



# Research Report

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## Information Failures in Livestock Markets: Evidence from Lao PDR

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### ABSTRACT

Rural populations in developing countries are often highly dependent on livestock for nutrition, agricultural services, and direct income. However, as economies develop and as income rises, demand for animal products increases, offering otherwise relatively isolated farmers a way to participate in urban growth through food markets. But market participation is seriously complicated by information failures across informal supply chains that link rural household producers to urban consumers. Because middlemen often transfer animals to wholesale and retail markets, smallholder products are pooled and adverse selection results, i.e. there is no incentive for smallholders to invest in improving the quality of their product. This puts a serious constraint on the economic benefits producers can reap from growing markets, and also poses a threat to animal health and food safety, essential quality characteristics from a public health perspective. Fortunately, there are policies available that facilitate the flow of product information and help correct these market failures, such as branding by origin, government certification, and/or micro-contracting. To evaluate the feasibility and benefits of these policy options, however, market structure and factors influencing consumer demand must be more clearly understood. This paper examines such market characteristics in the capital of Lao PDR, Vientiane, as a first step to the more effective evaluation of policy options for improving livestock quality and smallholder livelihoods.

## 1. Introduction

The production of livestock and livestock products plays an integral role in rural economies. While livestock are seldom the primary source of household income, they may serve as an investment and function as a method of wealth storage in the absence of formal banking institutions. Some animal types are also capable of contributing manual power, providing transport, and producing fertilizer; all of which contribute positively to the welfare of rural households. These things, combined with the rapidly growing consumption of meat, milk and eggs in the urban centers, allow livestock production to significantly contribute to poverty alleviation for the rural poor.

Policies are available that could enhance the market access and participation of livestock producers. However, before implementing new policies, it is vital to have a thorough understanding of local markets and social structures. These institutions are often highly complex, and without proper research and understanding of their functioning, any attempt to affect the livelihood of rural livestock holders could easily produce unforeseen and even negative consequences. Therefore, it is essential to conduct a broad assessment of the existing market conditions so that policies can be specifically tailored to meet the needs of local populations. The assessment should allow the researchers to better understand how livestock contribute to the livelihoods of rural households, the role that intermediaries play, establish policy implementation methods, and generate coherent policy objectives that can be quantified, allowing evaluation of program effectiveness.

This pilot market assessment will allow researchers and policy makers to identify target groups for policy implementation. They can then determine the most efficient use of institutional support and the best methods for expanding market access for the smallholders. In this paper we present the results of an initial local market study in Vientiane, Lao PDR and attempt to characterize the roles of individuals in the supply chain as well as the demands of local consumers.

## 2. Overview of Market Conditions

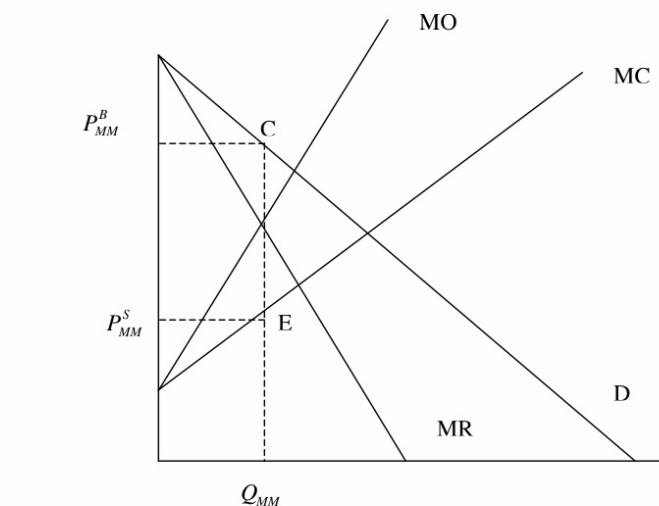
Livestock have traditionally been an integral part of rural economies, with households producing primarily for subsistence and local use. However, continuing population growth, urban migration, and urban income growth has led to increased demand for animal products in developing countries (Delgado *et al.* 1999). In 1973 the developing world obtained 19 percent of its protein from animal products. By 1993 the figure had risen to 26 percent (Delgado *et al.* 1998). This demand provides the potential for rural smallholders to shift from traditional subsistence farming into larger scale production for urban markets, as a method of promoting poverty alleviation. In

order for this potential to be realized, however, there are many structural and logistical issues that must be addressed.

A major problem that arises for rural livestock producers is limited market access. It is difficult to facilitate poverty alleviation when the players are economically isolated from large urban markets due to logistical and transport costs. Smallholders often avoid having to face these costs directly by selling to intermediary aggregators. These middlemen play an important role in the supply chain by providing the service of transporting livestock, often over long distances, from rural areas to urban markets. They buy livestock products from a variety of smallholder producers and merge the animals from many producers while en route to the urban markets. Intermediaries are able to exploit the producers' limited market access, keeping them disengaged from downstream consumers. Middlemen reduce the producers' bargaining power and remove incentives for improving product quality. The system also prevents producers from gaining reliable information regarding urban market conditions due to their geographic, economic and social isolation.

Direct market participation is highly limited for rural smallholders due to the existence of the intermediaries in the supply chain. There are two primary problems that arise from the existence of these intermediaries. The first is that intermediaries act in their own self-interest in order to increase their level of market power. They act as monopsonists when aggregating livestock products from rural producers, and as monopolists when they sell to urban consumers or market sellers.

**Figure 1:** Traditional welfare analysis of a market with middlemen (after Zilberman:2008)



- $Q_{MM}$  = middlemen output
- $P_{MM}^S$  = price paid by middlemen to suppliers
- $P_{MM}^B$  = price paid to middlemen by buyers
- $P_{MM}^B - CE - P_{MM}^S$  = middlemen profit

The presence of these middlemen causes distortions in the market, resulting in a case where, when compared to the optimal equilibrium, producers receive a lower price for their products, consumers pay a higher price for goods, and the quantity of goods being traded in the market is less than optimal (Zilberman, 2008). Some of the welfare losses associated with these distortions are captured by the middlemen, but much of it is a dead weight loss associated with a loss in efficiency (Figure 1).

The second problem that arises when intermediaries exist in the market is that they act to mask producers from consumers, thereby causing additional market failures due to consumers having imperfect information. The major cause of imperfect information in these markets is due to middlemen aggregating livestock which was purchased from a wide variety of producers. This practice effectively removes any information concerning the product's origin. As urban consumers become wealthier they demand higher quality products. However, with the current market structure they lack information needed to judge the quality of the products offered. This reduces the amount that they are willing to pay for livestock products because they are unable to reliably evaluate the quality, or risk, associated with a product. Even if the market vendors were aware of and reliably provided the pertinent information, consumers would be unlikely to trust them, knowing that the sellers have incentives to exaggerate the quality of their product in order to increase their profit.

