ASSESSMENT OF SMALL-SCALE NATIVE PIG PRODUCTION IN SELECTED VILLAGES IN SALAVAN DISTRICT, SALAVAN PROVINCE, LAO PDR

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ABSTRACT

This study assessed the small-scale Moo Lat native pig production in selected villages in Salavan district, Salavan province, Lao PDR. The results of this study reveal that the respondents' primary reason for raising native pigs is for additional income. Their most predominant systems of native pig raising are free-range and sheltering under a tree. In terms of feed provision, they commonly used by-product feeds. The study recommends that the farmers be included in capacity-building and technology transfer programs, conducting farmers' needs assessment, and improving the marketing system. In conclusion, most pig raisers do not practice proper pig management because they do not follow the standard vaccination, vitamin supplementation, pen cleaning, pig bathing, deworming, pen disinfection, iron injection, umbilical cord cutting, tail docking, teeth cutting and male castration. Their pigs' common diseases are Clasical Swine Fever (CSF), Foot and Mouth Disease (FMD) and parasite infestation.

Key words: Moo Lat Native Pig, production performance, production system, physical characteristics, body measurements

INTRODUCTION

Livestock raising is socio-economically and culturally important. It is a source of livelihood and provides food and nutrition. Next to chicken, pork is the second most-consumed meat, with an estimated 12 kg per capita per year; while total meat consumption per capita per year is 55 kg (Department of Livestock and Fisheries, 2015).

Pig production is the most significant part of smallholder livestock management in Lao PDR. Farmers raise pigs using three main rearing systems, namely: free scavenging, confinement in a small area with simple shelter provided, and penning. The traditional pig management practice is based on free-range grazing of harvested or fallow lands. Women traditionally manage the pigs. They spend time and labor each day collecting and preparing feed for their pigs. Pigs are directly provided with mixed feeds (rice bran, broken rice, crushed maize and soya, dried and crushed cassava, dried acacia leaves, and others), kitchen waste, or left-over food (Phengsavanh *et al*., 2010).

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This study analyzed the system and assessed the performance of small-scale native pig production to identify management practices and to improve socioeconomic factors that contribute to native pig production in the selected villages in Salavan district, Salavan province, Lao PDR.

MATERIALS AND METHODS

All procedures were approved by the Institutional Animal Care and Use Committee (IACUC). The study covered only one province in Lao PDR (Salavan province). This province was selected because of its familiarity with pig production as depicted in it having the highest pig production in the country. Four villages in Naxaynoy township, namely: Naxaynoy, Naxaynhai, Donkhao, and Learnsamphanh, were used as sampling sites for the survey. The number of respondents from the four villages was computed using Slovin's formula. According to Tejada and Punzalan (2012), Slovin's formula calculates the sample size (n) in a given population size (N), and a margin of error (e) as follows:

$$n = \frac{N}{1 + Ne^2}$$

Where n = Sample
N = Total number of households with native pigs in the four villages
e = Margin of error set at 0.05 or 95% confidence level

From the four villages, a total of 173 respondents were interviewed using the survey questionnaire in the data on socio-economic characteristics of small-scale native pig farmers (Table 1). The data gathered on this aspect included the following: general information such as marital status, age, sex size of household, occupation, and land use. The socio-demographic characteristics of the pig raisers included education, income, and outcome of family and some information about housing and living conditions; source of knowledge, and communication channels of pig raisers.

The Microsoft Excel Program 2017 (Microsoft Corp., USA) was used for data analyses and generating graphs and tables. The IBM SPSS Software ver 20 (Internatioanl Business Machines Corporation, USA) was used for descriptive statistics; frequencies were generated for qualitative variables; while sum, mean and standard deviation were computed for quantitative variables.

Table 1. Total numbers of households and samples from the randomly selected villages.

District	Township	Villages	Total Number of Households	Sample
Salavan	Naxaynoy	Naxaynoy	107	61
		Naxaynhai	88	50
		Donkhao	52	29
		Lernsamphanh	58	33
Total			305	173

RESULTS AND DISCUSSION

Almost all of the respondents belonged to the prime working age (25-54 years) and the majority of the respondents (78%) are males and the remaining (22%) are females. The majority of household members finished primary school. The respondents have an average of 6.32 household members. Their average household size is larger than the national average household size of 5.3 considering that the Salavan province-wide average is 5.8 (Population and Housing Census, 2015). Their household incomes are derived from livestock production such as pigs, chicken, cattle, duck and buffalo. The most common crops planted are cassava, rice, muskmelon, corn, and coconut. Some of their incomes are also from salary, from businesses like restaurants and grocery stores, income from being hired as laborers, and others. In all four villages, the respondents' two topmost expenses are on food and children's education and followed by other expenses like electricity, transportation, medical, and house repairs. The majority of the respondents have semi-permanent type of houses. All of them get their household and drinking water from a shallow well with a hand pump or well with a pump. Almost all of the respondents use electricity for lighting.

