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Livestock development and poverty alleviation: revolution or evolution for upland livelihoods in Lao PDR?

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Abstract

Livestock play a key role in the lives of poor, rural people in developing countries, providing a major proportion of their cash income, capital assets, draught power, fuel and fertiliser. Rapid growth in demand for meat and dairy products in Asia presents both opportunities and challenges for livestock development and poverty alleviation. This paper explores the potential of livestock intensification to benefit the livelihoods of upland households and meet market demand in the Lao Peoples' Democratic Republic (Lao PDR), a South East Asian country undergoing significant economic change.

A review of the livestock sector in Asia shows increasing demand for live animals and meat in neighbouring Vietnam, Thailand and China. Lao PDR is well positioned to capitalise on the growing Asian livestock sector, however the extent livestock production in Lao PDR can reduce poverty, meet growing domestic meat demand and lift livestock exports is problematic. Findings from research in two upland northern provinces demonstrate how the introduction of forages for livestock has revolutionised the lives of some farmers and villages, but concludes that strategies are still needed to engage poorer households. The impacts of changing domestic and export markets are less certain, and are discussed within the context of environmental and public health, cultural traditions, economic development and sustainable livelihoods.

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Introduction

Rising consumer demand for animal products in developing countries over the last 30 years has fuelled what is now known as a “Livestock Revolution”, particularly in Asia (Delgado, 1999). As countries experience economic growth, higher incomes and increasing urbanisation, consumers are able to diversify their diets to include more meat and dairy products (Delgado et al. 1999; FAO 2002; Steinfeld, Wassenaar and Jutzi 2006). Although per capita meat consumption in developed countries is still three and a half times that of developing countries, the doubling of meat consumption and trebling of meat production in developing countries has far exceeded the more modest increases from developed countries. This represents more than 80% of the global increase in meat production over the last 25 years with projections that developing countries will produce twice as much meat as developed nations by 2030 (FAO 2006b).

In South East Asia, there has been increasing meat consumption and demand for live animals in Thailand, Vietnam and China (Quirk et al. 2003). These countries border the Lao Peoples’ Democratic Republic (commonly known as Laos), creating an opportunity for the country to capitalise on the growing Asian livestock sector (Stur, Gray and Bastin 2002). Despite steady economic growth since 1990 (now at 6.2%), and a 13% decrease in the incidence of poverty, one third of the Lao population are still considered poor and illiterate (per capita GDP is \$490) (ADB 2006). Most of the population (75%) are dependent on agriculture and forest products for a living, and up to 40% of farmers are fully or partially involved in shifting cultivation (slash and burn) farming practices (Hansen, 1998; ADB 2006).

Villagers traditionally keep small numbers of livestock by free grazing and sell at opportunistic times. Main limitations to livestock production in Lao PDR are lack of available feed, particularly in the dry season, and livestock diseases. High morbidity and mortality rates are common and poor nutrition causes low reproductive rates and weight gain (Stur, Gray and Bastin 2002; FAO 2005). With a fast growing domestic population and ongoing livestock disease constraints (FAO 2006a), the extent Lao PDR can lift its livestock output to alleviate poverty and meet export demand is problematic. If livestock intensification increases around urban areas or close to border markets, what are the implications for smallholder livelihoods, environmental health and future land use in the uplands given their remoteness and complexity?

This paper explores the potential of livestock intensification to benefit the livelihoods of upland households in Lao PDR and meet market demand. The first section describes the role of livestock in poverty alleviation and challenges for pro-poor livestock research and development. The influence of the Asian Livestock Revolution follows including the current and potential role of Lao PDR in this growing industry.

Research findings highlight the impact of introducing managed feed resources and disease prevention on livestock and livelihoods in two upland northern provinces. The ability of some Lao farmers to change from livestock keepers to market-oriented livestock producers is discussed. Finally, conclusions are drawn on whether livestock development will revolutionise farming systems in Lao PDR, bring potential negative impacts or slowly evolve as a sustainable proposition for upland farmers and communities.

Poverty alleviation from livestock development

Livestock play a key role in the lives of poor, rural people in developing countries (Delgado 1999; FAO 2002). The sale of animals provides a major proportion of annual cash income and capital assets of households, particularly in pastoral areas. In mixed farming systems, livestock are often the only source of draught power and fertiliser for crops, also utilising crop residues after harvest (LiD 1999; Steinfield, Wassenaar and Jutzi 2006). Livestock provide a safety net when crops fail but there are disease risks, and capital or credit is required to start up enterprises (Dolberg 2001).