The market failures associated with imperfect information can, in this situation, also result in public health risks that emerge due to the lack of reliable information about the health of livestock / livestock products as they move from the rural areas into urban markets. These concerns mostly regard livestock diseases which can make livestock products unfit for consumption or can be transmitted to humans via contact or consumption. In the case of markets for meat from large animals (eg. pigs, cattle, and buffalo), where animals are slaughtered at locations that are spatially removed from the wet markets in which consumers purchase their meat, there is the concern that any unsafe meat from diseased animals could be sold at a variety of different markets throughout the city. There are also public health risks in the poultry sector. Currently, much emphasis is being placed on the safety of the poultry supply chains and markets due to the risk of Highly Pathogenic Avian Influenza (HPAI), especially in regions where the disease is endemic. In these areas, poultry is often sold live at the urban markets, allowing birds from many different regions to intermingle and increasing the potential for a large outbreak in an area with a dense human population.

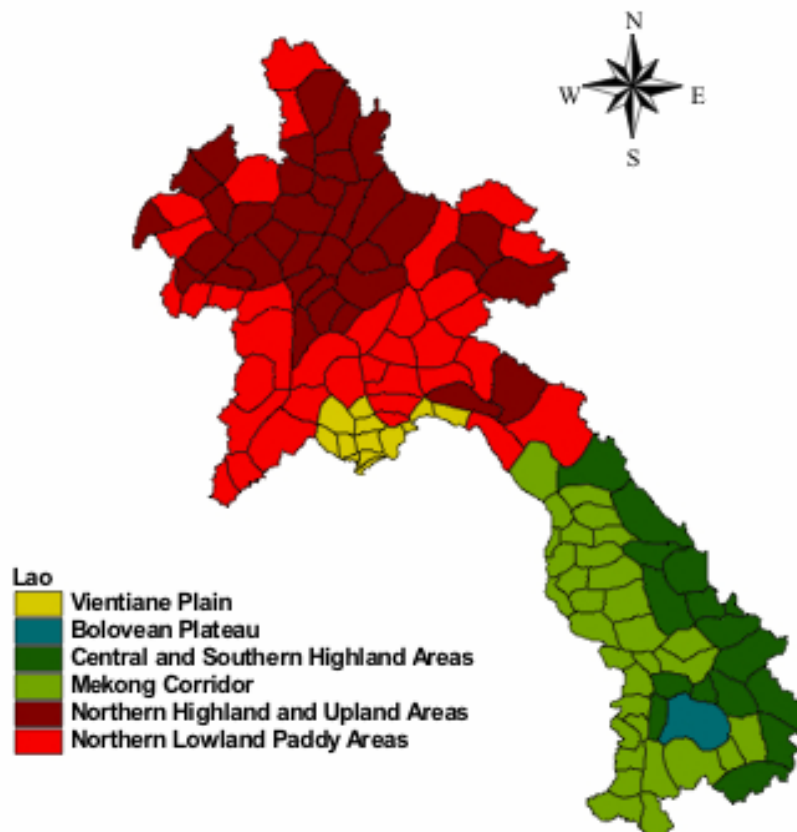
The final issue that arises from imperfect information is that it causes adverse selection for the quality of livestock that producers supply. There are no incentives for smallholders to improve the quality of their products because if they were to invest in quality improving measures, such as vaccination or improved feed, they would not receive higher prices for their produce. There is

currently no way for the consumer to know if a product is of superior quality because producers are unable to build a reputation with their buyers. As a result, smallholders who supply their livestock produce at the lowest cost to themselves will generate the greatest profit, since there is very little price variation based on quality.

## Lao PDR Livestock Market

Lao PDR is a landlocked country in the Mekong region of Southeast Asia, with a population of 6.7 million over a land area of 236,800 sq km. In 2007 Laos had a GDP of US\$12.6 billion, of which agriculture accounted for 41.2%, with livestock accounting for over a third of that value (Lao Ministry of Agriculture and Forestry, 2002). The agriculture sector also accounts for 80% of employment in the country's economy. The population is 73% rural and has a poverty head count ratio of 74%, based on a \$2 per day (PPP) threshold (World Bank, 2007). Most of these individuals produce entirely for subsistence purposes, with only half of households that raise livestock selling any of them in a year (World Bank, 2006).

**Figure 2:** Agro-ecological regional map of Lao PDR (World Bank, 2006)



Most of the large livestock (cattle, buffalo and some pigs) comes from the rural regions of the Northern Lowland Paddy areas, the Vientiane Plain, and the Mekong Corridor (Figure 2), while

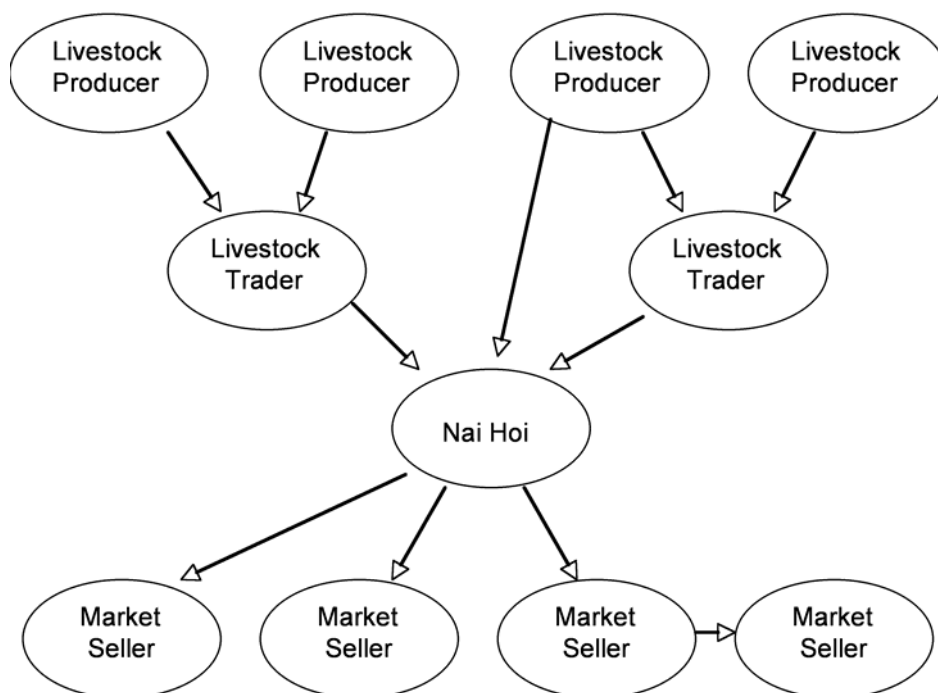
small livestock (poultry and some pigs) come primarily from the Vientiane Plain and Vientiane Municipality itself. Based on this knowledge the following background information was gathered regarding the local conditions of the urban Vientiane livestock markets.