In 2018, 23 Moo Lat were added to the raisers' herd, 770 were sold, 196 were consumed, 256 died due to disease outbreak, and 23 were given to others for free. Currently, the 173 respondents have a total of 977 heads. Their use of mobile phones to obtain information on pig's market price is very limited and they do not use a megaphone or other media for announcements whenever they have a meeting. The majority of their knowledge on native pig raising is from their parents.

All of the respondents revealed that they do not do proper health management of their pigs such as vitamin supplementation, vaccination, cleaning of pens, bathing, deworming, and disinfecting their pigs. The main problems that they encounter in native pig raising are disease outbreaks, high mortality, low productivity, and lack of knowledge. They just bury their pigs when they died. For management methods of pigs' manure, most of the respondents use it as fertilizer for their crops. Similarly, Conlan *et al*. (2011) stated that both Classical Swine Fever (CSF) and Foot and Mouth Disease (FMD) are already endemic in Laos, and are characterized by periodic outbreaks. About 70% of losses in the village pig population are related to these diseases, and CSF is one of the most important pig diseases in the country.

Overall, to date, the respondents have an average of 16 years of pig raising experience. Most of the respondents (60%) raise their pigs in free-range system and a majority of pigs' raisers feed their native pigs with rice bran and followed by cassava, kitchen left-over, mixed feed from the local forest, banana stem, papaya and household discard. Their sources of feed are feed mills for the rice bran, farm refuse for the cassava root, muskmelon peel, banana stem, their household kitchen for the left-over feeds and the commercial feeds. All of them raise the Moo Lat breed and also all of their pigs practice natural mating. Keonouchanh *et al*. (2011) reported that breeding of Moo Lat native pig is also popularly practiced at present especially in upland areas of Lao PDR like Luangprabang, Oudomxay, and Xaysomboun provinces and this type is also raised in some lowland territories such as Salavan and Savannakhet provinces.

All of the respondents sell their pigs by estimating the pig's weight and ocular evaluation. They rarely use a weighing scale to determine the weight of the pig. The mean pig age preferred for selling is 6.23 months at an average body weight of 15.37 kg. Similarly,

Linden (2014) reported that the local marketing systems in developing countries are generally exploitative, collusive, and economically inefficient. Furthermore, the marketing of native pigs in Laos is similar to Bangladesh where the common areas of sellers are mostly in their homes and on the roadside. Additionally, farmers prefer to purchase piglets after weaning (Ritchil *et al*., 2013).

The majority of the respondents (82%) stated that the first mating of gilts is at the age of 7 months and a few of them (18%) stated that the first service of gilts is at 9 months old (Table 2). The majority of the respondents (90%) stated that their boars have earlier first mating service than their gilts at 7 months old. A few of them (10%) observed that their boar's first mating service was at the age of 9 months

As regards to the timeline of the sow's gestation period, half of the respondents (50%) observed that the Moo Lat sow's pregnancy period is at 114 days. Some of them (32%) stated that their sows have a 110-day gestation period and some others (18%) observed that it is at 120 days. Most of the respondents (78%) observed that their sows' first farrowing was at the age of 10-11 months. Some of them (22%) observed their sow's first parturition was at the age of 12-13 months. On litter size of Moo Lat sows, the majority of the respondents (88%) stated that their sows provided 7-10 piglets, a few (9%) said their sow give birth to 4-6 piglets and a few others (3%) their sow give birth to11-13 piglets. The average birth weight of the native pigs in the study sites is 0.70 kg. With regards to the weaning period of piglets, most of the respondents (68%) observed it to be at 90 days, some of them (31%) observed their piglets weaned at the age of 75 days and a few others (1%) said that their piglets weaned at 60 days. The average body weight of the piglets after weaning is 6.98 kg. Similarly, Keonouchanh *et al*. (2011) reported that the age of the first estrus is between 189-586 days (356 days) with 39 kg of body weight. The weight of mature sows is about 47-61 kg, and the youngest age of first farrowing is around 1 year. Depending on management systems, sows have 1.5 to 1.8 litters per year and 7 to 8 piglets per litter. Usually, the weaning period of piglets is 60 to 90 days with an average of 9.5 kg. Mature males of this type have also lower body weight (25 kg) than females and the maximum body weight of boars can reach 30 to 50 kg (Keonouchanh *et al*., 2011).

Based on the results of the study, the following strategies to enhance small-scale native pig production are recommended: the Agricultural Extension Workers and the Local officials in the four villages should initiate capacity-building of village organizations and managements. They should also conduct pig raisers activities on management methods such as providing housing to confine pigs and disinfection of pen, breeds and breeding, feeds and feeding and proper health management.