International livestock research and development programs aim to reduce poverty, but recent studies on program effectiveness reveal little evidence of widespread impact on the livelihoods of the poor (LiD 1999; Scoones and Wolmer, 2006). Reasons given include inappropriate technology, inability to deliver services to the poor, and domination by wealthier, more able or higher status farmers (LiD 1999). Since participation in development projects is largely voluntary, it is often households who already have the capacity to participate that benefit the most (Christoplos and Farrington 2004).

In the case of livestock intensification, it is those who have livestock (or the means to buy livestock) and those with access to land and labour who are more likely to adopt new practices and increase income (Dolberg 2001; Whittaker 2006). Households with limited labour resources face trade-offs between more intensive livestock raising (with inherent disease risks) and maintaining crop production. In the uplands of Asia, moving away from traditional rice production is a long term process and may be more difficult for poorer or disadvantaged households to achieve if land, labour and credit are not readily available (Nath, Inoue and Chakma 2005; Alexander et al. 2006; Whittaker 2006). For poor households, who lack the necessary start-up capital, it can be difficult to increase livestock beyond a few pigs and chickens which are then sold to pay for children's education or health emergencies (Whittaker 2006).

Livestock research and development projects may unknowingly widen the gap between households who are able to build wealth via livestock and families that remain in poverty. As Christoplos and Farrington (2004, p 3) state,

‘The essential starting point must shift from a desire for productivity increase to an analysis of who the poor are and why they are poor.....Lack of income is not the sole aspect of being poor; poverty is above all related to a lack of power and lack of entitlements. If one considers why the poor so rarely benefit directly from extension and other rural services, it directs attention to a view of poverty as a lack of entitlement to these services.’

Pro-poor rural development has largely been the domain of the non-government sector in Asia. In contrast, government research and extension agencies have traditionally worked on transferring information to farmers on what they see as useful technologies (Christoplos and Farrington 2004; Friday, McArthur and Watson, 2006; Van den Ban and Samanta 2006).

The following section looks at the impacts of the livestock revolution occurring in Asia including the challenges and opportunities for poverty alleviation.

The Asian Livestock Revolution: who wins, who loses?

The benefits of the livestock revolution in Asia have not been equally distributed throughout regions or countries (FAO 2002; Steinfeld, Wassenaar and Jutzi 2006). Lao PDR's most northern neighbour, China, has experienced the greatest increase in annual per capita meat consumption over the last decade (16% for beef and 26% for pork). Production growth has matched consumption, with annual increases ranging from 15% for beef, 14% for poultry and 6% for pork (Quirke et al 2003). China is now the second largest beef producer in the world although quality remains low. With projected increases in per capita income growth, meat consumption per person is predicted to increase by 68% over the next 20 years (Quirke et al 2003). Although pork dominates the diet of most Chinese, beef and poultry meat are becoming more popular and affordable. An increase in dependency on poultry and pig meat imports is forecasted (Quirke et al 2003).

For Vietnam and Thailand, who share the longest borders with Lao PDR, there has been steady growth in per capita income. This has led to increased consumption of traditional protein sources such as seafood, pork and poultry (albeit with variations associated with outbreaks of avian influenza, foot and mouth disease and classical swine fever). Production of these commodities has kept pace with consumption and even exceeded demand leading to significant exports (eg seafood from Vietnam, poultry from Thailand). Although beef consumption is relatively low in both countries, governments forecast modest increases to continue in urban and tourist areas and possibly increase significantly in Thailand when high tariffs are removed (Quirke et al 2003).

Livestock production systems in Asia comprise a mix of large, capital intensive commercial operations, labour intensive smallholder peri-urban enterprises and rural crop-livestock systems (FAO 2006b). The majority of livestock producers in Asia are rural smallholders with less than five head of cattle, buffalo and pigs or less than 50 head of poultry.

Nevertheless, livestock production has increasingly shifted from rural areas to peri-urban areas where larger operations take advantage of concentrated feed and urban markets (Steinfeld, Wassenaar and Jutzi 2006). Whilst industrial scale farming of pigs and poultry has lifted production and met growing consumer demand, it can create problems with environmental pollution, risk of disease spread in animals and humans, as well as social inequities by dominating markets and lowering prices for smallholder producers (Delgado et al. 1999; FAO 2006c)

Future predictions for livestock production systems in Asian developing countries suggest significant growth prospects despite removal of global trade barriers (Quirke et al 2003). However, meat demand will exceed production which will slow exports and increase reliance on imports from industrial countries. Developing countries in Asia wanting to export will need higher food safety and quality standards, and disease information systems (FAO 2006b).

Trade liberalisation is likely to affect smallholders differently from commercial producers (Quirke et al 2003). Meat prices in countries that have high tariff barriers against meat imports will fall relative to world prices. Higher grain prices resulting from trade liberalisation (and possibly droughts from climate change) will increase the competitive position of smallholders who rely on forages and crop by-products. On the other hand, evidence that trade liberalisation will raise real labour wages relative to returns on capital, suggest it may lure smallholder producers to more highly paid employment (Quirke et al 2003; Steinfield, Wassenaar and Jutzi, 2006).

