feature of most training where staff will have direct contact with livestock and be required to solve practical problems through observation, e.g. staff can be asked to assess the affect of planting depth on forages, or the amount for feed required for a 200 kg cow. Review of field activities within the workshops will ensure that the process of working contributes to on-going learning and improvement.

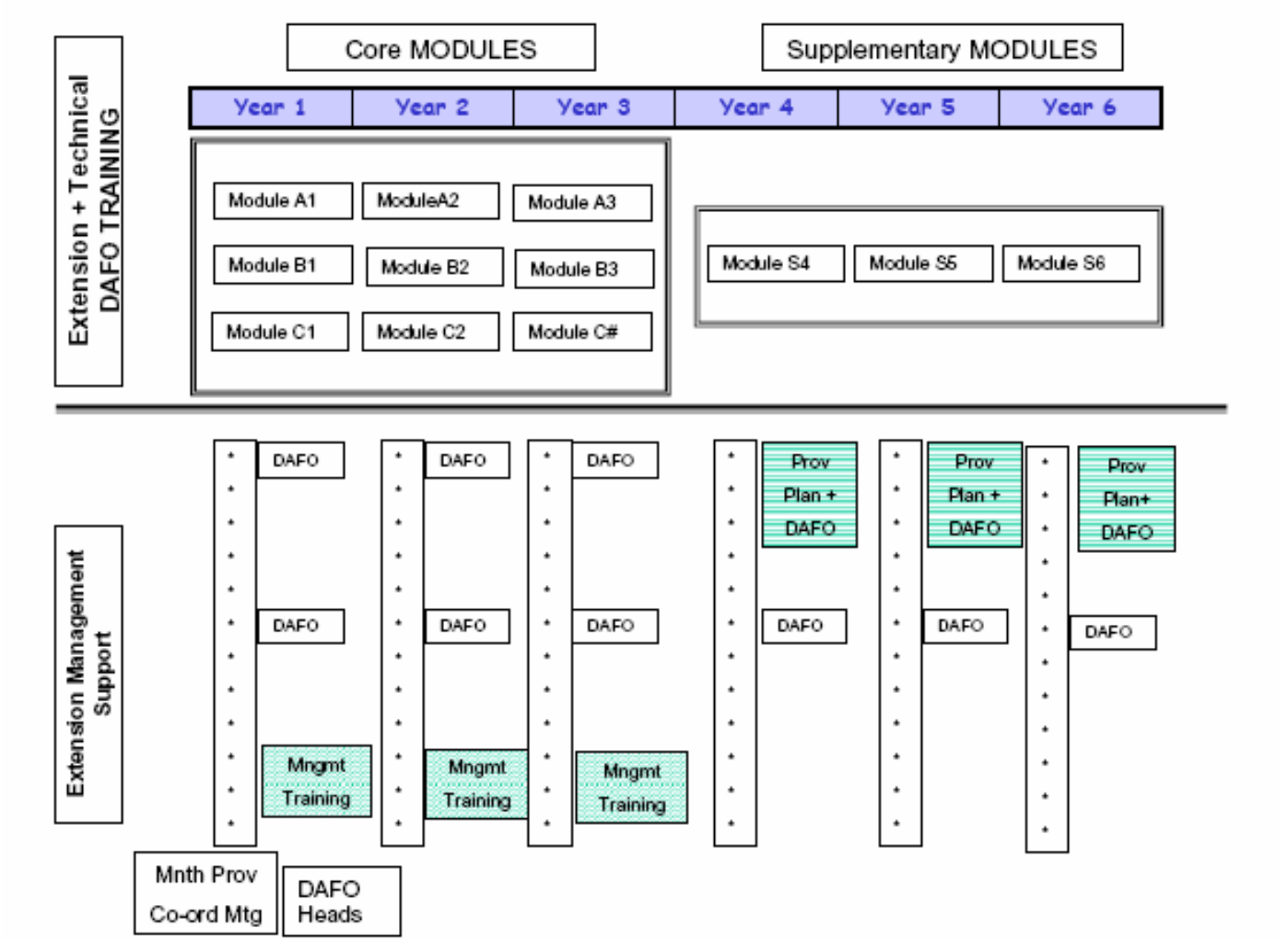
211. In addition to the structure of the training sessions, the extension management activities are also structure to provide for exchange and team building.