### Meat Market Players

Three types of non-poultry meat dominate the formal Vientiane market; buffalo beef, cattle beef, and pork. Buffalo and cattle beef are very similar in appearance, but cattle beef is preferred on the basis of taste.

Meat consumed in Vientiane is primarily raised by smallholders outside of the Vientiane municipality. Most of these individuals play no role in the transport of their produce to the market unless they live close to Vientiane Municipality. Instead, they sell to livestock traders who transport the animals to Vientiane for sale. There are generally two to three livestock traders that work within a province and sometimes they will share transport to get their animals to Vientiane. Livestock traders then sell to Nai Hoi. Nai Hoi are intermediaries who own the animals at the time of slaughter, though often they do not own a slaughterhouse and instead rent the use of one and bring in their own workers to do the slaughtering. In some cases the livestock traders sell to the Nai Hoi at the slaughterhouses, while other times they deliver the animals to the Nai Hoi's homes. The Nai Hoi slaughter animals either once or twice daily and then deliver the meat to market sellers at their stalls in the large markets. Many Nai Hoi also sell at the large markets.

**Figure 3: Meat Supply Chain**



The market sellers place orders for the amount and type of meat they want with the Nai Hoi the day before. All of these agreements are verbal and largely done by cell phone. Individuals who sell at smaller markets tend to buy meat from sellers at large markets for resale. They may also buy from Phonthong market, where many of the Nai Hoi sell meat at close to wholesale prices.

### **Poultry Market Players**

Poultry reaches the market via a different supply chain. Most of the poultry that is consumed in Vientiane is produced locally, either in the Municipality itself or in Vientiane Province. Often poultry market sellers will buy animals from smallholders that live in their village and slaughter them at home in the morning before market. There are also some traders who will go to different villages to buy birds and then sell them live at the market before regular market hours. However, the market for poultry at the time of this work (summer 2007) had been disrupted and pushed largely into the informal sector due to a recent outbreak of HPAI in the city that resulted in a human death. In response to the death, attempts were made to cull all poultry within the city limits, and bans were placed on the movement and sale of poultry within the city until the situation had been resolved. At the time of this study, the bans on movement and sale within the city had been lifted for most districts. However, the government was attempting to implement a more controlled system for poultry slaughter and sale, which will allow for closer disease monitoring. The goal is to set up specific locations where all birds intended for sale at the formal wet markets are to be slaughtered and inspected by government veterinarians. Once passing the certification they will be stamped to indicate they are approved for sale. Market sellers will be prohibited from selling birds that have not been certified. The concern with this approach is that, due to additional costs in either time or fees, the market for poultry will be pushed entirely into the informal sector where it will nearly impossible to implement regulations.

The repercussions of increased regulation on the sector are already apparent. During the surveying process for this study it was extremely difficult to determine the source of the home-raised poultry being sold in the market. In some cases, live birds were being purchased at a bus station early in the morning from smallholders riding the bus in from Vientiane Province. Many sellers would not even get off the bus; but would sell their products through the open windows and then leave on the same bus in a matter of minutes. In this way they were able to avoid paying taxes and answering any questioning about the health of their animals.

### 3. Research Design

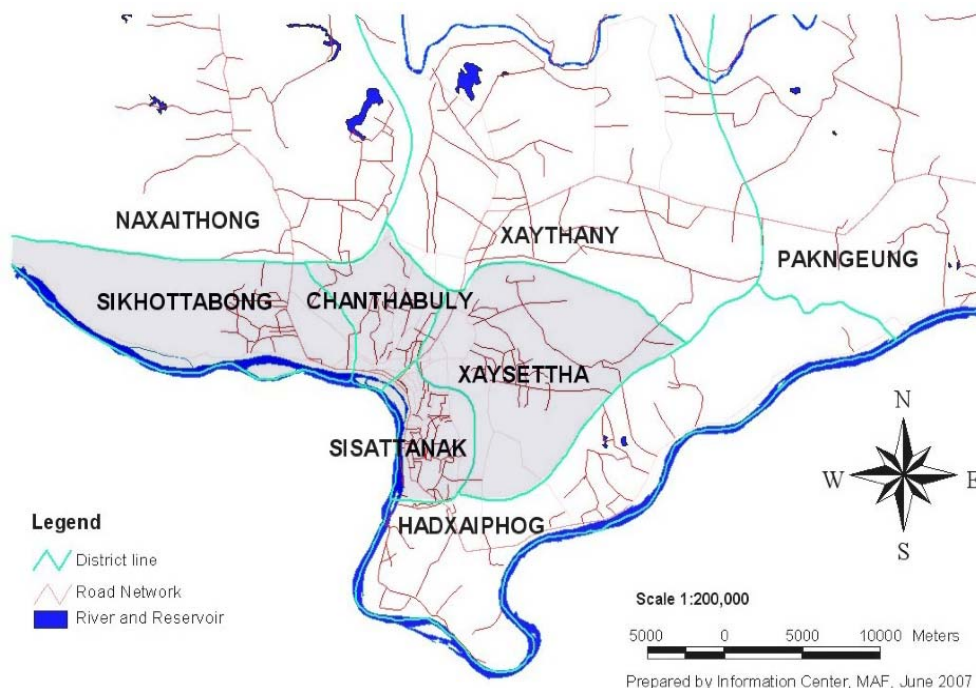
#### Market Flow Survey

A market flow survey attempted to gain responses from the market players in the Vientiane market using a full coverage method. Information acquired from market reconnaissance indicated that this was the best method to use in order to get a sufficient sample size, as there are a limited number of players that are involved in the market due to the small size of the overall market. It is likely that the result of this implementation method gives more coverage to the individuals in the market who reside in Vientiane; thus, market sellers will have the highest coverage level with decreasing coverage as we move up the supply chain. Livestock traders who come from other provinces are likely to have the least thorough coverage level due to the fact that the survey was conducted over a limited period of time and many of them only make a trip to the Vientiane market one to two times per month. This issue will be considered as the data is analyzed.