Ultimately, the capacity of livestock production systems to respond to changes in world prices, costs of production and trade regulations will determine who benefits and who loses from the Asian Livestock Revolution. Within this broader Asian livestock revolution, livestock production in Lao PDR is also under pressure to change.

Upland livelihoods and livestock production in Lao PDR

The Lao Peoples' Democratic Republic is a country in transition. Like the sleepy Mekong River which meanders its way from north to south, the country has been slowly and cautiously emerging from the impacts of the Indo-China War and socialist reform since 1975 (Fujita 2006). Lao PDR is sparsely populated compared to its South East Asian neighbours with a 2006 population estimate of around 6 million (compared to Thailand at 65 million and Vietnam at 85 million). Population growth rate has been high over the last two decades at 2.4%, resulting in a youth majority (41% are under 15 years old) (CIA 2006).

The agricultural sector accounts for about half the country's GDP and has performed well over the last 15 years with steady increases in crop yields and livestock numbers for both domestic consumption and export (FAO 2006a). Agriculture has intensified and become largely mechanised along the Mekong River corridor as a result of improved services, market access and diversification opportunities (Sisouphanthong and Taillard, 2000).

In contrast, the uplands are home to many ethnic minorities; creating a culturally diverse landscape with a myriad of subsistence and market orientated farming systems. Poverty is more pronounced in the uplands due to extreme remoteness, lack of infrastructure and services, deforestation and land degradation, periods of food shortage and lack of opportunities to create farm or off farm income (ADB 2001; GOL 2005). Figure 1 below shows the poorest districts (dark colour) identified by the Government of Lao in their 2005 National Growth and Poverty Eradication Strategy. These districts are being targeted for rural development projects. The five districts shown were involved in the research described in this paper.

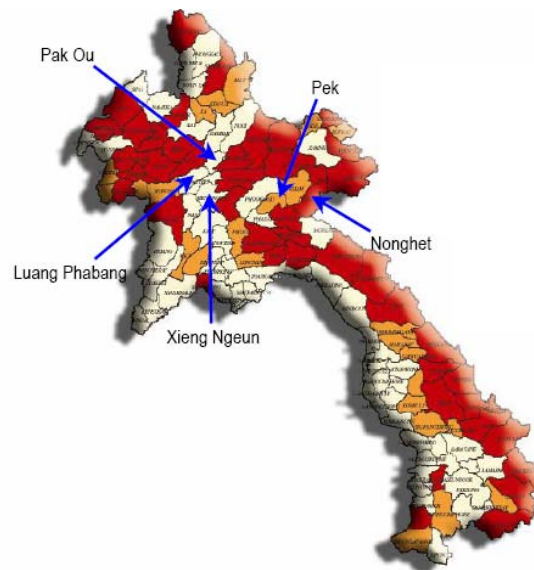


Figure 1 Priority poor districts and study districts
(Source: Government of Lao, 2005)

Shifting cultivation (clearing vegetation and rotating areas) has been the traditional way of farming in the uplands of Lao PDR with low population densities, abundant land and access to forests to supplement diets and building materials (Rasul and Thapa 2003). Glutenous or ‘sticky’ rice is the main staple crop grown for home consumption along with other crops and products such as cassava, maize, Jobs tears, sesame, chilli, vegetables, mulberry bark or teak.

Upland farmers are increasingly facing challenges to maintain food security in the face of declining crop yields and government policies to reduce shifting cultivation for environmental protection (Roder 2001; Alexander et al. 2006). Shorter crop rotations have caused lower yields, more weeds and pests, increased labour requirements, loss of forest and wildlife resources and land degradation in some areas (Roder, 2001; Rasul and Thapa 2003).

Under these circumstances, rural households are looking for opportunities to reduce labour inputs and increase income whilst maintaining access to land whether privately owned or communal. At the same time, remote villages are being encouraged to move nearer to roads and services with mixed results (Ducourtieux, Laffort and Sacklokham 2005). Land titling and allocation programs are underway in some upland districts with alternative land uses introduced (Thongmanivong and Fujita 2006).

One of the alternatives encouraged by Lao government agencies and aid organisations is livestock intensification. Householders generally keep a few large and/or small livestock (eg cattle, buffalo, goats, pigs, poultry, fish). Livestock are used for home consumption and ceremonial needs, draught power and manure, cash income (up to 65%), building wealth and as a safety net for health, education, and weddings (Hansen, 1998; Stur, Gray and Bastin 2002). Livestock scavenge during the day and are housed at night with supplementary feed collected from forests or residue crops which can be very labour intensive. In remote areas they can be walked to markets providing a relative advantage over perishable products (Stur, Gray and Bastin 2002).