212. Monthly Extension Coordination Meetings will be held and attended by extension staff of all active districts and the PIO (x2). The meetings will be chaired by the PAFO PIU, but be conducted in an informal atmosphere to facilitate an open exchange of ideas and views. Extension staff will report on their activities, submit trip reports and expenses, and make detailed activity plans for the next month. In addition to this management function, this activity will provide an opportunity for peer mentoring and cross-fertilization of experiences between districts.

213. A second level of extension management training will be provided for the DAFO Heads of all districts as they become active in the project. The DAFO heads have the responsibility for co-ordinating all extension activities within their district. The DAFO Heads will be engaged through bi-annual DAFO Extension Management Meetings which will (i) review progress; (ii) introduce the extension methods being applied, and (iii) introduce and review planning and M&E procedures.

214. As each province enters the fourth year, the PIO will assume responsibility for conducting the Annual Planning Workshops for all DAFO staff involved in the Project. These workshops will review progress, identify issues and then formulate work plans for the coming year. This activity continues to maintain the peer interaction and mentoring but at a more mature level. It will also give PAFO staff a higher profile in the driving and management of project activities at a higher level, which will assist the sustainability of the livestock activities in the province.

Figure 6 : Training and Extension Management Support for Capacity Building of DAFO (Heads and Generalist Staff)



c. Details of Training Inputs

215. The core and supplementary training modules will be implemented by the training team based within the PMU. The team will be comprised of International Extension Training Specialist (x1), National Extension Training Specialists and livestock production specialists.

Table 9 : Composition and Training Inputs for the Training Team Within PMU

Member	Source	No	Time
Extension Training Advisor	International	1	12mth x 6
Extension Training Specialists	NAFES	2	12 mth x 6
Livestock production specialists (large / small)	NAFES / NAFRI	2	6 mth x 6
Livestock production specialists (health)	NAFES / NAFRI	1	4 mth x 6

216. The training inputs by year are listed in the table below alongside the field activities to be carried out each month, so as to emphasise the linkages between training and field work. The Extension Management activities are also included in these tables.

YEAR 1

MONTH	TRAINING INPUTS (DAFO STAFF)	VILLAGE EXTENSION
1		
2		
3	**Workshop 1 Project Orientation (x6 days)** - Intro. to extension processes - Intro. to Livestock systems (fertility, growth and survival) - Common livestock production strategies - PRA general - Management of extension (reporting forms)	
4		- Village selection/invitation - PRA –general
5	**Workshop 2 Establishment (x6 days)** - Livestock PRA - Forage types, species, adaptation, function - main causes of mortality and main 5 ways to prevent. - Planting forages: site selection + planting - Interest group formation and function	- Livestock PRA (large/small interest groups)
6		- Village Planning by interest group - Intro. of interventions
7		- Follow-up
8		- Follow-up
9	**Workshop 3 Mid-season Review (x 3days)** - forage establishment - next steps (Vill-cluster Exchange and vill. Feed-back mtgs)	- Follow-up
10		- Village-cluster Exchange Mtg: preparation - Village-cluster Exchang
11		- Village Feed-back Mtg
12		

YEAR 2

MONTH	TRAINING INPUTS (for DAFO)	VILLAGE EXTENSION
1		
2	**Workshop 1 Planning and Technical Review (x 6 days)** - Review tech. issues, progress, and expected development pathways - Group dynamics + facilitation skills - Interest group planning - Monthly planning and reporting	
3		
4		
5	**Workshop 2 Animal Production (x 6 days)** Pigs: housing, management and feeding of piglets, Cattle: Cow + calf management, finishing-off Goats: housing and management	* New households prepare plots * Vill. Training – animal production (pig housing, segregation + feeding of young)
6		* Follow-up
7		* Follow-up
8		* Follow-up
9	**Workshop 3 Market Orientation (x 3 days)** - Review field activities - Facilitation of focus groups and cross visits - Function of market chains, and methods for market chain survey	* Follow-up (incl. preparation for Vill-cluster Mtg)
10		* Vill-cluster Mtg (incl. market review for pigs)
11		* Village Feed-back Mtg
12		* Conduct Vill-cluster market review mtg. (small animals) * Vill feed-back from market chain survey

