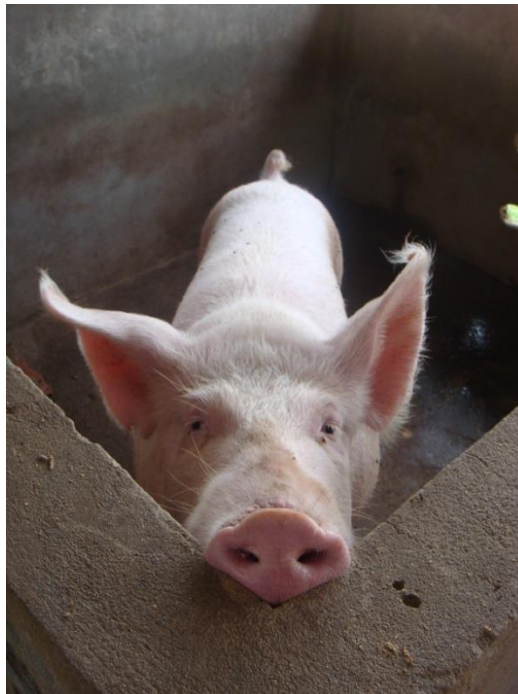


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Small scale pig production in Takeo province in a rural area of Cambodia

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Småskalig grisproduktion i Takeo provinsen på Kambodjas landsbygd

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Sammanfattning

Kambodja ligger i sydöstra Asien. Landet har tropiskt klimat med typiska monsunregn samt distinkta torr- och regnperioder. En stor del av Kambodjas befolkning är fattig och många av dem lever på landsbygden. Lantbrukarna odlar ris, samt föder upp grisar, nötkreatur och fjäderfä. Under en två månader lång fältstudie genomfördes en utvärdering av flera samverkande projekt som pågått sedan 2005. Projekten har genomförts av den lokala organisationen CelAgrid. Målet med fältstudien var att utvärdera dessa projekt vars syften var att med hjälp av en hållbar ekonomi höja lantbrukarnas årliga inkomst, att stärka människors tillgång till näringsriktiga och säkra livsmedel, att förbättra djurens hälsa samt utbilda lantbrukare i djurskötsel. När rapporten är skriven ska även en uppföljning genomföras; slutsatserna ska sammanfattas och ges ut på det lokala språket varigenom lantbrukarna får ta del av viktiga resultat och eventuell nyvunnen kunskap. Fältstudien genomfördes på landsbygden i Takeo provinsen. Totalt intervjuades 25 lantbrukare i fem olika byar kring frågor gällande den småskaliga grisproduktionen samt mer generella frågor rörande CelAgrids projekt. I byn Sras Takoun fick utvalda lantbrukare delta i en praktisk utvärdering. Den utfördes med hjälp av PRA- metoden (*Participatory Rural Appraisal*), även kallad deltagandemetoden. Resultaten visade att lantbrukarnas årliga inkomst hade ökat, och att deras tillgång på livsmedel hade förbättrats sedan projektet startade. Lantbrukarna hade också lärt sig mer kring djurskötsel, vilket hade medfört en delvis förbättrad djurhälsa. Sammanfattningsvis har CelAgrid nått sina mål med projektet, även om det fortfarande finns mycket kvar att göra på Kambodjas landsbygd.

Abstract

Cambodia, in Southeast Asia, has tropical monsoonal climate with distinct dry and rain seasons. Many people are poor and live in rural areas. Farmers mainly culture rice, and raise pigs, cattle and poultry as well. During two months, a minor field study was performed in Cambodia. The main purpose was to evaluate the impact of contributions done by projects that started in 2005 and were managed by the local organization CelAgrid. The project's main objectives were improving animal health, educating people in animal management, improving food security and enhancing families' annual incomes through sustainable economy. Small scale pig production was part of the field study as well. Another purpose of the present study was to convey newly found knowledge and vital point of views back to farmers participating. After this report is done, a compilation will be given back in their local language. During the practical part of the minor field study, 25 farmers were interviewed in five different villages in Takeo province. In one village, Sras Takoun, some farmers participated in a practical evaluation, by the use of a Participatory Rural Appraisal (PRA-) method. According to results found, annual income had increased and the food security had stabilized since the project started. Farmers learned about animal management; resulting in somewhat improved animal health. In conclusion, CelAgrid reached their purposes. However, there is still a lot to do in the rural areas of Cambodia.

Table of contents

Preface	4
Introduction	4
Small scale pig production	5
Animal production and health	6
Anti-poverty program in the rural areas	7
Ongoing development project	7
The participatory rural appraisal method	8
Material and Methods	9
Background information.....	9
Questionnaires and PRA-method.....	9
PRA-methods.....	10
Additionally research and follow-up.....	12
Results	12
Questionnaires, general questions.....	12
Questionnaires, focusing on pigs	13
PRA-method.....	14
<i>Village mapping</i>	14
<i>Farm mapping</i>	14
<i>Case studies</i>	14
<i>Timeline concerning pig production</i>	15
<i>Livelihood mapping</i>	15
<i>Timeline concerning disease related issues</i>	16
Discussion	17
Conclusions	22
Acknowledgements	22
References	23

Preface

In February 2011, two students left Sweden for a two month long Minor Field Study (MFS) in Cambodia. The main purpose with the study was to evaluate impact of contributions done by the project *"Integrated development approach toward sustainable food security and income of farming communities"* (Borin, 2009). From the beginning, that project was the only substratum for the study. After arriving, it proved to be many projects connected to the first. These projects were included in the study as well. The report focus on results and analysis from the field study, but also gives a general idea of small scale pig production in Cambodia. During the practical part of the MFS, farmers in Takeo province, Sanlong commune, were visited. Work was also performed at CelAgrid's office in Phnom Penh. Half of the work done in Cambodia is reported in this report; and the remaining part is presented in another report by Hanna Haglund.