The present study initiated the characterization of the Moo Lat native pig. If furthermore studies can be done, other native pig breeds in Lao PDR can be characterized and evaluated. Native pig nucleus breeding farms may be established to conserve at the same time improve the genetic material. Pure and improved native pig breeds developed should consider market demands and farmers' needs. Through these nucleus breeding farms, the supply of quality native pig breeders can be done in the community. The government, private sectors, and NGOs should synergize to promote strategies of farmers on proper reproductive strategies of the sow to increase the growth performance of piglets and minimize mortality.

The government, private sectors, and NGOs should work together to develop a marketing strategy by establishing and facilitating medium enterprises to approach farmers in the villages. This will upgrade the quality of products to the international markets and

Table 2. Production performance of boars and sows.

Parameters	Naxaynoy (n=61)	Naxaynhai (n=50)	Donkhao (n=29)	Lernsamphanh (n=33)	Overall (n=173)
Gilt's first mating					
7 months	55 (90%)	41 (82%)	22 (76%)	24 (73%)	142 (82%)
9 months	6 (10%)	9 (18%)	7 (24%)	9 (27%)	31 (18%)
Boar start at first service					
7 months	50 (82%)	45 (90%)	28 (97%)	32 (97%)	155 (90%)
9 months	11 (18%)	5 (10%)	1 (3%)	1 (3%)	18 (10%)
Gestation period					
110 days	27 (44%)	12 (24%)	6 (21%)	10 (30%)	55 (32%)
114 days	31 (51%)	24 (48%)	16 (55%)	15 (45%)	86 (50%)
120 days	3 (5%)	14 (28%)	7 (24%)	8 (24%)	32 (18%)
First farrowing					
10-11 mos.	60 (98%)	38 (76%)	15 (52%)	22 (67%)	135 (78%)
12-13 mos.	1 (2%)	12 (24%)	14 (48%)	11 (33%)	38 (22%)
Piglets/litter size					
4-6 hds.	5 (8%)	3 (6%)	4 (14%)	3 (9%)	15 (9%)
7-10 hds.	55 (90%)	47 (94%)	23 (79%)	28 (85%)	153 (88%)
11-13 hds.	1 (2%)		2 (7%)	2 (6%)	5 (3%)
B**irth weight**					
Mean, kg	0.76	0.68	0.69	0.67	0.70
Weaning Period					
60 days				1 (3%)	1 (1%)
75 days	28 (46%)	18 (36%)	5 (17%)	3 (9%)	54 (31%)
90 days	33 (54%)	32 (64%)	24 (83%)	29 (88%)	118 (68%)
Weaning weight of pigs					
Mean, kg	6.43	6.70	7.37	7.41	6.98

establish farmers' access to the market. Middlemen can be avoided by establishing direct business relations with retailers that will strengthen small-scale farmers. The agricultural extension workers should collaborate with the farmers to guide them on pig raising practices such as record keeping of the pig production to maintain growth performance and proper feed formulations to their pigs.

The respondents are middle-aged adults and dominantly males, married, and have basic education, large households, and a balanced number of working and economically-dependent household members. They are primarily crop farmers and secondarily livestock raisers; thus, pig raising is a source of additional income. They are poor but they possess land and animal resources that support their living.

They have grown old with pig raising experience, but their native pig production system (pig growing practices, breeding management, health and sanitation management, and marketing) remains traditional due to a lack of communication channels, training opportunities, and proper market linkage. They, therefore, need help and should be heeded and assisted by the MAF, especially the Livestock Department of the DAFO.

The strategies recommended are a reflection of the pig raisers' willingness to cooperate for the improvement of their native pig production system. The recommendations they put forward are technical and thus need the assistance of experts in livestock raising.

The Veterinary Division of Laos and also private sectors must conduct comprehensive researches on this matter and must initiate animal vaccination (especially on CSF and FMD). Native pig production should be given more attention by both of government (agricultural extension workers) and private sector by providing designated technical staff to work with the farmers in the target villages and introduce farmers to the importance of utilizing and direct feeding by-products like rice bran and copra cake combined with cooked vegetables and root crops.

The Agricultural Extension Workers should train the pig raisers on record keeping. Training programs for them should be conducted by the government with the pig farmers, particularly on health management and bio-security measures with the main target of increasing efficiency, not only production and health, but also the economic viability, and enhancing capacity and knowledge of the farmers.

ACKNOWLEDGMENT

The corresponding author is deeply thankful to the SEAMEO-SEARCA for the scholarship grant and to the Savannakhet University of Lao PDR for allowing him to take a master's degree at UPLB. He is likewise thankful to the PAFO and DAFO of Salavan province for allowing him to conduct data gathering for his research. He also would like to thank his adviser, advisory committee members, professors, and friends at UPLB.

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