



Working with Ethnic Group: A Case Study of Introducing Pig Fattening to Garay Ethnicity in Ouyadav District, Ratanakiri Province

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Abstract Ratanakiri is remotely located in northeast of Cambodia about 600 km from Phnom Penh. Pig production of Garay ethnicity was challenged with poor feeding and high risk of mortality. The study aimed to compare the effect of feed supplement, estimate the economic efficiency, and study the adoption of target group to the demonstrated experiment pig fattening. A group discussion was launched to select 5 volunteer farmers from each village who met the criteria. The chosen farmers were trained on pig fattening process. Each of them had been subsidized two piglets; hand in hand pen construction, and feed supplements for 4 months. Some information was informally interviewed to understand the current feeding and management; and determine the suitable interventions. Farmers were then randomly allocated into two treatments, viz. T0 (Control group – free range feeding) and T1 (Supplement group – 40% concentrates, 30% rice bran, 30% cassava chip). The growth rate was recorded every 2 weeks for 4 months. After a 7-month period, all adopted farmers were interviewed by using questionnaire for impact study. The results have shown significant 3-fold improvement in daily average weight gain of improved diet group although the economic efficiency of the two groups did not differ. After seven months of interventions on the ground, some changes were observed. For example, 80% of the selected farmers kept pigs in pens regularly and started to utilize local available feeds. Thirty percent was willing to buy commercial feeds. All management tasks were done 50%, 40%, 10% by wives, husbands, and children, respectively. Vaccination was not totally implemented by them. We concluded that our interventions have changed some behaviors of focused farmers and neighbors on the production in terms of management practices and feeding for pig fattening. More feeding options need to be assessed for better economic efficiencies.

Keywords fattening pig production, productivity, intervention, Garay ethnicity

INTRODUCTION

Ratanakiri province is located in the northeast of Cambodia. It borders with Laos PDR to the west and Vietnam to the east. The province is located about 600 km from Phnom Penh and the average annual temperature is in the range of 26-31 °C. Ethnic Group was the main target of the study; there is Garay ethnicity contributing totally 98% of population in Ka Te and Samkaninh villages of Lumchor and Soam Thom communities, respectively belonging to Ouyadav district selected as studied area. The main jobs of villagers are cassava and rice cropping, animal husbandry (more

noted as local breeds), as well as forestry such as hunter and labor work (RPDA, 2010). In Cambodia, pig raising is one of the sources of income for farmers through selling of pigs, pork, and processed pork, which are good sources of protein (Sorn, 2011). 92.81% of Pig production was conducted by smallholder in 2010 and this percentage decreased to 84.87% in 2013 due to rising of disease outbreak and low profit when selling to the market (DAHP, 2013). In general, small scale animal production depends on locally available feed resources such as rice bran, broken rice, sugar cane tops, sweet potato vines, cassava roots, and kitchen waste; while commercial feeds are rarely used due to high cost. The proportion of commercial feed used is about 20 % of pig smallholder, while the remaining 80 % depends on mainly crop residues and farm by-products, which are often poor quality and low nutritional value (Khieu et al., 1996). Biosecurity is defined as the implementation of creation the barrier to prevent most contamination and infection by segregation, cleaning, and disinfectant; the practices depend on production system concerned, the local geographic and socio-economic (FAO & OIE, 2010). However in Ratanakiri, the pigs of the ethnic group are freely raised, challenging poor feeding, no deworming and vaccination programs; resulting to high risk of diseases and mortality. In addition, due to land converting from forestry-covered to agro-industry land such as rubber farm, cassava, and so on; less scavenging areas are available. This leads farmers to hesitate to increase number of pigs, or even continue their raising. The introduction of pig fattening by concentrating diet supplemented to local basal diet, and proper management and bio-security (pig housing, deworming, and vaccination) by farmers would be a solution to overcome the constraints; while pig production performance and farmers' income would be improved. The farmtrials in this paper employ hypothesis testing and lessonlearn methods to study the adoption of new techniques of participating famers and neighboring ones.

OBJECTIVES

The study aimed to compare the effect of feed supplements, estimate the economic efficiency, and study the adoption of the target ethnic group to new techniques of the demonstrated experiment of pig fattening.

METHODOLOGY

There are 2 steps in this study: the first is to select the focused group and set up a trial of pig fattening, and the second is evaluation of farmer adoption.