YEAR 3

MONTH	TRAINING INPUTS (for DAFO)	VILLAGE EXTENSION
1	**Workshop 1 Management for Production (x 6 days)** - SMART feeding - Management for production and breeding - Selection for breeding - Communication skills for village training	
2		**Village Planning Mtg** * Animal production introduced
3		
4		**Village Training – Animal Production** *(2 vill / cluster x 3 cluster / dist)*
5	**Workshop 2 Animal Health** (*x 6 days)* - LIS / AHIS data collection - key diseases each species (symptoms, importance, treatment + strategies)	**Follow-up –** (2 Production Viill. /cluster) * Vill. Training: LIS / AHIS * animal health service for Production villages
6		
7		**Follow-up –** (2 Production Vill. /cluster)
8		
9	**Workshop 3 Mid-season Review (***x 3 days)* - Review field work - - Extension Management: annual planning and budget formulation	**Follow-up –** (2 Production Viill. /cluster) * Prep. for Vill-cluster mtg
10		**Vill-cluster Mtg** * Identify service + input supply requirements
11		
12		

3. Capacity Building for PAFO Subject Matter Specialists

217. The coordination of all training activities and field work by DAFO will be carried out by the PIO, through conducting the Monthly Provincial Coordination Meetings and mentoring in the field. As has been emphasised, a large proportion of the capacity building for the DAFO staff will be derived from on-the-job training and peer mentoring. The combined work of co-ordination and mentoring will require the full-time committ of 2-3 staff within each PIO (possibly referred to as SMS-Extension). The training requirement and timing for these two groups of provincial SMS will differ. The SMS-Extension to a large extent will receive their training alongside the DAFO they co-ordinate under the guidance of the Training Unit for the PMU. Additional training in extension methods and skills (facilitation and communication) for the SMS-Extension will be provided through short external courses (using training companies in Lao PDR or Thailand). As they will require these skills to work with the DAFO from the beginning of the project, this training will be provided to them as soon as possible. Only one of the SMS-Extension staff from each PIO will be trained each year.

218. In addition to the SMS-Extension there will be te need for technical referral at the provincial level. Two additional staff will need to be available to review and advise work at the field level in the areas of animal health and livestock production, i.e. SMS-AH and SMS-LP. The burden on the SMS for Animal Health and Livestock Production will become greater in subsequent years, so it is proposed that training will be provided in the first two years for all provinces. This will again be through external courses (training companies in Lao PDR or Thailand). Their training needs and schedule are listed in the table below.

Table 10 : Training Needs and Inputs for Provincial SMS

Provincial SMS	Training Needs	Year 1	Year 2	Year 3
SMS Extension	Knowledge - Methods and approaches to agricultural extension - Role of extension in community planning, and development - The application of extension approaches to crop and livestock production and agriculture-based enterprise Skills - Facilitate DAFO staff to increase technical skills - Respond to enquiries of how to plan and conduct extension activities - Create and sustain a network of contacts in Lao PDR and the region through email, phone, personal visits.	DAFO core training models External course extension methods and skills (1st cohort)	DAFO core training models External course extension methods and skills (2nd cohort)	DAFO core training models External course extension methods and skills (3rd cohort)
SMS Animal Health	Knowledge - causes of disease, interaction of; host, pathogen and environment. - cause and patterns of major diseases affecting livestock in PLDP area. - The principles of disease control: hygiene, good management and feeding, effective use of drugs and chemicals and vaccination Skills - Undertake simple disease investigation incl. case histories, post mortem examination and collection of fluid and tissue samples. - Instruct DAFOs in animal handling, collection of samples, drug administration and vaccination. - Develop a disease control strategy for a district or cluster of villages.	External course: Animal health (1st cohort)	External course: Animal health (1st cohort)	
SMS Livestock Production	Knowledge - Life cycles, production and reproduction of the livestock of Lao PDR - Livestock production systems of upland systems in Lao PDR and similar systems in Asia - The feeding requirements of different ages, classes and species of livestock. - The genetic and environmental components of growth, survival and reproduction Skills - Design appropriate feeding systems to meet smallholder production objectives - Identify problems and opportunities in livestock farming systems. - Advise on the management of inbreeding, introduction and evaluation of new breeding stock.	External course: Livestock Production (1st cohort)	External course: Livestock Production (2nd cohort)	

4. Capacity Building for National Agencies

a. NAFES and NAFRI

219. Capacity building and extension coordination are a key activities in the project. Institutional capacity building for the PAFES and DAFO falls within the mandate of NAFES. Ideally, NAFES would assign two SMS for extension methodology to the Training Unit of the PMU for the duration of the project. These staff would work under the guidance of the International Advisor for the Training Unit of the PMU and thus receive in-house training. Four staff from NAFES should receive short course training at the same time, so as to build up a core of effective trainers.