#### Consumer Household Survey

A consumer household survey was designed to establish characteristics and preferences of urban households that purchase livestock products from the urban markets. The households in six villages of each of the four central districts of Vientiane; Chanthabuly, Sikhottabong, Sisattanak, and Xaysetha; were sampled, for a total of twenty four villages.

**Figure 4:** Administrative map of Vientiane municipality



Villages were randomly selected using the probability proportion to population size method based on the number of households per village. Only villages that were classified as urban by the Lao National Statistics Center were included in the randomization as rural and semi-rural villages were not of interest in this study.

**Table 1:** Proportional allocation of surveys by district

| District     | Total Households | Surveys per District | Surveys per Village |
|--------------|------------------|----------------------|---------------------|
| Chanthabuly  | 12,433           | 108                  | 18                  |
| Sikhottabong | 15,251           | 138                  | 23                  |
| Sisattanak   | 11,357           | 102                  | 17                  |
| Xaysetha     | 17,874           | 156                  | 26                  |

The numbers of surveys per district were assigned based on the total number of households in each district. The breakdown is shown in Table 1, with the total number of surveys equal to 504.

## 4. Results

### Supply Side Market Structure

#### *Supplier Characteristics*

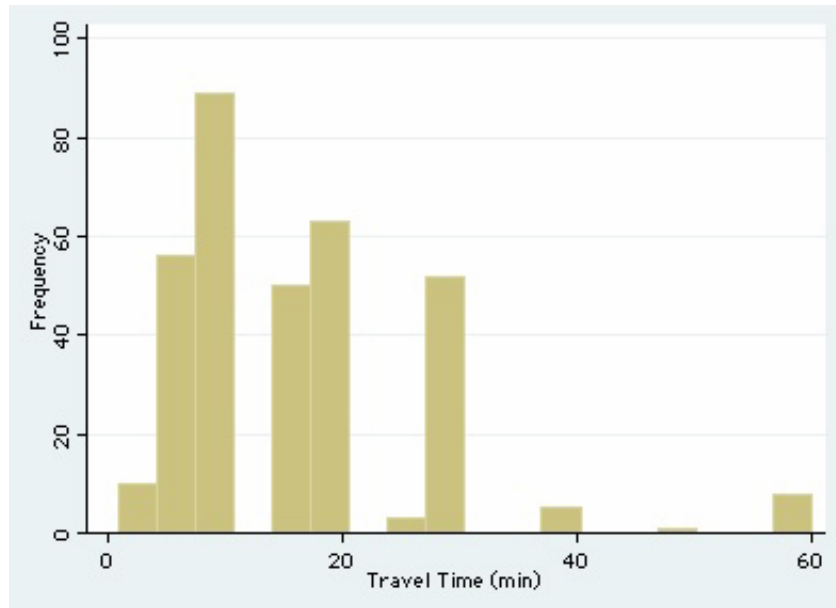
The market flow survey allowed us to gain information that gives us insight into the structure of the supply side of the livestock market in Vientiane. Women make up over 85% of the suppliers in the sample with majority of participants middle aged or younger.

**Table 2:** Respondent characteristics

| Gender | Number | Age   | Number |
|--------|--------|-------|--------|
| Male   | 48     | <35   | 154    |
| Female | 313    | 35-45 | 137    |
|        |        | >45   | 68     |

However, 56% of the suppliers do not work alone, and of those 99% work with their family. As a result there may be a bias towards younger respondents since children and younger family members will often sell at the market for their families even though they are not responsible for decision making in the process.

The level of market participation among suppliers is very high with 93.2% of respondents working seven days a week (the mean is 6.7 days with a standard deviation of 1.2).

**Figure 5:** Transit time for Nai Hoi and market sellers

Nai Hoi and market sellers tend to live close to their place of work. The distribution of travel time for these market participants can be seen in Figure 5, the mean travel time reported is 16.5 minutes with a standard deviation of 11.3 minutes. This does not include the travel time of livestock producers or traders, since they make infrequent trips from other provinces their inclusion leads to extreme outliers in the data.

At the time this survey was implemented there were many more individuals in the market who were supplying meat than individuals who were supplying poultry products as can be seen in Table 3. It is reasonable to assume that this is at least partially due to the recent outbreak of HPAI in the city which resulted in the mass culling of poultry and the subsequent movement of the poultry market into the informal sector.

**Table 3:** Product type traded by respondent

| Product            | Respondents | Percent of Total |
|--------------------|-------------|------------------|
| Buffalo            | 53          | 15               |
| Cow                | 159         | 44               |
| Pig                | 159         | 44               |
| Backyard Chicken   | 24          | 7                |
| Industrial Chicken | 7           | 2                |
| Eggs               | 30          | 8                |
| Other Poultry      | 6           | 2                |

When looking at the livestock market in Vientiane it is most instructive to examine the market for meat and the market for poultry products separately. This is because cattle, buffalo and pigs are all brought to the city by the same process and most of them go through the same

slaughterhouses and suppliers deal in all three meat types. Poultry on the other hand mostly comes from within the city and are brought to market by way of far fewer intermediaries, in most cases they are slaughtered either at the homes of the market sellers or at their stalls once they arrive in the morning. Poultry suppliers were also much more difficult to identify and obtain responses from during the course of this survey due to the sensitivity surrounding the recent outbreak. As a result these markets will be examined individually.

### ***Pig, Buffalo and Cattle Meat Supply***

The meat supply chain is fragmented and consists of various intermediaries. The roles of respondents are summarized in Table 4, the percentages will not sum to one hundred because many individuals take on multiple roles within the supply chain.

**Table 4:** Meat market vendors by product type

| Role in Market      | Number | Percent of total |
|---------------------|--------|------------------|
| Livestock Producers | 1      | 0.3              |
| Livestock Traders   | 26     | 8.9              |
| Nai Hoi             | 50     | 17.1             |
| Market Sellers      | 260    | 88.7             |
| Other               | 11     | 3.8              |

To get an idea for the amount of meat that is flowing through the Vientiane market daily the totals reported by each type of market player were summed and tabulated. In these calculations bias towards those individuals who participate daily in the urban portion of the market is expected due to the survey implementation methods.

**Table 5:** Volume of pork traded (kg/day)

| Agent             | Pork   |        |
|-------------------|--------|--------|
|                   | Bought | Sold   |
| Livestock Traders | 7,741  | 7,366  |
| Nai Hoi           | 12,300 | 12,581 |
| Market Sellers    | 19,507 | 19,129 |

In the case of pork we can see that this is in fact the case, with the total amount reported being bought daily increasing by 152% and the amount sold increasing by 160% as we move down the supply chain from livestock traders to market sellers.