Livestock production in Lao PDR contributes around 15% to national GDP and 33% of agricultural GDP (GOL 2005). Livestock numbers have increased steadily over the last 25 years, with total meat production increasing from 30,700 tonnes in 1980 to 104,000 tonnes in 2004 (FAO 2005). However, over the last 10 years, buffalo, cattle and pig numbers have been reported as remaining relatively static indicating populations may have plateaued at 1.1 million, 1.3 million and 1.7 million respectively (ADB PPTA 2005).

The rise in meat production and consumption has been fuelled by a fast growing population and per capita income in Lao PDR since 1980. Domestic production of meat has kept in line with consumption, however only 25% of milk is produced domestically with most imported from Thailand (FAO 2005). About 75% of cattle and buffalo produced are consumed domestically, and the remaining 25% are exported. Thailand imports approximately 100,000 head per year from Lao PDR, accounting for about 20% of Thailand's total annual live animal demand (FAO 2005). Higher quality animals are sold in the capital, Vientiane, whilst provinces are left with poorer quality livestock (Stur, Gray and Bastin 2002).

Trade investment links with Thailand, Vietnam and China are already strong (64% of Lao PDR's total merchandise trade in 2004), and livestock trade may be enhanced by ongoing development of regional road networks (ADB 2006). However, there is significant unregulated trade in animal hides to Thailand, and corresponding uncontrolled and unrecorded trade in live cattle and buffalo to Vietnam (ADB PPTA 2005).

The Lao government wants to increase livestock production to reduce poverty and increase protein consumption from 22 to 50kg/head in rural areas and from 33 to 70kg per head in urban areas (ADB PPTA 2005). The National Growth and Poverty Eradication Strategy identifies targets of an average meat supply of 60kg/capita/year and increased exports to the value of \$50million by 2020 (FAO 2005). Given that 95% of livestock are local breeds produced by smallholders under low input/low output systems for domestic use and local trade, questions remain about the potential for producers to a) lift productivity to reduce their poverty levels b) increase production to meet growing domestic demand and c) contribute to export markets.

The following section describes our research on the impact of introducing managed feed resources and livestock disease prevention in two northern provinces. The findings highlight the ability of some Lao farmers to find a pathway out of poverty by changing from livestock keepers to livestock producers.

Research setting and methods

In 1995, the Australian government funded an on-farm research program to develop suitable forage varieties for livestock production in Southeast Asia with CIAT (The International Centre for Tropical Agriculture) (Peters et al. 2001). Several promising species were then introduced to Lao PDR in 2000 via the Forage and Livestock Systems Project (FLSP), a partnership between CIAT, the Lao government and Australia. A small team of four researchers together with 16 provincial and district extension staff tested the forages with farmers across five districts in two northern upland provinces of Lao PDR, using a participatory approach (See Figure 1).

Initially 18 villages identified major livestock problems and farmers self selected to trial and integrate forages into their systems, whilst learning about livestock feeding, health, and management (Phengsavanh, Phimpachanhvongsod and Horne 2004). Within two years, the number of villages had increased to 38 with 500 households growing forages of which 50 were gaining significant livelihood impacts (eg labour savings, increased productivity, greater livestock security, income to buy rice and other goods, and children able to go to school instead of tending to animals in the forest or grasslands). However, these impacts remained unrecorded or evaluated.

A social research project was introduced in 2003 to 1) capture and evaluate emerging production and livelihood impacts on those households using forages, and 2) find out why some farmers had decided not to grow forages, or had stopped. An action research approach was employed (Kindon 2005) using case study methods (Yin 1994) and semi-structured interviews for 1) and 2) respectively. The authors trained and mentored 26 provincial and district extension staff in collating data and developing case studies. Half of these staff were also involved in farmer interviews, as part of a wider research team (Millar, Photakoun and Connell, 2005).

Case study method

Each district team was given digital cameras and asked to take photos of what they saw as significant impacts occurring in their project villages. The images were presented at staff workshops where peer discussion ensued on what constituted a ‘significant’ impact. It took several months for staff to realise that merely growing more grass or pigs was not an impact- there had to be a change in the farming system or well being of families.

To develop the case studies, each team selected and interviewed both male and female farmers using a range of livestock systems. Staff were guided in how to describe farmer’s initial livestock problems, what forages and feeding systems were being used, the production and/or livelihood gains and plans for the future. In total, 32 case studies were developed during 2003-2004 (64% of households with impacts at the time) as summarised in Table 1 below.