Farmer Selection

Ka Te and Samkaninh villages were selected as the studied areas based on the ethnic resident that is 98% of Garay group. The discussions were conducted with local authority about farmers' situation in the selected villages. Farmer meetings were set up to introduce the project purposes and activities in each village. The selection of volunteer farmers to join the project was done during the meetings. Then, all willing farmers' houses were visited to observe their resources. The criteria of selecting the farmers were as follows: be ethnic group, willing to work, have available labors and house-area for constructing the pig pen, and grow some vegetables for the pigs. The household heads that were women, widows, and disable people were also encouraged to participate. After all criteria were met, the selected farmers were trained on fattening pig production, breed and breed selection, feed and feeding, housing, and bio-security.

Experimental Design

The selected farmers were assigned into 2 treatments as shown in Table 2, with five replications (farmers), and two piglets were distributed to each farmer. The two treatments were: T0: control group by supplementing rice bran and T1: supplement group: supplementing concentrates at 40% with cassava chip 30%, and rice bran 30%, mixed with farmer's basal diet.

Table 1 Feed supplementation

| Group | T0 (Control) | | T1 (Supplement) | |
|---------------------------------|--------------|---------|-----------------|---------|
| | Jul-Aug | Sep-Oct | Jul-Aug | Sep-Oct |
| Duration | | | | |
| Quantity for 2 piglets (kg/day) | 0.4 | 0.5 | 0.8 | 1.0 |
| Piglets (heads) | 10 | | 10 | |
| Crude Protein (%) | 9.5 % | | 20.5 % | |

Piglet Housing and Distribution

After completed the training course, pig pens were constructed by full participation from farmers to improve their understanding about pig pen. The method was learning by doing as they had no experience to construct the pen before. The pen size was 2 meters in width and 3.5 meters in length with concrete floor, iron sheet roof, and wooden barred to protect the piglets out. Twenty local breed piglets of three months old were bought from nearby villages, and then they were randomly distributed to volunteer farmers. The initial piglet-weight in both groups was non-significant as: T0 was 6.39 ± 0.38 kg and T1 was 6.41 ± 0.36 kg.

Feed and Feeding for Pig Fattening

Concentrate feed was used as a part of supplement diet to show farmers how much feed rich-protein could improve the growth performance of their pigs. The basal diet of both groups was based on locally available feed resources such as taro stem, banana stalk, sweet potato vines, pumpkin, papaya and vegetables. Feeds for supplement of both groups were packed for 1-time feeding to be mixed with basal diet.

Management and Bio-security

In order to introduce the farmers, some parts of bio-security were implemented; the pens were disinfectant by applying commercial calcium bicarbonate, cleaned by boiled water 100°C after 1-day period, and piglets were kept in individual pens with drinking nipples. All the pigs were vaccinated against hog cholera disease, treated with an anti-parasitic drug (Ivomic given by injection) at the first week of keeping and beyond after one month next. Pigs were fed 2-3 times per day depending on available time of the farmers.

Table 2 Vaccination

| Date | Piglet Age | Vaccine name | Disease | Usage |
|------------|------------|--------------|-------------|------------------|
| 27/07/2013 | 3 months | Pest Porcine | Hog Cholera | Muscle injection |
| 27/08/2013 | 4 months | Pest Porcine | Hog Cholera | Muscle injection |

Data Collection and Analysis

The piglets were weighed every two weeks in the morning before feeding. Feed supplementary and feed refusals were daily recorded. All data were recorded using Microsoft Office excel 2010. The study of farmers' adoption was conducted by questionnaire 3 months after the experiment finished. In every 2 weeks, growth performance deviation was analyzed by using Independent Sample T-test Statistics of SPSS version 18. The adoption data from the questionnaire was analyzed by Microsoft Excel to calculate the descriptive statistics and to design graphic.

Chemical Analysis

Samples of feed supplement—concentrated feed, rice bran, cassava chips, were collected from the area of study and analyzed for Dry matter (DM) and Nitrogen (N), according to Undersander et al. (1993) and AOAC (1990), respectively.