Introduction

Cambodia is located in Southeast of Asia between Thailand, Laos and Vietnam. A tropical monsoonal climate dominates the country with distinct dry and rain seasons. The temperature varies between 21 and 35 degrees Celsius and air humidity is high (Nationalencyklopedin (NE), 2011). Phnom Penh is the capital of Cambodia, the population speaks mainly Khmer and most of them practice Buddhism (Cambodian Information Center (CIC), 2011). In the rural areas many are rice farmers raising cattle, pigs and poultry as well (NE, 2011). Additionally, fishing and vegetable cultivation are common pursuits. Health care has low standard and insurances are not common. There are many poor people in Cambodia. According to national poverty line, about 30 percent of the population was counted as poor in 2009 (The World Bank (TWB), 2011).

Centre for Livestock and Agriculture Development (CelAgrid) is a Cambodian, non-governmental organization who collaborates with several universities and institutes (CelAgrid, 2011). CelAgrid gets support from several donors, for example Academic for Educational Development (AED) and International Development for Research Cooperation (IDRC). Eight villages from Takeo province, Treang district, were chosen by CelAgrid's staff to participate in the project concerning *"sustainable food security and income of farming communities"* (Borin, 2009). In 2004, four of these villages formed community organizations and were offered contributions as piglets, supplies for building pig pens, biodigesters, seedlings and fingerlings from one associated project (Borin, 2007). Since then, participating farmers have "passed on gifts" to other families; in other villages as well. For the farmer, that gift passed on were two-four piglets or/and two heifers (Rom, 2011). In that way, CelAgrid's project spread.

During the field study, some of CelAgrid's project objectives were evaluated. Objectives evaluated were improving animal health, educating people in animal management, improving food security and enhancing families' annual income; especially in women headed families (Borin, 2005). According to World Health Organization (WHO, 2011), food security refers to *"when all people at all times have access to sufficient, safe, nutritious food to maintain a*

healthy and active life". According to CelAgrid, safe food is referring to when it is "*free from microbial, chemical and physical contamination during all stages of food production and handling*" (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011). One purpose with the field study was to examine what general impression farmers had concerning CelAgrid's project objectives. Therefore, both shortages and advantages were included in the field study evaluation and survey. After finishing the report, another purpose is to transfer newly found knowledge and vital point of views back to small scale farmers in Takeo province. Also, the study intends to contribute with information that could inspire and direct other similar projects in Asia.

Small scale pig production

Pig production is of great value in Asian countries (Steinfeld, 1998). They contribute to families' income and occasionally serve as a trustee bank (Sovann et. al., 2002). Small scale farming is the most common way of producing pigs in Cambodia. This type of production often means one or two pigs at the most. By-products from rice production, such as rice bran and broken rice, are used as feed. Therefore the rice production affects the small scale pig production substantially. Cambodian pigs are also fed with kitchen waste and if enough money, piglets are offered concentrate. Often, pigs in small scale productions grow slow as a consequence of deficient feeding. The amount of pigs in Cambodia is not sufficient and import from Vietnam and Thailand usually occur (Samkol, Pok. Staff from CelAgrid. Personal communication, 2011). Lack of knowledge concerning pig management and shortages in disease control are common features (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011).

There are few commercial pig production businesses in Cambodia (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011). Yu Tong and CP companies are two of them, located close to Phnom Penh (Saroeun et. al., 2007). They have high productivity and use superior equipment. Integrated farming systems are practiced a lot in Southeast Asia and Cambodia. Integrated farming systems represent livestock kept together, with fish or/and crops (Ramsay et.al., 1999). All three productions combined results in mutual benefits. For example, when using integrated farming system in Vietnam, farmers could achieve maximum advantages although resources were limited. Within integrated farming systems, resources are called inputs and outputs. For example, manure from pigs is called output. Manure later becomes an input when used in another system; as fertilizer for crops and nutrition for plankton in fishing ponds. In that way, manure produce more feed for the fishes.

According to another small scale pig production study, also done by CelAgrid, the most common way of keeping pigs is together with cattle and poultry (Saroeun et. al., 2007). Confinement systems are a common way of raising pigs in rural areas of Cambodia, but free-range systems also occur. The main purpose of pig farming was meat production. According to Saroeun et.al., (2007) it was common to use only local breeds such as Kandol, Hinam and Domrey in areas investigated by the study. However, crossbreeds did occur, particular close to Thailand border. Interviewed farmers realized that there are both advantages and disadvantages for keeping crossbreeds or not. Local breeds were comparative disease resistant, simpler to feed with local resources and had better reproduction (Saroeun et.al.,

2007). Furthermore they grew slow, were smaller and contained more body fat than crossbreeds. In the same study, farmers recognize that free-range systems included pigs finding their own feed, which also meant less money spent, and less need for care taking. Saroeun et.al. (2007) recognized a higher risk of parasite infections for free-range pigs; they grew slower and had an increased mortality. Farmers did not need anyone to take care of the pigs when keeping them in free-range systems and no cropping of plants was necessary. Saroeun et.al. (2007) reported that free-range pigs sometimes found their own natural feed such as earth worm, water spinach, weeds and roots. Still, pigs were fed with by-products from rice production, kitchen waste and concentrate.