District	Number of Households	Ethnic groups	Livestock systems	Forage systems
Pek	3	3 Hmong	Buffalo	Grasses- cut and carry
Nonghet	11	11 Hmong	Cattle, Buffalo, Pigs, Horses	Grasses and Stylo-cut and carry
Pak Ou	3	3 Lao Loum	Pigs Poultry Goats	Stylo-fresh and in feed mix Grasses and Stylo
Xieng Ngeun	11	3 Lao Loum 3 Hmong 4 Lao Theung 1 Kasak	Cattle/Buffalo Goats Pigs	Grasses Tree Legumes Stylo/Sweet Potato Maize and Cassava
Luang Prabang	4	3 Lao Loum 1 Hmong	Pigs Goats	Stylo/Sweet Potato Grasses and Tree Legumes

Table 1 Background summary of case studies

*Note, variation in the number of case studies per district is due to the extent of impacts emerging at the time and also staff motivation and confidence in doing the case studies. An adequate range of examples were achieved for the purposes of the research.

Farmer interviews

A separate study was conducted in 2004 to determine why some farmers were not using forages or had stopped. Nine villages were selected across the five districts (2 Pek, 2 Pak Ou, 3 Xieng Ngeun, 1 Nonghet, 1 Luang Prabang) to cover the range of farming systems, livestock (small and large animals) and ethnic groups. Three farmers from each village were invited to participate in 1-2 hour interviews. One farmer declined, making a total of 26 farmers interviewed. Questions followed an interview guide based on their past and current farming and household situation, reasons for not planting forages or stopping, views on the project and plans for the next five years.

Findings

The impact of forages on family livelihoods

An analysis of the 32 case studies showed that initial benefits to households were faster livestock weight gain, healthier animals, reduced labour in finding local feed, closer management of livestock, reduced cost of buying feeds, and better prices for fattened animals. Over time, these benefits started to impact on family livelihoods in terms of increased cash income to buy goods and services, more time to devote to other enterprises, children able to go to school and a reduced need to grow upland rice (Table 2).

Table 2 Summary of impacts from using forages for livestock

Production benefits	Livelihood impacts
Enough feed in the dry season	Labour saving of 1 to 5 hours/day
Rapid livestock weight gains	Time for other activities (eg handicrafts)
Saves cost of buying rice bran (forages are free!!)	No need to cook pig feed
Better prices offered by traders	Less firewood needed
Better survival of young	More income to buy rice and other goods
Can feed and look after sick animals	Children can cut and carry (quick and easy)
More income to invest in livestock production (increase numbers)	Children can go to school (no need to look after animals)
Reduced wandering and damage to crops	Taming of livestock, better handling.
Reduced risk of loss or theft	Easy to vaccinate
Reduced soil erosion from grasses	Easy to sell livestock
Improved soil condition from legumes	

The following case study (Box 1) tell the story of Mr Pa Yer Moua Xayker, a Hmong farmer from the village of Khampanien in Nonghet district, Xieng Khouang Province. It was compiled by Mr Neuakhom Thepphanid, district extension officer from Nonghet. Box 2 is a case study of Mr Si Chan from Dansavan village in Luang

Prabang compiled by Mr Thavone Mani, district extension officer in Luang Prabang district.

Box 1 Case study of Mr Pa Yer Moua Xayker from Nonghet

In the past

Mr Pa Yer Moua Xayker raised cattle and buffalo using the traditional method of free grazing. However, his livestock wandered far into the mountains and forest. Young calves did not have enough feed in the dry season, and livestock became thin and died from disease because there was no vaccination program. He kept the male buffaloes and cattle near the house to cut and carry local feed, but it was difficult for him to cut and carry because he had to walk for two to three hours every day.

Implementation

In 2001, Mr Pa Yer Moua Xayker's family joined with FLSP and tried forages in a small plot using Guinea Si Muang, Brizantha and Stylo species. In 2002, he went to visit the village of Ban Xang organized by the local district extension officers. He exchanged knowledge and experience with Mr Neng Lao Ly who was the first person to fatten buffaloes in Xang village. Mr Pa Yer was interested in this new technique so after coming back home he started to buy thin cattle for about 2,600,000 kip (\$260US) per head. He fattened cattle for 2 months and then sold them for about 3,800,000 kip/head, with a profit of 1,200,000 kip/head. He continued to buy thin cattle to fatten up to three times per year, concluding that fattening made more money than saving in the bank. In 2004, he made a profit of six to eight million kip (\$600-\$800US). Some of this profit has been invested in buying iron roofing material to sell to households in his village.