220. SMS for animal health and livestock production will also need to contribute to preparation of training materials and courses. Staff with this expertise should be drawn from within NAFRI. While they have a broad base in their technical background, some specialised and focused training in the issues the project must address should be provided. Their training needs and training inputs will be the same as for the PAFO SMS above.

5. Capacity Building for Other Partners

221. In each district there are potential partner projects who can be expected to conduct livestock development activities in their participating villages using their own funds. These projects may require some guidance in the development process and technical knowledge. In addition to the core training workshops for the DAFO staff, from Year 3 the PLDP will annually provide: (i) short courses to give an overview on the extension process and technical aspects of livestock development (three days, including field trip) and (ii) a short review workshop where these agencies can provide feedback. This support for other agencies will further be supported by providing extension materials which can be used in their project areas.

B. Annex

1. Core Training Modules

222. This manual will support the training program of the Capacity Building For Smallholder Livestock Systems (CBSLS) and the Participatory Livestock Development Project. It consists of nine modules covering the establishment and expansion phase of PLDP. Each of the modules corresponds to approximately a four month period in which there will be many informal training events and one formal workshop. These core training events will be complemented by a series of special topic trainings. The first workshop will be held in July 2005.

The Schedule for Completion of the Core Modules is:

1. Draft outline (10 pp)	March 31 2005
2. Detailed Manual of all modules (100 pp)	May 31 2005
3. Module 1 updated and workshop-ready	June 30 2005

a. Objective of the Manual

223. To provide guidelines for the PDLP training team to deliver the planned modules, and reference material to guide, motivate, inform and support extension workers for defining working approaches and technical information.

b. Format

224. Loose leaf; full colour; designed for black and white copying; robust for travel in backpacks on motorbikes on rough roads; water and dust resistant paper.

c. Circulation

All Extension Workers, trainees and mentors for the CBSLS and PLDP Projects.

2. Core Training Module 1

a. Context with Field Work

225. This module provides the main introduction for the DAFO staff to the project, in terms of its coverage, range of activities and working approaches. Immediately following, staff will begin to initiate activities in the field, namely: selection of villages and conducting the general PRA.

b. Training Objectives

Staff Understand

- The PLDP project area of activities and scope of work;
- Extension approaches incl. (i) intervention types; (ii) component and systems change; (iii) development pathway for livestock; (iv) exploratory learning and (v) the Lao Extension Approach;
- Production cycles of the major livestock species, especially pigs; and
- Role / function of General Participatory Rural Appraisal (PRA) with appropriate tools incl. (i) history line; (ii) resource map; (iii) production calendar, etc.

Staff Able to

- Undertake a supervised General PRA; and
- Summarise and report on PRA outputs to a peer group using visual and oral methods.

c. **Activities.**(all project activities with formal and informal training components)

Training Workshop 1 : Project Orientation

- Lectures and group exercises in extension methods;
- Lectures on production cycles, field visits to provide examples and field classroom exercises in pig production;
- Conduct a General PRA under the supervision of a trainer (class broken into small teams);
- Practise skills in presentation and reporting by reporting results of PRA;
- Hands-On: Initiate forage growing competition with Pak Seung students;
- Selection of villages for the PLDP project in participating districts;
- Mentored PRA in participating villages; and
- Reporting at Monthly Provincial Coordination Meetings.

d. **Resources** (components to be included in the Working Manual)[33]

- Summary of PLDP approach to extension and use of technology (intervention types);
- The production cycle of pigs with data on the current systems in northern Lao and the major constraints on production;
- Development pathway for livestock: pigs; and
- Methods and tools for a general PRA.

[33] All material will be prepared in 'A' format in components with one page of visual and text which can be enlarged as a poster, and a second page of trainer notes and reference material. The two pages together can be duplicated as a double-sided flyer.