Depending on the resources available, pig production could be performed all year around (Saroeun et. al., 2007). Farmers interviewed by Saroeun et.al. (2007) noted diseases, lack of technique and low selling price as the most common problems within pig production. Due to that many farmers did not vaccinate their animals, animal health was affected negatively. Sometimes, the vaccine had expired and therefore was of bad quality as well. Farmers claimed that common diseases were Foot and Mouth Disease (FMD), diarrhea, Classical Swine Fever (CSF) or hog-cholera and parasites (Saroeun et.al., 2007).

Animal production and health

Department of Animal Production and Health are responsible for and works with animal welfare, vaccinations, severe disease outbreaks and illegal actions concerning animals (Peda, 2011). In 2013, a new law considering “Animal Production and Health” will be implemented, but first it has to be confirmed by the government, “*Cambodian people party*”. According to Peda (2011), the law is referred to as “*draft of animal production and health*” and will include all animals used for production, as well as subjects concerning animal nutrition and veterinary medicine. For the time being, there is a guideline for how to slaughter animals in Cambodia. This guideline is called “108” and declared by the ministry.

In Cambodia, there is a vaccination policy for animals used for production (Peda, 2011). The “*vaccination program*” is one of Department of Animal Production and Health’s responsibilities and vaccinations of the animals are available for all farmers free of charge. If vaccination is taking place in the village, farmers sometimes need to pay 0.1 US dollar for ice required for storage of the vaccine. The disease generally vaccinated for is CSF. Animals also need to be vaccinated against FMD, but there is not enough money for providing vaccine. Voluntary people, working for Department of Animal Production and Health, perform vaccinations and this could be a reason for farmers not believing in it. If the vaccination is not done properly, the outcome will be poor. If the vaccine is of too small amount, not stored correctly or is of bad quality, the results from vaccinating could be reduced. For Department of Animal Production and Health, lack of equipment and money are an obstacle. They need support from donating organizations to manage.

A “village vet” or “village animal health worker”, is a local resource, it could be a farmer, who receives one month of training (Peda, 2011). It includes basic information so that village vet can deworm, castrate and vaccinate animals in the village. The village animal health worker shall report to department in case of a disease outbreaks; that is if there are clinical

signs of animal infections. Every month the village animal health worker reports about the village situation to the district veterinarian, who reports to the province veterinarian, who finally reports to department veterinary. In Cambodia, a full veterinary education is six years.

In order to stop illegal actions concerning animals, department use “sanitary polices” (Peda, 2011). Sanitary polices are people from department who can arrest persons practicing illegal activities and breaking animal protection laws. Often, illegal activities concerns transportation or selling sick animals for slaughter, which can result in a penalty of 1000 US dollar. According to Peda at Department of Animal Production and Health (2011), it is difficult to change farmer’s attitude towards animal welfare. For example, the department works against transporting poultry and pigs on motorcycles. Sometimes when transported alive, chickens hang in their legs and pigs are loaded in cages. A middleman, who buys animals at the farm gate and sells them at the market or to a slaughterhouse, need to have a license for transporting animals. Some middlemen manage animals better than the farmer. Those middlemen purchase a lean animal, and after a few months of feeding, vaccinating and deworming it, the animal has grown. The middleman then sells the animal and gets a profit of about 100-150 US dollar. A middleman get less than 0.25 US dollar per kilogram live weight pig and 0.1-0.5 US dollar per kilogram live weight poultry. In cattle, condition of the animal counts, which means that both head and body size is measured.

Anti-poverty program in the rural areas

Agricultural development is important as the poverty problem is mainly located in rural areas (Bello, 2005). In Cambodia, productivity is still low. The low productivity is an effect of hostile weather conditions, deficient farm resources and government’s collectivization strategies. The Association of Southeast Asian Nations (ASEAN) is an organization with a total of ten member states with Cambodia as one of them (ASEAN¹, 2011). They work for economic growth, peace and social progress among others. In 1967, ASEAN was established and their aims and purposes are compiled in the “*ASEAN Declaration*” or the “*Bangkok Declaration*” (ASEAN², 2009). The ASEAN Cooperation in Food, Agriculture and Forestry is a strategic plan of action with seven main objectives of cooperation (ASEAN³, 2011). Two of the objectives are “*Strengthening food security in the region*” and “*Agricultural rural community and human resources development*”. ASEAN divided ten member states into three groups where Cambodia, together with Laos and Myanmar, belongs to the third (Bello, 2005). Because of the included countries non stabile economies, the third group needs extra attention. Problems concerning agriculture differ between low-income and high-income countries. Therefore the alignment is needed.

Ongoing development project

In 2004, a large project started by the non-governmental organization CelAgrid; with support from Heifer Project International, Food and Agriculture Organization (FAO), Mekong Basin Animal Research Network (MEKARN), Swedish International Development Cooperation Agency (SIDA) among others (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011). It started as a combination of many different projects, donators and organizations; all

with the purpose of accomplishing income stability and food security for farmer communities in Takeo province, Sanlong commune. According to the Telefood project report, that project started with 30 community members in four different villages; Sras Takoun, Louk, Ang Tapouk and Krom (Borin, 2007). The members were selected according to a number of criteria: women headed families, land resources available for crops and vegetables, agreeability to participate, willingness to adopt regenerated farming systems, leisure for learning activities, permanent abidance in the village and agreeability to share with others. Additionally, farmers selected often had no animals (Rom, 2011). Each member received two piglets (two females or one female and one male), material for one biodigester, material for building a pig pen, material for building a fish pond and fingerlings (Samkol, Pok. Staff from CelAgrid. Personal communication, 2011). Farmer Food Feed Field School (4FS) trained farmers every two weeks in alternative farming systems and how they should manage their animals correctly. For example, they educated farmers in pig feeding and management, vaccination and how to prohibit animal diseases. Healthy animals produce more, and as a consequence of that farmers could earn more money. The farmers had one obligation when attending the project, to pass forward four piglets to another family who also wanted to participate in the project (Rom, 2011). This had to be done before keeping piglets for selling or reproduction (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011). That system is called “pass on the gift” (POG) and was done in a similar way on the heifers and fingerlings as well, but with other quantities.