Impacts

- ✓ Save time from two-three hours to 30 minutes for collecting feed
- ✓ Save labour
- ✓ Enough feed for livestock
- ✓ Get profit from fattening cattle
- ✓ Stopped shifting cultivation and now plants forages instead of upland rice
- ✓ Sells one animal to buy rice for consumption.
- ✓ Family are happy

Future plans

Mr Pa Yer Moua Xayker will expand forages to larger areas and will buy thin cattle for fattening (three head each time, three times per year)



Box 2 Case study of Mrs Si Chan from Luang Prabang

In the past

Mrs. Si Chan and her family had problems with raising goats. In the dry season she let the goats graze free and in the wet season she tethered the goats in a limited area and moved them three times per day. When it rained for a long time she kept the goats in the pen, and cut and carried tree leaf (Kok sa kham, Bay thong) and native grasses, but this was not enough to feed the goats. They were thin and some of them died from disease. After giving birth, the female goats did not have enough milk to feed the kids.

Implementation

In 2002, Mrs. Si Chan decided to plant forages with FLSP. The forages were Gliricidia, Guinea Si Muang, Brizantha, Paspalum and the total area planted was 30x50 m². Two to three months after planting she tried to feed three goats. Every day she fed by cut and carrying 3kg grasses and 2kg of Gliricidia, three times per day as a supplement. She fed for about one year and the goats grew well- fat and strong.

Before using forages her goats never had twins, but now they have twins and are strong. She compared her goat with another farmer's goats near her house. Both goats give birth at the same time. Her goats are raised in the grazing area with forage for supplement. Her goats are strong and have twins, but her neighbour's goats raised by local feed with no supplement, only have one kid and are not strong. After one year Mrs. Si Chan and her neighbour sold one goat each to the market. Her goat weighed 21 kg and sold for 250,000 kip, but her neighbour's goat weighed 15 kg and made about 180,000kip. So she got 70,000 kip more than her neighbour. Until now she has sold four goats to buy rice for consumption.

Impacts

- ✓ Enough feed for goats
- ✓ Save time in collecting feed
- ✓ Reduce labour
- ✓ Goats have twins
- ✓ Goats gain weight
- ✓ Increase number of goats to seven goats
- ✓ Make money
- ✓ Family are happy

Future plan

She will expand Gliricidia and forages (about 1 ha) to a new area and will buy 10 goats.



Scaling out impacts within and across villages

As forage use expanded and livestock management improved, household impacts started to accumulate within and across villages. District staff then developed village case studies where significant changes were occurring in the well being of most families within a village. One such case study is that of Nonghet, a north east district bordering Vietnam dominated by the Hmong ethnic group (see Figure 1).

In 2001, two villages were selected to trial forages with 18 farmers volunteering to establish their own plots. The following year another four villages joined the project and 44 households started using forages with one farmer beginning to fatten cattle and buffalo. In 2003 and 2004, the FLSP project ran a series of cross visits so that new farmers could visit more advanced farmers in other villages and districts. The result was a dramatic trebling of farmers planting forages and a thirteen fold increase in households (HH) fattening livestock in the Nonghet district in 2005 (Figure 2).

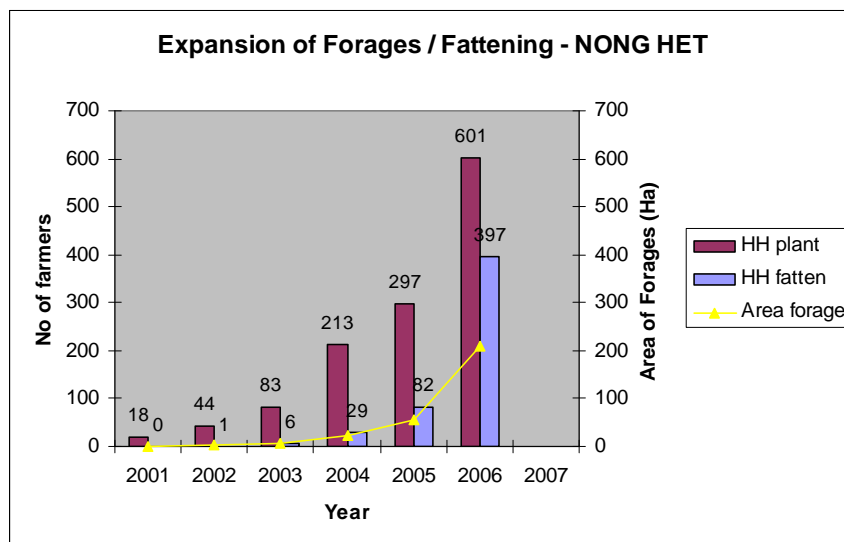


Figure 2 Expansion of forages and livestock fattening in Nonghet district
(Source: John Connell, CIAT Asia)

The project finished in July 2005 but staff continued to work with farmers. By 2006 it became evident that farmers outside the 24 project villages were buying and exchanging forage cuttings. A total of 50 villages (45% of all villages in the district) are now growing over 200 ha of forages involving 600 households of which 66% are fattening.