**Table 6:** Volume of buffalo beef traded (kg/day)

| Agent             | Buffalo Beef |       |
|-------------------|--------------|-------|
|                   | Bought       | Sold  |
| Livestock Traders | 2,754        | 3,232 |
| Nai Hoi           | 5,279        | 4,954 |
| Market Sellers    | 2,702        | 2,657 |

However, when we look at the reported numbers for the amount of buffalo that is being bought and sold we see the increasing trend from the livestock traders to the Nai Hoi, but then the reported amount bought and sold by the market sellers drops back off to the level reported by the livestock traders. Conversely, the amount of cattle beef reported being bought daily increased by 432% and the amount sold increasing by 448% as we move down the supply chain from livestock traders to market sellers.

**Table 7:** Volume of cattle beef traded (kg/day)

| Agent             | Cattle Beef |       |
|-------------------|-------------|-------|
|                   | Bought      | Sold  |
| Livestock Traders | 1,584       | 1,706 |
| Nai Hoi           | 3,864       | 3,681 |
| Market Sellers    | 8,429       | 9,357 |

As can be seen from these numbers there are some large discrepancies, buffalo meat seems to be disappearing and cattle meat appearing. Considering the complete coverage design of the survey, and its potential shortcomings, it is not surprising to see that the amount of meat being traded increases as we move down the supply chain due to those individuals having more comprehensive coverage. However, it is unlikely that, in the case of accurate reporting, the opposite trend would be observed. This may be the evidence that sellers are in fact being deceptive about the type of meat they are selling. Table 8 shows the sum of the reported amounts of buffalo and cow beef being traded daily.

**Table 8:** Combined volume of buffalo and cattle beef traded (kg/day)

| Agent             | Beef   |        |
|-------------------|--------|--------|
|                   | Bought | Sold   |
| Livestock Traders | 4,338  | 4,938  |
| Nai Hoi           | 9,144  | 8,636  |
| Market Sellers    | 11,131 | 12,015 |

In the combined case of buffalo and cattle beef we can see that the total amount reported being bought daily increases by 157% and the amount sold increasing by 143% as we move down the supply chain from livestock traders to market sellers. These results very closely mirror those

found for the pork supply chain, in which there are no substitutes. While nothing conclusive can be determined from this data alone, when coupled with first hand reports given by consumers indicating that these meat types are often both sold as cattle beef it may indicate that market sellers are in fact concealing the nature of their product. Only further study can uncover more information about this potential market failure.

### ***Poultry Supply***

The poultry supply chain is shorter with much of the production occurring within the Vientiane municipality. The response from the poultry portion of the livestock market was much lower than that of the meat sector, this was due both to non response and difficulty in identifying individuals who acted in the market. The occupational breakdown of the respondents is displayed in Table 9.

**Table 9:** Poultry market agent characteristics

| Role in Market      | Number | Percent of Total |
|---------------------|--------|------------------|
| Producers           | 9      | 13               |
| Poultry/Egg Traders | 30     | 43               |
| Slaughterers        | 3      | 4                |
| Market Sellers      | 61     | 88               |

**Table 10:** Volume of backyard / local chicken traded (head/day)

| Agent             | Local Chicken |      |
|-------------------|---------------|------|
|                   | Bought        | Sold |
| Chicken Producers |               | 69   |
| Chicken Traders   | 253           | 256  |
| Market Sellers    | 388           | 378  |

**Table 11:** Volume of industrial chicken traded (head/day)

| Agent             | Industrial Chicken |      |
|-------------------|--------------------|------|
|                   | Bought             | Sold |
| Chicken Producers | 0                  | 0    |
| Chicken Traders   | 0                  | 0    |
| Market Sellers    | 207                | 172  |

**Table 12:** Volume of other poultry traded (head/day)

| Agent             | Other Poultry |      |
|-------------------|---------------|------|
|                   | Bought        | Sold |
| Chicken Producers | 0             | 0    |
| Chicken Traders   | 0             | 0    |
| Market Sellers    | 37            | 37   |

**Table 13:** Volume of eggs traded (pieces/day)

| Agent             | Eggs   |        |
|-------------------|--------|--------|
|                   | Bought | Sold   |
| Chicken Producers | 0      | 0      |
| Chicken Traders   | 18,639 | 17,007 |
| Market Sellers    | 24,765 | 25,108 |

## Demand Side Market Structure

### *Consumer Characteristics*

A market price survey was conducted to obtain insight into the consumer demand side of the livestock market. The respondents are members of households that regularly go to the market and are involved in the purchasing of livestock products. This gives us information regarding the characteristics of consumers, their consumption habits, and the prices that individuals are paying for various livestock products.

Over 85% of the consumers surveyed who participate in the market are women, with consumers ages evenly distributed across age classes. This is to be expected due to the traditional division of labor within the society, women are responsible for housework including shopping and cooking.

**Table 14:** Respondent characteristics

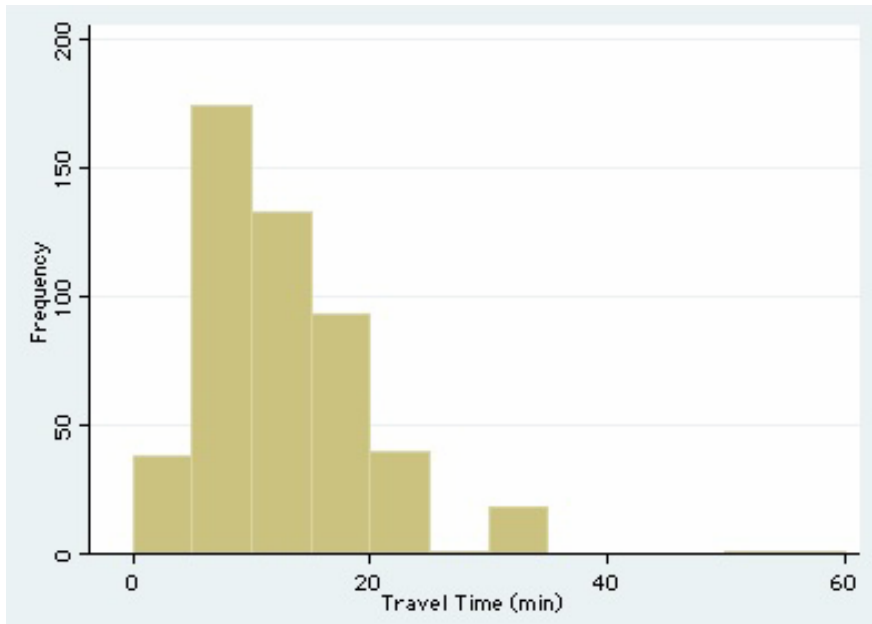
| Gender | Number | Age   | Number |
|--------|--------|-------|--------|
| Male   | 74     | <35   | 159    |
| Female | 428    | 35-45 | 179    |
|        |        | >45   | 162    |