In another development project, Heifer International Project, each farmer in the same area received one cattle, one biodigester unit, vegetable seeds and seedlings (Borin, 2005). Through the Telefood project, self help groups and farmer organizations were established in the area as well (Borin, 2007). Members from participating villages selected a leader for their farmer organization. Every two weeks, staff from CelAgrid visited participating villages and provided them with more knowledge and help according to project activities. Also, demonstrations of how to build pig pens, digesters and fishponds as well as monitoring the activities were done by CelAgrid’s staff. After that, new participating families could learn from others. Leaders for a farmers association were selected and according to project plan at least 30 percent of the candidates had to be women. Saving groups were established in the villages, where group members agreed on an input between 500-1000 riel per month and a two percent interest rate. From that saving group, farmers could lend money with low interest rate (Rom, 2011). FAO in Cambodia were involved in Telefood project and contributed with money and knowledge (Borin, 2007).

The participatory rural appraisal method

The Participatory Rural Appraisal (PRA-) method is often practiced in small groups of local people (Chambers, 2007). Within the PRA-method, many different tools are used, including mapping, diagramming and scoring; with stones or other items. The method contains both visual and concrete statements and analysis. In order to get participants to understand something that is difficult or impossible to explain orally, both symbols and objects are used. A PRA-method includes tools for documenting activities, behaviors and people interactions on farm level. Participating people, farmers or others, help creating maps and diagrams

themselves. Maps are drawn on the ground or a paper, using sticks or pens. Maps often show resources of many kinds; such as feedstuff, food and water. Diagrams can be timelines or seasonal schemes, which can represent many parts concerning the participant's lives and society.

Material and Methods

Background information

This minor field study was performed during the end of dry season in rural areas of Cambodia. Five different villages in Takeo province, Sanlong commune, were visited (Sras Takoun, Krom, Louk, Ang Taphouk and Krang Thnort) during the practical part of the field study. Questionnaires and PRA-methods were used in order to evaluate overall impacts from the development project in communities. From the beginning, an evaluation was expected to be done according to one project only; "*Integrated Development Approach toward Sustainable Food Security and Income of Farming Communities*" (Borin, 2009). In the end, an evaluation based on other coordinated projects was included as well. Questions concerning pig, cattle and fish production as well as annual incomes, food security and other impacts from the project were investigated during the field study (Appendix 1). This was done in order to analyze if previous development projects had fulfilled their purposes or not. In questionnaires and during the PRA- method, following aspects were investigated:

- Agricultural production (cultivations, livestock keeping, feed etc.)
- Type of livestock now, 2011, and before the project, 2004 (cattle, pig, poultry, fish etc.)
- Impacts of project objectives (improvements, shortages etc.)
- Further needed improvements of this type of projects
- Economic consequences from evaluated project
- Consequences concerning quality of life for the people (food, money, work effort etc.)

Questionnaires and PRA-method

The practical part of the research started with visiting a village called Sras Takoun in Takeo province, Sanlong commune. This visit was done in order to get an idea of the situation concerning farming communities in Cambodia. Also, it was important to get to know more about the village and the project before completing the questionnaires later used. After visiting Sras Takoun, it was possible to prepare more properly composed questions.

The questionnaire was divided into four different parts; general questions concerning family situation and more specific questions focusing on cattle, pig and fish production (Appendix 1). In five different villages, interviews were done with help from two interpreters, Keo Sath and Huy Sokchea, (in Sras Takoun, Krom, Louk, Ang Taphouk and Krang Thnort). A total of 25 farmers participated during the interviews; one person each from five different families in five different villages. After that, compilation of the questionnaires were carried out.

Next step was to prepare and perform the PRA-method, by using answers from questionnaires, local staff and project information. The PRA-method was performed in one village, Sras Takoun, with people from ten different families or more. The PRA-team

consisted of me, Hanna Haglund (bachelor degree student), Keo Sath (interpreter, PhD student), Huy Sokchea (interpreter, MSc student) and people from about ten different families in Sras Takoun. A total of six PRA-methods were used. Materials applied were flip charts, colored pens and small stones.

PRA-methods

A village mapping was also performed. Some village members, together with one person from CelAgrid's local staff, copied an already existing village map done in a similar study (Appendix 2). There were some modifications in the group during the process, and therefore it is unclear how many farmers participated during this PRA-method. Case studies and farm mappings were done simultaneously. In the case studies, three people from three different families participated. Small scale interviews were performed with one farmer, one interpreter and two students participating in each session. According to the project, interviews concerned farmers' point of view and gave an opportunity for further discussions. With help from the interpreter, a farm map was drawn together with the farmer (Picture 1). Farmers visualized their own farm, before project started in 2004 and present time in 2011.



Picture 1. Farm mapping in Sras Takoun

During the fourth PRA-method, a timeline concerning pig production was done over the project period. It contained classifications for animals kept, reproduction, animals sold, diseases and animal feed (Picture 2). Ten persons from ten different families were participating during this PRA-method. Stones were placed on a scheme and village members valued from one to five what they thought about each objective before the project (2004), in present time (2011) and in future. One stone were classified as the lowest score and five stones as the highest.