Livestock production using forages has now been embraced by over 2,000 farmers and 200 villages in northern Lao PDR. As forages are easy to establish and have low input requirements, farmers can readily adapt them to their local environments and farming systems. If managed as a harvested crop, supply can be continuous with transplanting cuttings or sowing seed. For many farmers, they have been able to accumulate wealth by progressing from small to large animals. The impact on their livelihoods has been significant in terms of reducing poverty and hardship to varying degrees depending on their original circumstances, as illustrated in the two farmer case studies.

Livestock intensification is not for everyone

The case study of Nonghet district is seen as a success story, however the uptake of forages and animal health interventions varied across villages and districts. Some households chose not to adopt livestock technologies whilst other farmers trialled forages and livestock raising for a while then stopped. The interviews with 26 farmers revealed the following reasons for not using forages (Table 3).

Table 3 Reasons for not using forages (N=26)

Summary of reasons given	No of mentions
Would like to see impacts first	5
Not enough labour	4
Not enough time (doing other activities at planting time)	4
Tried but not successful	3
Not enough land	2
Seed came too late or not available	2
Need more information	2
Already sown land to another crop	1
Land is too far from house	1
Not enough money to buy livestock.	1
Sick at the time of planting	1
Enough feed already for livestock	1
Need to build a fence	1
Able to use a forage plot left by farmer who moved to another village	1

In some cases, farmers had a preference for growing crops, negative experiences with growing forages or raising livestock, had non-farm enterprises or were simply not aware that forages were available. Other farmers had used forages and livestock production as a stepping stone to change enterprises or get out of farming altogether.

The key findings from the interviews were 1) livestock intensification is not for everyone; 2) livestock fattening may allow farmers to diversify into other livelihood options and; 3) there are serious constraints that need to be overcome if poor farmers are to benefit from livestock intensification.

The following section provides a discussion on the potential of livestock intensification to alleviate poverty in Lao PDR, whilst meeting domestic and export demand. The implications for cultural traditions, land use and environmental or public health are also explored.

Discussion

The rapid adoption of forages and associated livelihood gains experienced by upland farmers in northern Lao PDR has left little doubt in the minds of the Lao government and donor agencies that livestock production can help alleviate poverty to some extent. In many countries, forages have proven to be a useful entry point to engage farmers in solving their immediate problems with livestock feed shortages (Peters et al. 2001; Stur, Gray and Bastin 2002; Misra et al. 2007). Once farmers see benefits emerging, their capacity to deal with complex management issues such as animal health, breeding and marketing increases (Phengsavanh, Phimpachanhvongsod and Horne 2004).

Although our case study research showed a diversity of households engaged in livestock improvement, interviews with those not engaged showed poverty factors at play (eg lack of land, labour, cash and good health). By farmers self selecting to participate in the project, the process favoured the wealthier, more able households. Project staff were aware this would happen, aiming to get plots established and impacts demonstrated first before embarking on strategies to involve poorer families. One of these strategies has been to focus on small animals (pigs and poultry) and women farmers, a popular approach with NGOs (Dolberg 2001; ADB PPTA 2005; Ali 2007).

At a national level, the Lao government has mandated that all research and development be targeted at priority poor districts (shown in Figure 1). Scaling out of livestock production in northern provinces is now aimed at the poorest districts and provinces (ADB PPTA 2005). As a broad policy direction this is commendable. Nevertheless, livestock extension efforts will need to focus on facilitating 'pro-poor' strategies to ensure equity between districts, villages and households.

Around the world, there is a growing realisation that approaches to agricultural research and extension need to focus more on the poor and underprivileged (Christoplos and Farrington 2004; Rangnekar 2006). Partnerships are forming between government agencies and the non-government sector to embed beneficial technologies into rural development programs for the poor. Proven participatory learning approaches based on livelihood needs are central to this process (See Biradar, Sridhar and Balamatti (2006) for an interesting case study on smallholder livestock production partnerships in India). Livestock development in Lao PDR will need to not only target priority poor districts but develop partnerships between government, private and NGO sectors to maximise efforts in remote upland areas.

Our research has shown that achieving poverty alleviation through livestock production depends on household access to feed resources, land, labour, disease management strategies and reliable markets. Upland farmers are seeking reliable technical and market advice as well as credit schemes to enable them to trial new enterprises while minimising risk to their livelihoods (Alexander et al., 2006; Whittaker 2006). Sound extension support is needed as farmers develop new, more intensive modes of production (Millar, Photakoun and Connell 2005; Alexander et al. 2006). Pluralistic services that are well coordinated can help overcome many of the wider social, economic and environmental constraints faced by poor households (Christoplos and Farrington 2004

Our results also revealed that livestock intensification is not for everyone, and some farmers may use livestock production as a stepping stone to other livelihood options. This has implications for the livestock sector to meet growing domestic meat demand and take advantage of export opportunities. Given current population growth rates and predicted economic growth, meat consumption will continue to rise, particularly in major urban centres and regional towns. This will increase demand for meat, particularly cattle beef which is preferred over buffalo beef (Stur, Gray and Bastin 2002).