**Table 15:** Respondent role in market

| Role in Market     | Number | Percent of Total |
|--------------------|--------|------------------|
| Livestock producer | 31     | 6.2              |
| Livestock trader   | 1      | 0.2              |
| Nai Hoi            | 1      | 0.2              |
| Meat trader        | 3      | 0.6              |
| Market seller      | 0      | 0.0              |
| Business buyer     | 99     | 19.60            |
| Household buyer    | 479    | 95.0             |

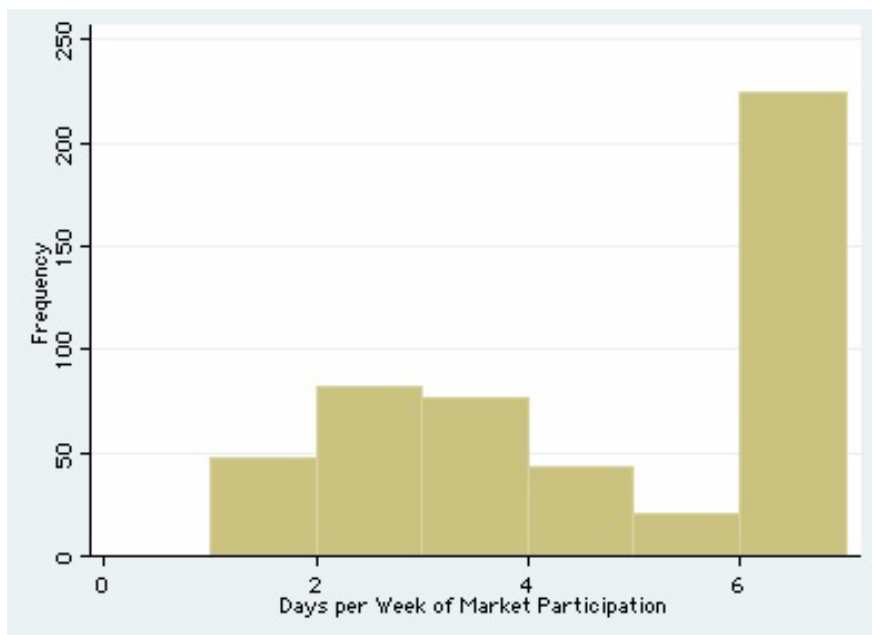
As can be seen from Figure 6, Vientiane consumers enjoy easy market access with an average travel time to market of 10.5 minutes and a standard deviation of 6.9 minutes.

**Figure 6:** Travel time to market for Vientiane consumers (minutes)



This level of market access is important since all respondents make more than one trip to the market weekly, with half of respondents visiting a market more than four times per week. This is especially important for the many households that do not have means of refrigeration for meat products and therefore place high value on the freshness of the product and the ability to purchase it shortly before preparation.

**Figure 7:** Number of days per week that consumers visit a market



The products that are most heavily demanded by the consumers surveyed are pork, cow beef, and eggs; over 70% of consumers reported purchasing these goods (Table 16).

**Table16:** Types of livestock products purchased by respondents

| Product             | Number | Percent of Total |
|---------------------|--------|------------------|
| Buffalo meat        | 78     | 15.6             |
| Cattle meat         | 351    | 70.2             |
| Pig meat            | 459    | 91.8             |
| Home-raised chicken | 99     | 19.8             |
| Industrial chicken  | 27     | 5.4              |
| Eggs                | 375    | 75.0             |
| Duck                | 32     | 6.4              |

The majority of consumers exhibit loyalty to market sellers that they frequent. When this observation is broken down further by gender it is observed that men are split evenly on whether or not they are loyal to a market seller, while nearly two thirds of women consumers report loyalty.

The final characteristic of Vientiane livestock consumers is that the majority of them (68.9%) are concerned about the safety of livestock products sold in the markets. The consumers who were concerned about the safety of products in the market were then asked to specify what types of products they were concerned about specifically. These results are displayed in Table 17.

**Table17:** Consumer food safety concerns by livestock product

| Product                  | Percent Concerned |
|--------------------------|-------------------|
| Buffalo Beef             | 48.7              |
| Cattle Beef              | 27.5              |
| Pork                     | 20.6              |
| Home Raised Chicken Meat | 43.0              |
| Industrial Chicken Meat  | 65.7              |
| Other Poultry Meat       | 44.3              |
| Eggs                     | 4.5               |

It is not surprising to see that the concern is high for poultry products due to the recent HPAI outbreak and subsequent public information campaign regarding the risks associated with poultry. However, it is interesting to note the high level of concern regarding buffalo products. It is unclear if this a specific concern or simply because of buffalo meat's status as an inferior product.

## Product Prices

Consumers were asked to report the prices that they pay for common types of meat sold for each animal type on a usual basis, as well as the highest and lowest prices that they pay in order to establish a range of prices for each product.

Additionally, consumers were asked what characteristics about the product would be willing to pay more, if any, from the following options: coming from a province that has a good reputation for production of that product, freshness of product, if the animal was home raised, and the age of the animal at the time of slaughter. The responses are summarized in the following tables, broken down by type of livestock.