3. Core Training Module 2

a. Context with Field Work

226. Staff will have completed the general PRA and reported on this within their MPCM. This will have given them some knowledge and insights about the general conditions and opportunities in these villages. The field work to follow will require staff to focus on issues affecting livestock by conducting a Livestock PRA. Following this they will lead farmers in establishing forage plots.

b. Training Objectives

Staff Understand

- Role of feed (especially forages) in the production cycle, for pigs, cattle and buffalo;
- Role / function of farmer groups (interest, focus groups); and
- Function of livestock PRA and tools, incl. (i) calendar for management and feeding; (ii) problem cause diagrams, etc.

Staff Able to

- Form interest groups for small and large animals, select focus groups for activities with forages;
- Carry out mentored Livestock PRA;
- Select suitable sites, plant forages using seed and cuttings for key forage species;
- Access information through Livestock Support Network (Dist. Library, Prov. SMS, project web site); and
- Hands-on: Handling livestock - administer medication for de-worming ('Toxacara' in buffalo calves, ???? pigs)..

c. Activities

Workshop 2 : Identifying Issues and Establishing Forages

- Report on general PRA;
- Role of feed in livestock production systems (when and how it makes a difference);
- Forage types, characteristics, adaptation, use and planting (6 species);
- Main causes of mortality (parasite, disease,) and their prevention (bio-security, vaccine, medication);
- Livestock PRA, function and tools (theory, practice and reporting); and
- Role / function / formation of farmer groups (interest, focus groups).

Mentored livestock PRA
Reporting back, Provincial Monthly Coordination Meeting
Create Interest and Focus Groups
Select Site and Plant Forge Plots with Farmers

d. Manual Components

1. Production cycle for buffalo, cattle and goats;
2. Forage types (six main types);
2. Stylo for pigs;
3. Causes of mortality and prevention;
4. Tools for livestock PRA;
5. Livestock support Network; and
6. FAQ's about disease control.

4. Core Training Module 3

a. Context with Field Work

227. By now staff will begin to have some understanding of specific issues for livestock and initiated forage production. There may have been problems with establishing the plots and with farmers initial use of the forage to feed their livestock. These will be reviewed and provide many lessons for the staff.

228. The coming work in the field will be to facilitate a series of farmer-2-farmer exchanges. The focus group farmers will review their own experiences; village-cluster exchange meetings will be held, to ensure broader lessons are learnt and as a buffer against weak results in any single village. Village feed-back meetings by the focus group will provide the spring-board for expansion in the following year. An important skill will be to observe changes in animal conditions, so as to facilitate farmers gaining appreciation of the effect of forages or other interventions.

b. Training Objectives (for the four month period, K = Knowledge; S = Skill)

Staff Understand

- Farmer-farmer extension processes for village-cluster exchange and village feed-back meetings; and
- Points to observe in livestock condition resulting from forages and other technologies.

Staff Able to

- Facilitate 'village-cluster exchange' and 'village feed-back' meetings under supervision; and
- Deliver the requirements for monitoring and reporting of the Project.

c. Activities (all project activities with formal and informal training)

Training Workshop 3 : Review of Establishment

- Review: initiation of focus groups; forage establishment; issues encountered related to animal disease;
- Finalise monitoring and reporting processes for the Project;
- Forecast activities for coming year;
- Hands-On: XXXXXXXX (animals condition: observation points);
- Follow-up visits to villages;
- Reporting to MPCM; and
- Mentored village-cluster exchange' and 'village feed-back' meetings.

d. Manual Components

- Methods to initiate, facilitate and report on interactions in village clusters; and
- Visual observation points for condition of pigs; cattle and buffalo and goats.

5. Core Training Module 4

a. Context with Field Work

229. The farmer-farmer activities will have provided staff with an idea of results being gained and whether impact-yielding systems are emerging and whether there is expansion within the existing villages. These achievements should be reinforced and used where possible, for example in coming interest group planning meetings.

230. The interest groups will begin to play a key role in assessing results and planning for expansion. Staff will need to know the process and how to facilitate these meetings.

b. Training Objectives

Staff Understand

- Group processes and how they are influenced by gender, wealth, ethnicity and experience;
- Farmer to farmer extension within group and within the wider community; and
- Role and function of annual and monthly planning.