However, price controls on the retail meat price, taxes and restrictions on movement of livestock between provinces can reduce the incentive for farmers to invest in livestock production (Stur, Gray and Bastin 2002). Furthermore, if cross border trade continues into Vietnam, there may be a shortfall in live animals for the domestic market. On the other hand, if the increasing number of upland farmers engaging in livestock fattening does not satisfy domestic meat demand, prices will continue to remain high, and more farmers may be encouraged to change from livestock keepers to livestock producers.

Such a scenario may also encourage entrepreneurial farmers to set up larger units closer to urban centres as has occurred in neighbouring countries (Quirke et al. 2003; FAO 2006b). Experiences with industrialisation of livestock production in other parts of Asia have shown that it can quickly lead to pollution problems from effluent, and create public health risks (FAO 2006c). Although Lao PDR has few large commercial livestock units, growing domestic and potential export markets may stimulate expansion, and the need to address environmental issues.

The opening of road networks from Thailand to China and Vietnam will further encourage trade in livestock feeds, live animals and livestock products (ADB PPTA 2005). The danger here is that smallholder farmers may be unable to compete with larger producers regarding animal quality and quantity, and prices may fall in line with increased supply. The risks are greater for smallholders, particularly if they become overly dependent on livestock as a major enterprise, without fall back strategies (LiD 1999; FAO 2006b).

One of the major challenges for livestock trade in Lao PDR will be meeting higher food safety and quality standards, in line with disease control measures (Scoones and Wolmer, 2006). Although a disease surveillance system has been established, the frequency and accuracy of reporting is often unreliable. Expansion of veterinary and husbandry services are required to address livestock diseases and reduce mortality. Better husbandry methods to ensure the survival of livestock are a necessary incentive for smallholder farmers to invest their resources (Stur, Gray, and Bastin 2002).

Finally, the findings of this research highlight how the cultural diversity of ethnic groups in the uplands creates enormous variation in farmer attitudes to livestock, and propensity to intensify. The rapid expansion of forages and livestock fattening in Nonghet district is largely due to several cultural aspects of the Hmong people. The Hmong have a strong historical association with cattle and pig husbandry, and a tradition of stall feeding cattle for bull fighting. So confined or pen feeding with forages was not foreign to them. The strong family or clan ties among the Hmong facilitated knowledge and information exchange between districts and provinces.

Ethnic traditions are often closely related to environmental conditions and limits to agricultural production. For example, lowland households (Lao Loum or Lao Theung) are more inclined to breed buffalo particularly if used for draught in paddy fields, and fatten goats if close to markets. In addition, where there is fertile, arable land for paddy rice and cash crops, there is less reliance and interest in livestock intensification. However, these traditional associations with livestock are changing as villages move from upland to lowland, and different ethnic groups amalgamate into one village. Through our cases studies and interviews, we learnt that ethnic groups tend to retain their traditional livestock systems if possible, whilst taking on new enterprises such as fish farming, timber production, cash cropping or handicrafts.

Conclusions

The key findings from our research are that livestock development in Lao PDR has revolutionised the lives of some upland farmers and villages. However, strategies are needed to engage poor households and minimise potential negative impacts of larger scale livestock intensification on smallholder farmers. Livestock research and development can be effective if attention is paid to meeting the immediate needs of poor farmers and minimising their risks to food security. Forming partnerships with rural development agencies can facilitate the flow of useful technologies to more remote and poverty stricken areas. Further research is needed into pro-poor livestock development to determine the reality behind the rhetoric.

The livestock sector in Lao PDR is reaching a critical stage in transition from subsistence to market based production. Meeting growing domestic meat demand is possible if more farmers adopt livestock fattening using forages and health interventions. Export demand is less predictable due to illegal trade, disease outbreaks and lack of market information systems. Smallholder farmers will need to keep their enterprises diversified should markets prove unreliable, whilst taking advantage of livestock production to accumulate wealth and pursue other livelihood aspirations.

Lao PDR is in a fortunate position to learn valuable lessons from other South East Asian countries and avoid negative impacts of livestock intensification on environmental and human health, as well as cultural traditions. Whether the collective players in agriculture and rural development heed these lessons, will determine the future impact of livestock development on upland livelihoods. Although livestock intensification has been a revolution for some farmers, for many others it will be a slow evolution towards more sustainable farming systems.

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