**Table 18:** Reported pork prices (Lao Kip)

| Meat Type                | Price | Obs. | Mean   | SD. % | Min.   | Max.   |
|--------------------------|-------|------|--------|-------|--------|--------|
| Normal Type<br>Purchased | Usual | 437  | 25,105 | 8.5   | 17,000 | 35,000 |
|                          | High  | 435  | 25,533 | 9.4   | 17,000 | 35,000 |
|                          | Low   | 435  | 24,899 | 8.9   | 17,000 | 35,000 |
| Soft Meat                | Usual | 379  | 26,488 | 8.4   | 18,000 | 40,000 |
|                          | High  | 377  | 27,080 | 8.9   | 20,000 | 40,000 |
|                          | Low   | 377  | 26,159 | 9.0   | 16,000 | 40,000 |
| Leg Meat                 | Usual | 272  | 26,154 | 7.7   | 18,000 | 37,000 |
|                          | High  | 271  | 26,793 | 7.9   | 18,000 | 37,000 |
|                          | Low   | 270  | 26,022 | 7.5   | 17,000 | 37,000 |
| Ribs                     | Usual | 321  | 23,178 | 10.5  | 15,000 | 30,000 |
|                          | High  | 319  | 23,555 | 9.8   | 15,000 | 30,000 |
|                          | Low   | 319  | 22,994 | 10.7  | 15,000 | 30,000 |
| Bacon                    | Usual | 357  | 23,218 | 9.3   | 15,000 | 30,000 |
|                          | High  | 355  | 23,563 | 9.7   | 15,000 | 38,000 |
|                          | Low   | 355  | 22,980 | 9.8   | 15,000 | 30,000 |

**Table 19:** Reported buffalo beef prices (Lao Kip)

| Meat Type                | Price | Obs. | Mean   | SD. % | Min.   | Max.   |
|--------------------------|-------|------|--------|-------|--------|--------|
| Normal Type<br>Purchased | Usual | 72   | 34,319 | 7.8   | 25,000 | 38,000 |
|                          | High  | 72   | 35,375 | 7.3   | 25,000 | 40,000 |
|                          | Low   | 72   | 33,958 | 9.3   | 18,000 | 38,000 |
| Soft Meat                | Usual | 76   | 34,829 | 6.0   | 28,000 | 38,000 |
|                          | High  | 76   | 35,947 | 5.5   | 32,000 | 40,000 |
|                          | Low   | 76   | 34,671 | 6.2   | 28,000 | 38,000 |
| Leg Meat                 | Usual | 43   | 34,256 | 6.4   | 30,000 | 38,000 |
|                          | High  | 43   | 35,163 | 7.2   | 30,000 | 40,000 |
|                          | Low   | 43   | 34,116 | 6.9   | 30,000 | 38,000 |

**Table 20:** Reported cattle beef prices (Lao Kip)

| Meat Type                | Price | Obs. | Mean   | SD. % | Min.   | Max.   |
|--------------------------|-------|------|--------|-------|--------|--------|
| Normal Type<br>Purchased | Usual | 343  | 34,752 | 9.2   | 15,000 | 45,000 |
|                          | High  | 343  | 35,347 | 9.0   | 15,000 | 48,000 |
|                          | Low   | 343  | 34,472 | 9.6   | 15,000 | 45,000 |
| Soft Meat                | Usual | 336  | 35,271 | 6.3   | 22,000 | 45,000 |
|                          | High  | 336  | 36,009 | 6.0   | 24,000 | 48,000 |
|                          | Low   | 336  | 34,932 | 7.1   | 20,000 | 45,000 |
| Leg Meat                 | Usual | 217  | 34,710 | 5.7   | 25,000 | 40,000 |
|                          | High  | 217  | 35,180 | 5.9   | 25,000 | 40,000 |
|                          | Low   | 217  | 34,645 | 5.7   | 25,000 | 40,000 |

**Table 21:** Reported poultry meat prices (Lao Kip)

| Meat Type              | Price | Obs. | Mean   | SD. % | Min.   | Max.   |
|------------------------|-------|------|--------|-------|--------|--------|
| Home-raised<br>Chicken | Usual | 99   | 33,101 | 20.5  | 20,000 | 60,000 |
|                        | High  | 99   | 40,232 | 28.2  | 22,000 | 80,000 |
|                        | Low   | 97   | 30,845 | 23.2  | 20,000 | 60,000 |
| Industrial Chicken     | Usual | 27   | 16,444 | 3.5   | 12,667 | 23,333 |
|                        | High  | 26   | 18,077 | 14.2  | 13,333 | 32,000 |
|                        | Low   | 26   | 16,179 | 19.6  | 12,667 | 23,333 |
| Duck                   | Usual | 32   | 20,609 | 12.9  | 15,000 | 25,000 |
|                        | High  | 32   | 25,594 | 17.7  | 18,000 | 35,000 |
|                        | Low   | 31   | 19,774 | 19.5  | 7,500  | 25,000 |

**Table 22:** Reported egg prices (Lao Kip)

| Egg Type              | Price | Obs. | Mean  | SD. % | Min. | Max.  |
|-----------------------|-------|------|-------|-------|------|-------|
| Small Chicken<br>Eggs | Usual | 327  | 932   | 11.3  | 400  | 1,200 |
|                       | High  | 327  | 948   | 11.5  | 500  | 1,500 |
|                       | Low   | 326  | 928   | 11.6  | 350  | 1,200 |
| Large Chicken<br>Eggs | Usual | 269  | 1,007 | 14.3  | 500  | 1,500 |
|                       | High  | 268  | 1,028 | 14.1  | 550  | 1,500 |
|                       | Low   | 268  | 999   | 14.8  | 600  | 1,500 |
| Small Duck Eggs       | Usual | 125  | 1,105 | 14.1  | 550  | 1,500 |
|                       | High  | 124  | 1,140 | 12.3  | 600  | 1,500 |
|                       | Low   | 124  | 1,104 | 14.1  | 550  | 1,500 |
| Large Duck Eggs       | Usual | 121  | 1,256 | 14.8  | 600  | 2,000 |
|                       | High  | 120  | 1,286 | 13.2  | 600  | 2,000 |
|                       | Low   | 120  | 1,241 | 15.5  | 600  | 2,000 |