Staff Able to

- Work with interest groups to review progress, prioritise activities for Year 2;
- Review progress with interest groups and present to the whole village;
- Make and report on monthly plans; and
- Restrain and castrate a piglet (in preparation for Workshop 5).

c. Activities

Training Workshop 4: Village Planning and Technical Review

- Review results achieved by farmers and emerging impact yielding systems from previous year;
- Review all technical issues and refresh technical knowledge from previous year;
- Finalise monitoring and reporting processes for the Project;
- Visits to villages to monitor progress; and
- Reporting to provincial offices on problems and changes.

d. **Resources** (components to be included in the Working Manual)

- Making the most of diversity of experience in farmer groups.

6. Core Training Module 5

a. Context with Field Work

231. The completed interest group planning would now provide a clear indication of expansion and the need for further technical interventions, probably still based on forages but with better management for the livestock and seeking more effective use of the new feed resource.

232. Staff will need to have a clearer idea of how forages can be used to achieved greater impact and how to introduce this to the farmers who need it.

b. Training Objectives

Staff Understand

- Range of technologies to enable successful housing of pigs;
- Weaning and feeding requirements for piglets;
- Use of forages for quick results with cow + calf, and finishing cattle + buffalo; and
- Opportunities and ‘getting-started’ package for goat raising.

Staff Able to

- Identify site specific plans of pigs housing;
- Recommend feed requirements of piglets;
- Recommend feed requirements for cow+calf, finishing of cattle and buffalo;

- Explain and identify opportunity for goats raising; and
- Castrate pigs.

c. Activities

Workshop 5: Basic Animal Production

- Technology options for successful housing of pigs;
- Weaning and feeding requirements for piglets;
- Use of forages for quick results with cow + calf, and finishing cattle and buffalo; and
- Opportunities and 'getting-started' package for goat raising.

Village training in priority feed technologies
Follow-up
Reporting at Monthly Provincial Coordination meetings

d. Manual Components

- How to house pigs;
- How manage cow+calf;
- How to finish cattle and buffalo (feed, timing, seasonality of market); and
- Opportunities form goat raising.

7. Core Training Module 6

a. Context with Field Work

233. Following the introduction of additional technologies for improved use of forages, it is expected that staff will have begun to identify more impact-yielding systems. These will need to be reported and recorded

234. Given that these are being archived, staff will need to understand the role and function of market in stimulating farmers to demand more complex interventions (animal health, management, etc.) and the role of farmer-operated small enterprises to supply necessary services (e.g. boar breeders, planting material supply, etc.).

b. Training Objectives

Staff Understand

- Change to result from new interventions, and ways to observe/measure;
- Role and function of Farmer to Farmer exchange : cross-visits; and
- Market chains and ways to interact with these.

Staff Able to

- Use tools to measure change in condition in livestock (weight tape, condition score charts) due to specific feeding inputs;
- Identify, plan and conduct cross-visits; and
- Market links for livestock in their district.

c. Activities

Workshop 6 Market Orientation

- Review and report on application of specific feed inputs, and results;
- Role and function of Farmer to Farmer exchange : cross-visits;
- Market chains and ways to interact with these (actors, requirements, seasonality, volume, service providers);

- Forecast activities for Y3; and
- Hand-on: measuring stock for various characteristics.

Follow-up
Reporting back, Provincial Monthly Coordination Meeting
Conduct Cross-Visits
Village Cluster Exchange' and 'Village Feed-back' Meetings

d. Manual Components

- Cross visit process;
- Market chains (actors and functions); and
- Measurement of livestock condition (pigs, cattle, goats) : weight tape, condition score.

8. Core Training Module 7

a. Context with Field Work

235. Following village-cluster exchanges and village feed-back meetings, staff will have an appreciation of both what interventions have been applied, the effects on animal condition and the interest of farmers in specific villages to intensify production further. Sub-contracted NGO should have begun 'market orientation' activities.

236. Prior to the interest group planing for the 3rd year, staff will need to know what more advance interventions are available to be applied. They will be able to provide these as alternatives that interest groups might include in their plans. Sub-contracted NGOs will begin to introduce village development funds and animal revolving funds.

b. Training Objectives

Staff Understand

- Principles and 'tools' flip charts, demonstrations etc.) for good extension communication;
- Advanced technical options to meet the demands identified in participatory market chain surveys; and
- Understand more advanced basis of disease control and function of ear-tagging for this.