Picture 2. Timeline concerning pig production over the project period in Sras Takoun

During the fifth PRA-method, a livelihood map where drawn (Picture 3). All resources in village where included (Table 3) and the participants were asked to vote for the suggestion that suited them most. They could choose between following estimations: “entirely from village”, “partly from village” and “from outside the village”. Recording to how the village members voted, a percentage was established for each resource. The percentage belonged to respective estimation and had a maximal sum of 100 percent. Two livelihood maps were done, one “before project started (2004)” and one “in present time (2011)”. Finally, another timeline concerning disease related issues were done. It included vaccination, deworming and disease outbreaks. It reached from project started in 2005 until present time in 2011. This was performed as a group discussion, including ten farmers and two interpreters. Interpreters draw the timeline according to what participants said. In conclusion, all information found from the PRA-method where compiled and analyzed together with questionnaires.



Picture 3. Livelihood mapping in Sras Takoun

Additionally research and follow-up

Pich Peda, vice chief of Animal Health Office at Cambodian Department of Animal Production and Health, was visited in order to get more information about Cambodian laws concerning animal production. After concluding analysis and project examination is done, a summary of the conclusions will be translated to Khmer and given to the farmers. In that way the PRA-method is completed; by giving something back to participating villages members.

Results

Questionnaires, general questions

A total of 24 families thought that number of livestock substantially had increased since CelAgrid's intervention in the village. Total number of increased pigs in all villages was 21 following the project. One family in Sras Takoun thought that number of livestock had declined. There were some difficulties estimating the difference in number of animals in 3 families out of 25, therefore some results are missing. One family had chosen "no increase/constant" number of pigs after the project. All families reported that price on livestock had increased or was the same as before project started.

Table 1 shows differences in annual income for 16 families before project started in 2004 and in present time in 2011. One riel (KHR) is worth 0.0016 Swedish kroner (SEK) (Forex Ticket, 2011). From before project started, the statistics are taken from CelAgrid's own project documentations. Due to different reasons, data from 9 families are missing. From before project started there are no economic statistics at all belonging to Krom village. In one family the annual income had a negative difference between before the project and in present time. This means that total of 15 families had a positive difference.

Table 1. Difference in annual income for families in four villages between year 2004 and 2011

Village name	Annual income, 2004 (riel)	Annual income, 2011 (riel)	Difference, annual income
Sras Takoun	500 000	3 400 000	2 900 000
Sras Takoun	1 500 000	4 350 000	2 850 000
Sras Takoun	704 000	10 680 000	9 976 000
Sras Takoun	1 800 000	6 000 000	4 200 000
Sras Takoun	1 970 000	3 790 000	1 820 000
Louk	4 100 000	6 660 000	2 560 000
Louk	3 300 000	3 200 000	-100 000
Louk	2 500 000	3 240 000	740 000
Louk	3 600 000	10 600 000	7 000 000
Louk	4 250 000	25 500 000	21 250 000
Ang Taphouk	2 500 000	4 080 000	1 580 000
Ang Taphouk	2 000 000	2 600 000	600 000
Ang Taphouk	3 000 000	7 900 000	4 900 000
Ang Taphouk	510 000	2 000 000	1 490 000
Krang Thnort	3 000 000	21 350 000	18 350 000
Krang Thnort	1 807 000	3 400 000	1 593 000

In table 2, majority of the families belongs to income classification “poor”. Therefore, more than half of 25 families participating in the evaluation can be classified as “poor” in the year of 2011. During this question, interpreter ticked for “poor”, “average” and “better-off” based on following: *“using available information from village chief, monthly income above and based data collector observation on type of house and asset, tick the category of interviewed farmer.”* In appendix 3, differences between “the beginnings of the project in 2005” compared to “year 2010” can be seen. Also, criteria for each classification (“poorest”, “poor”, “average” or “middle” and “better-off”) are explained.

Table 2. Number of families in each village divided into each income classification, 2011

Income classification	Sras Takoun	Krom	Ang Taphouk	Louk	Krang Thnort	Total number of families
Poor	3	3	3	3	2	14
Average	1	2	2	1	2	8
Better-off	1	-	-	1	1	3

A majority of the interviewed family members said that the total amount of protein rich food in human diet had increased since the beginning of CelAgrid’s projects. In present time, all families except for one had access to protein rich food all year around. Usually, the families buy pork and beef for food, but they also buy fish and eat their own slaughtered poultry. All families sell their animals to a slaughterhouse at farm gate and almost everyone sell their animals to a middleman. Poultry, fish and duck produced at the farm are slaughtered at the farm as well. According to more than half of the interviewed village members, less than half of animals produced at farm are consumed as meat by the family.

Questionnaires, focusing on pigs

A total of 15 families interviewed had pigs. The breed mostly used in the five visited villages was a crossbreed between Landrace and Yorkshire. No one keeps their own boar and offspring is usually sold or passed on as a gift to another family participating in the project (POG). Families usually use a pen with fence and shelter as housing system for their pigs. The feed typically consist of rice bran, water spinach and kitchen waste. Three quarters of the families raising pigs said that there was lack of suitable feed for their pigs during dry season and that they need to buy water spinach during dry season. Also, kitchen waste, bad quality rice and/or banana stem was used as feed for the pigs during dry season. Problems found concerning pig production are mostly diseases and/or lack of feed. Additionally, fluctuations of the selling price can be a problem according to some village members. The most common diseases are Blue Ear Disease (BED) or Porcine Reproductive and Respiratory Syndrome (PRRS), followed by diarrhea and FMD. Disease problems are countered with help from a veterinary or with no treatment at all.