**Table 23:** Reported price determinants for different meat types

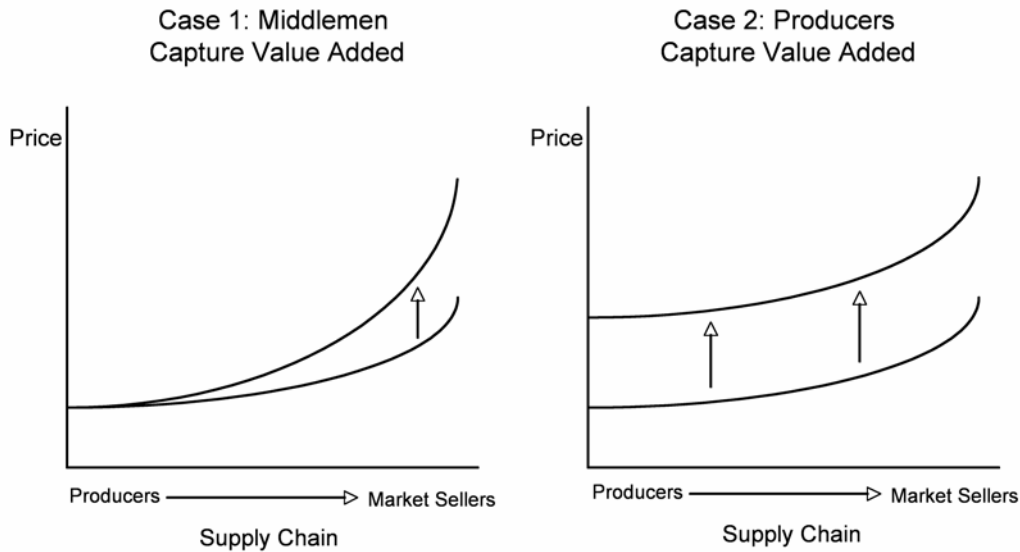
| Determinant | Buffalo |    | Cattle |    | Pig  |    | Poultry |    |
|-------------|---------|----|--------|----|------|----|---------|----|
|             | Obs.    | %  | Obs.   | %  | Obs. | %  | Obs.    | %  |
| Province    | 3       | 4  | 53     | 15 | 54   | 12 | 20      | 16 |
| Freshness   | 66      | 88 | 321    | 93 | 408  | 90 | 72      | 56 |
| Home Raised | 6       | 8  | 44     | 13 | 51   | 11 | 27      | 21 |
| Animal Age  | 2       | 3  | 30     | 9  | 47   | 10 | 31      | 24 |

## 5. Discussion

Vientiane urban consumers report very little price variation in the livestock products that they frequently purchase. This trend occurs across products and animal types. These results are likely to indicate that there is very little perceived product variation in the market. This is due to the fact that within the context of this market there is no reliable way to ascertain information regarding product quality. This inability of consumers to discern quality results in adverse selection for the quality of goods that smallholders choose to produce because they will not receive higher returns for investment in higher quality animals resulting in a vicious circle acting against product quality improvement.

The correction of this market failure could lead to significant welfare gains for various individuals in the market. Ideally this would largely benefit rural smallholders, encouraging reinvestment in higher product quality and improving their livelihoods. However, in order to overcome the market failure and meet these goals there are two primary challenges that must be overcome.

First, the information regarding quality must be reliable. If the information is inconsistent or comes from a source that is not perceived by the consumers to be trustworthy, no change will occur in buyers' willingness to pay for reported quality. The second challenge is to facilitate the ability of smallholders to capture the returns generated from improving the quality of their goods. This is difficult because middlemen are highly integrated into the supply chain, with smallholders unable to bypass them due to poor infrastructure and high transportation costs. It would also be difficult for producers to bypass well established middlemen because these individuals are participants in the urban sector of the market, which is likely to give them more influence with individuals responsible for policy implementation. This problem is illustrated by Figure 8.

**Figure 8:** Value added along supply chain

If a certification program was implemented in which government officials certified animals based solely on a veterinary check once the animals reached the urban areas, for example, all the benefits of quality would be captured by the middlemen and market sellers. As can be seen in case 1 this increases the slope of the value added as a high quality product moves along the supply chain; while the producers, who are removed spatially, socially and economically, will continue to be isolated from the possible gains. However, using the correct policy or combination of policies it may be possible to instead shift up the intercept of this figure, allowing the value added to products of superior quality to be conferred to the rural producers rather than intermediary actors.

### Policy Implications

There are potential policies that could facilitate the correction of the informational market failure, as well as transfer the benefits of correction preferentially to the rural smallholders. The first one is a branding or certification program which would indicate that certain quality standards have been met. In this case, for smallholders to benefit, the branding or certification must occur at the production point in the supply chain and certify that the smallholder is investing in measures that increase the quality of the product, such as vaccinations to ensure safety. This method can take the form of government sponsored certification or a privately funded branding/certification scheme. The privately funded approach is preferable because it can facilitate higher returns for quality products, and yet is funded by the premium that consumers are willing to pay for higher quality products rather than from government funds, and as a result is likely to be more sustainable. This is possible in a market where there is heterogeneous consumer demand due to varying preferences and income levels. For this policy to effectively overcome the incomplete

information market failure the method of branding must be reliable and tamper-resistant to ensure that the legitimacy of the information is trusted by consumers. The potential flaw in this policy is the fact that smallholders in Laos are often very removed from the markets due to spatial distance as well as poor infrastructure access. Thus, the implementation of reliable standards and certification systems at the producer point in the supply chain is likely to be a very costly project for those livestock types that are transported over long distances - buffalo, cattle and pigs.

A second policy option available is micro-contracting. In this case producers would enter into contracts with market sellers down the supply chain in order to produce a specific quantity of livestock that meet certain quality standards. This type of market interaction would give market sellers access to information regarding the quality of their product and control over the quality that they are willing to sell. When these interactions are made formal it is possible for producers to build reputations for quality with the market sellers, and market sellers in turn will have the opportunity to build reputations with urban consumers. This type of institution, where sellers and producers have established a private market solution, already exists in an unregulated fashion within the Lao textile industry. Northern rural communities produce silk textiles which are used for traditional dresses and there is a great diversity of quality in textiles with most of the high quality silks being sold in the urban markets. In order to facilitate market efficiency producers from a village will send one individual into the urban market to sell the textiles to a known market seller. She will then take the money from that sale and immediately buy more supplies to produce the textiles that are requested by the vendor. These contracts are informal, and formed through repeated interaction between producers and sellers. While this system is easy to establish because the quality of the product is very easily determined by producers, vendors, and consumers; it should be possible to establish a similar system for livestock using micro-contracting, especially if it were paired with a branding/certification program to provide visual confirmation of quality as well.

## **6. Conclusions and Extensions**

As the basic structure of the Vientiane livestock market has been assessed, and as the presence of market failures due to low price and perceived product variation has become apparent, further steps must be taken in order to determine the feasibility of implementing certification and/or micro-contracting policy options. It is important to determine if there is a high enough demand for improved quality animal products to enable private financing of a certification or branding scheme.

There is observed heterogeneity across incomes of Vientiane consumers and it is necessary to determine the willingness to pay for improved product quality. This will allow for the projection of income increase potential available to producers that are willing to invest in assets and technologies which will allow them to improve their product quality. If the potential for increasing producer income exists in the demand side of the market, methods to help implement private branding programs and encourage market participants to enter into micro-contracting should be investigated by a partnership of aid organizations and government ministries. This would be effective in alleviating poverty in rural poor populations in a way that would act to correct market failures and make information available that could have positive externalities on the government's ability to monitor food safety and improve public health.

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## 8. Disclaimer and Contacts

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