RESULTS AND DISCUSSION

Table 3 Average daily gain of pig (Gram/day/head)

| No. | Group | N | Mean | Std. Deviation | P. value |
|-----|------------|----|--------|----------------|----------|
| 1 | Control | 10 | 86.25 | 16.36 | 0.00 |
| 2 | Supplement | 10 | 277.59 | 26.05 | |

The supplementation group had higher daily weight gain than control group, piglets in supplementation group had ADG at 277.59 ± 26.05 gram per day ($P < 0.001$) as shown in Table 3. Comparing to the study of Phengsavanh et al. (2013), as providing the concentrated feed containing CP 20 % on Growing Local Breed gave an average daily gain at 263.5 gram/day. Yin (2008) showed that cross breed of local and exotic breed fed by normal food of famers (rice bran and kitchen waste), provides growth performance at 82.00 ± 9.36 gram/day; and another group supplemented commercial concentrated feed 15% of live body weight (LBW) provided up to 313.00 ± 18.00 gram/day.

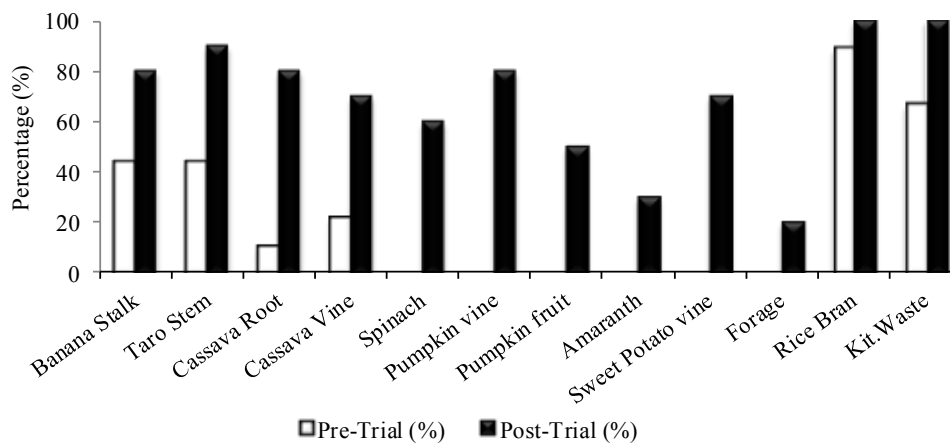


Fig. 1 Feed used as Pig's food pre-intervention and post-intervention

Before starting this study, the Garay ethnicity has raised their pigs by letting them freely scavenge with poor feeding. Pigs were fed irregularly depending on the convenience of owners. After 7 months of participatory with the study, the focused farmers have been utilizing some available local materials to feed their pigs such as banana stalk, taro stem, cassava root, cassava vine, spinach, pumpkin vine, pumpkin fruit, amaranth, sweet potato, and forages (Stylo 184), rice bran, kitchen waste, and other local vegetables as shown in Fig. 1.

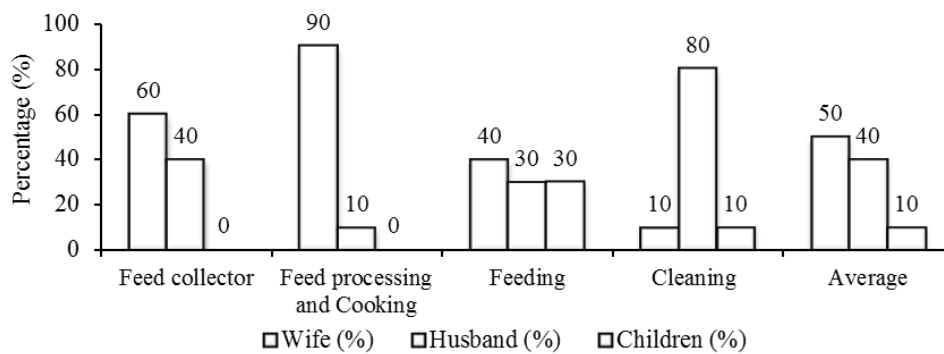


Fig. 2 Family participation in pig production

The Garay live traditionally, as men work on farm. All housework and taking care children are done by women. Normally, women are not allowed to make any decision. During the training, women were encouraged to work for pig fattening program and actively contact with the researchers to increase their social rights in terms of gender equality. Figure 2 shows that most of pig raising processes were done by women 50 %, men 40 %, and children 10 %.