PRA-method

Village Mapping

Noticed on the village map is that Sras Takoun is surrounded by rice fields (appendix 3). There is a primary school, a temple, a small canal, a petite mountain and a road close to village. According to the map, Sras Takoun lays next to Louk village. Two public ponds can be found on the map.

Farm mapping

After the project, all three families got, or were able to buy, several new things for their farm. Tes Tuys family got or bought one chicken house, one pig pen, one digester and one fish pond. Sok Malys family got or bought leuceana and mulberry trees, one cattle pen, one chicken pen, one digester and one fish pond. In Saroms family got or bought a banana tree field, one digester, one toilet, one earthworm house, one chicken pen, one fish pond, a larger pig pen and a water spinach field.

Case studies

Before the project started, fish was mainly consumed by all three families. Pork and beef were eaten as well, but only occasionally. Tuys family could eat protein rich food all year round before the project started. After the project, Saroms family can eat their home produced fish and do not need to buy as much meat as before. Therefore, they claim to have a higher intake of protein-rich food after the project.

According to Tes Tuy there are more problems with animal diseases now than before project started. He believes that the disease outbreak can be considered as a project failure. According to Tuy, although project provided the village with animal health workers they did not know how to treat the animals. During the disease outbreak, Sok maly sold all her piglets. Now she thinks better of the pigs from CelAgrid; they are healthier since they are vaccinated. In Sarom now knows how to vaccinate her pigs and find that there are better treatments available now than before CelAgrids project. Tes Tuy reports that although a veterinary service was provided by the project, those specific animal diseases (BED and FMD) made it more difficult to treat animals.

After the project, all three families have better income and use their money mostly for children's education. Families also use their money for buying protein rich food and feedstuff. Tes Tuy and Sok Maly sell their piglets and In Sarom sells both her piglets and fattening pigs. This gives In Sarom an additionally 4 000 000 riel per year, but in the future she would like to sell piglets only. Selling piglets only would be more profitable due to the amount of feed that fattening pigs require. Sok Maly gets a better profit since she is not using a middleman. Instead people who would like to raise piglets as fattening pigs can buy them directly from her. Both Tes Tuy and In Sarom use a middleman when selling their piglets, although Tes Tuy is aware of that it is less profitable. They find it easier since the middleman pick up all piglets at once from the village.

According to Tes Tuy and In Sarom, the major problem within pig production is animal diseases. Animal diseases are not a problem for Sok Maly and she believes that the reason is her annual vaccinations. She buys and injects the vaccine herself. Sok Maly believes that she can thank the project for her succeeded pig and cattle production. According to In Sarom, nothing has failed with the project. If improvements are to be made, she finds that one family’s attitude and commitment are important factors. In Sarom knows farmers involved in the project that had the wrong attitude and therefore did not succeed.

Tes Tuy and Sok Maly do not believe in artificial insemination (AI) and therefore they have never used it. Tes Tuy finds that piglets could be weak after birth when using AI. Sok Maly rather uses a boar in the village because according to her it is easier. In Sarom’s family has used AI once, but the number of piglets was lower than usually. No AI technician was available at that time, so In Sarom did it herself without knowing the technique. If a technician would be available, she would be positive regarding using AI. In the future, Sok Maly possibly could think of applying AI herself.

All three families are positive and interested in using new feedstuffs, such as silage from cassava leaves, for their animals, but for In Sarom’s family lack of labor is a problem. After the project, Tes Tuy has observed an improved animal growth because of new feedstuff introduced by the project. Since the project started, Sok Maly uses the manure from her pigs in the biodigester.

Timeline concerning pig production

Members from 10 families participated in the timeline method presented in figure 1. Total of points represents number of stones valued from one to five, where one is low and five is high. In all five classifications, “present” has a higher result than “before”. Summarized, there are considerably higher results for the project period “present” and “future”.

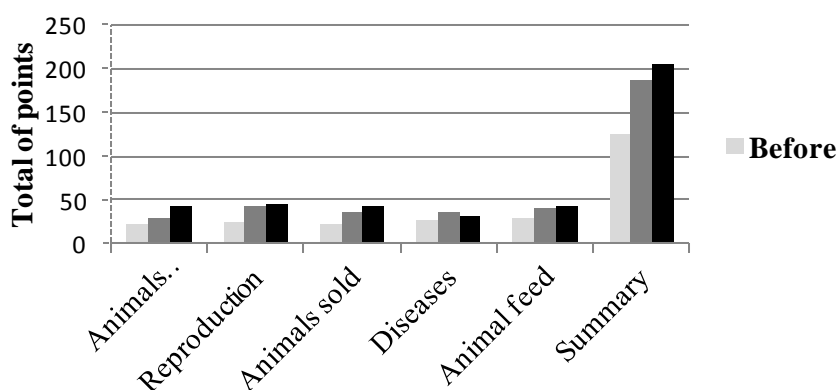


Figure 1. Timeline over pig production during the whole project period; before (2004), present (2011) and future.

Livelihood mapping

Table 3 shows results from 10 family members participating in a livelihood mapping. They show proportions in percent for each classification (entirely from village, partly from village

and from outside the village), both from before the project started and in present time. When comparing tables representing “before the project started” and “in present time”, changes can be observed for following farm resources: egg, vegetable, animal feed, water, food, biodigester and loan.