Staff able to

- identify poor quality breeding males and females;
- assess available feed resources for pigs;
- design a feeding and breeding calendar for cattle and buffalo; and
- ear-tag cattle and buffalo.

c. **Activities** (all project activities with formal and informal training components)

- <u>Training Workshop 7: Advance Animal Production</u>
  - Revision of year 2;
  - Summarise and discuss market requirements;
  - Prioritise new technology options;
  - Develop feeding and breeding calendar for cattle and buffalo;
  - Conduct mini-workshop for students at Pak Seung; and
  - Hands-On: ear tagging for cattle and buffalo, vaccination of pigs.

- Conduct interest group planning in each village, (incl. ear- tagging);
- In market orientated villages (2/cluster) identify training needs, design and conduct training workshops, (mentored); and
- Reporting at monthly provincial coordination meetings.

d. **Resources** (components to be included in the Working Manual)

1# Selecting good breeding male and female;
2# SMART feeding for pigs;
3# Feeding and Breeding Calendar for cattle and buffalo; and
4# Meeting the Market: producing livestock that the market needs.

9. Core Training Module 8

a. Context with Field Work

237. Staff will have carried out selected short on-site training for villages in selected topics. Interventions that will be beginning to be applied will include village organisation for herd management. Reporting on progress of these will provide peer mentoring and pool experiences.

238. The key intervention of growing importance will be 'animal health'. Staff will not attempt to train VVWs (sub-contracted NGOS will develop these as services). However staff will need to inform villages of the transmission and prevention of common diseases and advise on plans and access to services.

b. Training Objectives

Staff understand:

- transmission of parasitic and infectious disease;
- basis of options for disease control; and
- functions of a VLIS for village extension and strategic disease surveillance

Staff able to:

- identify core disease by observation and farmer description;
- design a simple animal health control program;
- recommend simple treatments for the core diseases;
- treat simple wounds; and
- assist farmers to use VLIS village and complete themselves district forms.

c. **Activities** (all project activities with formal and informal training components)

- Training Workshop 8 – Animal Health:
  - Principles of disease and infection;
  - Epidemiology and herd health;
  - Treatment of wounds and giving intramuscular and subcutaneous injections;
  - The VLIS at village and district level;
  - Design quarantine and disease control procedures for Pak Seung;
  - Hands-On: treat simple wounds, vaccination of chickens;

- Village training in disease control (mentored); and
- Reporting at monthly provincial coordination meetings.

d. Manual Resources

1# Disease of Pigs, Cattle, Buffalo, Goats and control options;
2# Quarantine and bio-security options for villages; and
3# VLIS, how and why it operates and information flows.

10. Core Training Module 9

a. Context with Field Work

239. Staff will have had training in most interventions to be applied, be gaining field experience but need to review their capacity and focus on key areas for further support. Seed propagation will be emerging as a farmer need.

240. 'Exit strategies' will be needed at various levels. With many example of impact and service providers established, widespread dissemination methods can be considered. Regular visits to villages will be declining. Staff will need to be assist village able to manage, self-monitor and access information on a continuing basis. Staff will no longer have 4 monthly workshops to guide their activities. They must be able to work independently, relying on Annual Provincial Planning Workshops and the Livestock Support Network.

b. Training Objectives

<u>Staff understand</u>

- Application of self-monitoring means (weight tapes, ear-tagging, breeding books etc.) for villager manage and improve livestock in on-going manner;
- need and benefits for independent decision-making at provincial distract levels of extension; and
- role of the media in the widespread dissemination of livestock extension messages.

<u>Staff able to:</u>

- formulae annual plans;
- deal with multiple projects with many stakeholders in the district; and
- conduct market field day and write items for media release, (papers, radio).

c. **Activities** (all project activities with formal and informal training components)

- <u>Training Workshop 9 Management of Livestock Development</u>:
  - Review the organisation of livestock extension;
  - Develop tools of working with multiple projects and partners;
  - Prepare sample and project materials for release to the media;
  - Describe and practise interacting with the media;
  - Practise skills seed collection and preparation;
  - Hands-On: seed collection;

- Reporting at monthly provincial coordination meetings; and
- Market/field day for widespread dissemination.

d. Manual Resources

1. Using the media for dissemination of livestock extension messages; and
2. Producing seed of Stylosanthes for sale and planting to feed livestock.