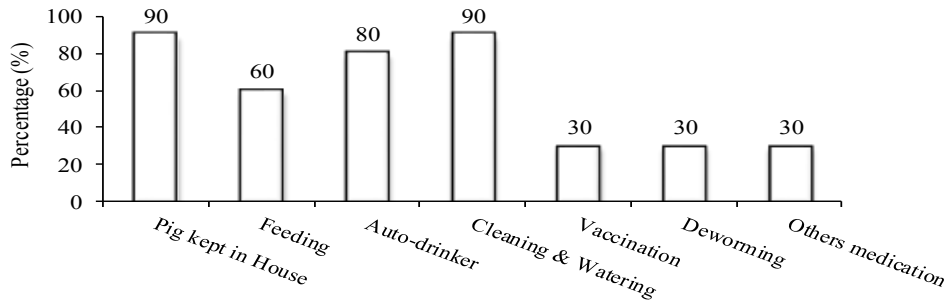


Fig. 3 Farmer adoption to component intervention

During the study, farmers kept their pigs in pens, and regularly fed 2-3 times a day. Two auto-drinking machines were broken by pig biting, whereas the rest 80 % could be used. Every morning, farmers cleaned the pens and pigs. These tasks were handled by children when the farmers were not available. Some farmer houses had a machine, which eased cleaning process. However, the vaccination and deworming process were complained by farmers, as it was expected to be done by a national program.

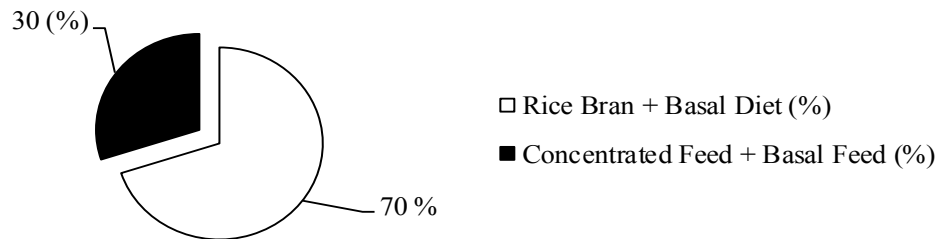


Fig. 4 Feed used during adoption study

The commercial feed is too expensive and the market is far from the village, causing farmers burdens to travel or buy as pig diet. As shown in Fig. 4., most of the farmers have used the rice bran mixed with vegetables, whereas there were three farmers who have bought the commercial feed for their pigs.

Estimated Economic Efficiency

The economic efficiency between two groups was not much different. For Group T1, supplementing by the concentrate feed was less economic than the result of using expensive commercial concentrate feed. The commercial feed was not recommended to use as pig food because feed conversion ratio (FCR) of local pig is a limitation.

CONCLUSION

The use of commercial feed supplement for pig production improved the growth performance but its expensive price caused non-economic production. On-farm experiment would help farmers to understand the real condition.

Table 4 Economic efficiency of control and supplement group

| Items | Unit | T0 (Control) | | | T1 (Supplement) | | |
|---------------------|-----------|------------------|--------|-------------|------------------|--------|-------------|
| | | Price/unit (USD) | Number | Price | Price/unit (USD) | Number | Price |
| Piglets | heads | 15.00 | 10 | 150 | 15 | 10 | 150 |
| Food | Kg | 0.23 | 500 | 112.5 | 0.54 | 1000 | 540 |
| Medication | per cycle | 0.50 | 10 | 5 | 0.5 | 10 | 5 |
| Housing | per cycle | 2.65 | 10 | 26.5 | 2.65 | 10 | 26.5 |
| Drinker | per cycle | 0.38 | 10 | 3.75 | 0.38 | 10 | 3.75 |
| Grand expense | USD | | | 297.75 | | | 725.25 |
| Gross Income | USD | 2.13 | 160.5 | 341.06 | 2.13 | 375 | 796.88 |
| Economic efficiency | (%) | | | 1.15 | | | 1.10 |

Knowledge that they gained could be more effective for making decision with consideration of process that was applicable for their areas. Some techniques and complicated process such as vaccination made farmers hesitate to follow; hence, they always thought the government would support it. Moreover, the information from this on-farm practice was rare to be done for smallholder farmers. Otherwise, further study should focus more on on-farm experiment with farmers, who have less understanding of how to involve their livestock production to new technology.

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