Table 3. Livelihood mapping with proportions in percent for each classification (entirely from village, partly from village and from outside the village, before the project started (2004) and in present time (2011)

Farm resources	Entirely from village (%) , before	Entirely from village (%) , after	Partly from village (%) , before	Partly from village (%) , after	From outside the village (%) , before	From outside the village (%) , after
Rice	60	60	40	40	0	0
Pork	0	0	0	0	100	100
Beef	0	0	0	0	100	100
Chicken	100	100	0	0	0	0
Egg	0	0	10	0	90	100
Vegetable	10	10	90	30	0	60
Animal feed	100	40	0	60	0	0
Water ¹⁾	100	0	0	100	0	0
Wood	100	40	0	60	0	0
Biodigester ²⁾	0	10	0	0	0	0
Loan	0	60	0	40	0	0
Natural fertilizer	100	100	0	0	0	0
Chemical fertilizer	0	0	0	0	100	100

1) One farmer invested in a water pump in present time

2) Only one family uses a biodigester in present time

Timeline concerning disease related issues

Disease related issues (vaccination, deworming and disease outbreak) were demonstrated for each year since the beginning of the project in 2004 until 2010. One vaccination against swine fever and salmonellosis were performed in September in the year of 2004. Only one farmer proceeded with the vaccination and deworming in the village. One deworming was performed in august in the year of 2004. Between the year of 2005 and 2010 same diseases occur; diarrhea and classic swine fever (or hog-cholera).

Discussion

In Cambodia, many people are poor and live in rural areas. Small scale pig production is of great importance in Cambodia and contributes a lot to families raising them (Steinfeld, 1998). Farmers participating in CelAgrids project were substantially poor before project started. They needed help to start a sustainable economic business and pigs given became one solution. CelAgrids project provided participating families with two pigs each and an opportunity to learn more about pig management (Borin, 2007). More pigs probably survived and could generate money when sold for meat or kept for reproduction. Thanks to the POG, project interventions spread to other families, without costing CelAgrid or the project more money. POG seems to be an effective way of broadcasting a sustainable project objective. Hopefully, this will inspire other organizations like CelAgrid to do the same. With small means, you can accomplish a lot.

In our study, some interesting results came up after compiling the questionnaires. Each family interviewed for general questions, except for one, thought that the number of livestock had increased since project started. That is positive results for the project. Total numbers of increased pigs in the villages were 21. Although some families did not succeed in pig production and in keeping them alive, many of them did. Unfortunately, some pigs became sick and died after project had started (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011). Furthermore, all families believed that price on livestock had increased or were the same as before project started, which also plays an important role for participating farmers. In that way, they could get maximum amount of money out of their pigs when selling them for meat. According to our study, all except for one family has got better annual income in present time compared to before the project started (Table 1). This means that CelAgrid's project has accomplished one of its main objectives; to improve family income. A positive difference in annual income was found in 15 families out of 25. Some data is missing from before the project started. However, there are a big variation between the highest and the lowest difference in annual income. Probably that is due to how one specific family handles the given resources, and how their family conditions vary. For example, if one family member is sick or disabled, that could be a reason for not being able to increase their annual income as much.

After the project, more than half of farmers interviewed still were classified as poor (Table 2). According to previous results, it is difficult to recognize if that is a failure or not. Even if their annual income increased, there are no data referring to if the same farmers were classified as "poorest" before the project started or not (Appendix 3). If they were, that would have been worse than "poor" and the result could be seen as successful. Evaluation of the income classification was done by our interpreters. This could be seen as a source of error if they did not evaluate the families exactly the same. The question probably should have been looked over and explained more before questionnaires were done in the villages. According to prior investigations, percentage representing the share for "poorest" and "poor" had decreased between 2005 and 2010 (Appendix 3). This can be seen as a positive outcome from CelAgrid's projects.

In our study, most families interviewed believed that total amount of protein rich food in human diet had increased since project started and that they had access to protein rich food during the whole year. This result is important and will contribute to participating families' health as well as food security. Therefore, another part of CelAgrid's project objectives was accomplished. The most common protein resource eaten by farmers interviewed seems to be bought pork and beef. On third place came bought fish and on fourth place their own slaughtered poultry. This could be a combination of tradition and what farmers prefer to eat. A majority of interviewed farmers claimed that only half of animals produced at the farm are consumed by themselves. This is an effect of Cambodia's laws concerning slaughtering of larger animals such as pigs and cattle (Borin, Khieu. Staff from CelAgrid. Personal communication, 2011). Farmers interviewed mostly buy pork and beef for dinner. One reason could be the climate; most likely there are less fish available during dry season which means pork and beef should be more common in average. When it is time for slaughter, all families participating in the project sell their animals at the farm gate. Most of them use a middleman when selling their animals. This seems to be the easiest way, but also means that farmers can earn less money. According to Peda, some middlemen make more money when buying a lean animal (2011). They manage it and then sell it for a higher price. Somehow, this seems unfair, but at the same time not.

During our field study, we noticed that pigs often were kept together with cattle and poultry. In another similar research, the same result was documented (Saroeun et.al., 2007). Such integrated farming systems seem to be common in rural areas of Cambodia. Usually, a crossbreed between Landrace and Yorkshire were used among farmers participating in our study. CelAgrid's project provided a Landrace x Yorkshire-breed, and therefore that was common among farmers participating (Samkol, Pok. Staff from CelAgrid. Personal communication, 2011). In a study by Saroeun et. al., local breeds usually were found in the rural areas of Cambodia (2007). In the same study, both local breeds and crossbreeds seemed to have their disadvantages and benefits. Therefore it can be difficult to decide which breed farmers should use. Crossbreeds, for example Landrace x Yorkshire-breed, probably are more profitable when used for meat production.

Furthermore, farmers participating in the field study claimed that typical feed for their pigs were rice bran, water spinach and kitchen waste. Kitchen waste might contain some protein rich parts, but probably that is given to the family members instead of being included as animal feed. If there is lack of human food, pigs are not able to eat crude products either. More than half of farmers interviewed claimed that there was lack of suitable pig feed during dry season. During that time of year, purchased water spinach, banana stem and bad quality rice were used instead. To inform farmers about new feedstuff, which also can be found during dry season, is necessary. Farmers learned more about new feedstuff as a part of projects 4FS. Farmers need to believe in using new feedstuff, and there might be need for knowledge about essential amino acids as well. Pigs grow better and probably stay healthier if they eat nutritious feedstuff, which is positive both for pigs and their owners. Naturally, focus

is on feeding humans, but as the country develops focus on finding nutritional feedstuff for animals should be included.

According to another study, confinement systems are a common way of raising pigs in the rural areas of Cambodia (Saroeun et.al., 2007). Farmers interviewed in our study also raise their pigs in confinement systems, usually applying pen with fence and shelter as housing system. Probably, this generates healthier pigs. When using confinement systems, pigs from different families, who do not have direct contact with each other, do not infect one another with diseases as easily. Raising pigs in confinement systems should be better for the humans as well; they get rid of pig manure spread in the village. According to our study, piglets are usually sold or passed on (POG) to other families. POG on pigs means passing on four piglets (Rom, 2011), which most likely is finished relatively fast. After that, all piglets surviving will be a resource and generate money for the family. According to our study, a boar is not kept in interviewed families' ownership. Keeping a boar in Cambodia requires work, time and money. Farmers probably think it is easier to travel with the sow instead, for meeting with a boar when it is time for mating. AI is not that common either. During our field study, a local insemination station was visited. Although it was a lot different from the ones we are use to, the insemination station was functional and its owner seemed to earn his monthly salary on running it. In my opinion, finding an inseminator in the villages is probably the biggest issue if using AI, and a difficult problem to solve. Most likely it is too expensive to take an inseminator to the village, and too long for travelling with the sow to the inseminator. One solution could be to educating the "local vet" in inseminating animals; if that is not already done.

According to the field study, farmers claimed that diseases and lack of feed are main problems concerning pig production. Some village members claimed that a fluctuating selling price can be a problem as well. In another study, animal health were affected negatively when farmers did not vaccinate their animals (Saroeun et.al., 2007). If more people would believe in vaccinating their animals, disease problems could decrease. Further, if Department of Animal Production and Health could provide more free vaccinations, animal diseases probably would decrease in the villages. The department needs more money and more farmers willing to vaccinate their animals. In order to convince farmers to vaccinate their animals, more information is needed. The most common pig disease documented in our field study was PRRS. The second most common diseases were diarrhea and FMD. PRRS always returns in October together with Hog-cholera or Swine fever, which occurs every other month. It could be possible to prevent, or at least decrease the extension of, some diseases if using more vaccinations. More information about keeping sick animals apart from healthy ones is probably needed as well. Some contagions can for example transport through air, and therefore sick pigs need to be totally isolated from healthy ones. Sometimes a veterinary treats sick animals, but it is also common with no treatment at all. Veterinary service in Cambodia is not the same as we are use to. It seems to be the "local veterinary" that often "treats" sick animals, and he or she only has a few weeks of animal health education. As a consequence of that, results probably will be poor or excluded when the local veterinary treats sick animals. The local veterinary reports if there are severe disease problems in the village and that is

important in order to document cases of illnesses. Lack of feed was also a problem and that can be seen as one of CelAgrid's many objectives during the projects. In order to get healthier animals, suitable feedstuff all year around is necessary. How that would be possible is difficult to see, but maybe new feedstuff is going to be the solution. As mentioned before, CelAgrid is working on it. To make a change, farmers need to trust in CelAgrid and believe in trying new feedstuff.

In the field study, the PRA-method helped to clarify for farmers participating what information we wanted from them. It was easier for them to explain when creating a map or a schedule instead of talking only. Tools applied during the PRA-method were both fun and educating; for us, interpreters and family members included. There were a lot of laughing and commitment among interpreters and farmers. Interactions, responses and body language could be noticed and in my opinion, the method was both effective and rewarding. During the PRA-method, all positive attitude and unity earlier felt among village members really shined through. PRA-method number one was farm mapping. Participating farmers did not seem to want to draw a farm map themselves. It could depend on them being afraid of doing wrong or feeling outnumbered by the interpreters, but the accurate reason is unclear. Instead, the interpreter drew according to what the farmer explained. This could be seen as a source of error, due to that the original plan was different. Interpreter may have drawn the map dissimilar from what the farmer had. If enough resources, a land surveyor could have been helpful instead. All three farmers participating in PRA-method number two and three had increased their resources after the project, which is a positive outcome from the project.

During PRA-method number three, case studies were performed on three farmers (In Sarom, Sok Maly and Tes Tuy), who separately answered to extended questions. This gave room for both discussions and follow-up issues. Some interesting conclusions in particular came up during the case studies. All three farmers participating laid their extra earned money on education for their children. The project will be part of providing children in Takeo province hope for a better future. Sok Maly and In Sarom thought their pigs were healthier after the project. Probably, that is because of them being vaccinated. According to In Sarom, selling piglets is to be more profitable than raising them as fattening pigs. That seems logical because there is already problem with finding feedstuff during dry season, it should be hard to manage fattening pigs as well. Tes Tuy and Sok Maly do not believe in AI. None of them had the chance to employ an inseminator, or were educated in inseminating themselves. Most likely, those are reasons for bad results given after their own tryouts. Due to Cambodia's situation, the AI-technique needs to be improved. However, that seems to be difficult with no money and/or market for doing so. As far as new feedstuff, all three farmers interviewed were interested in trying it. Lack of feed are a problem during dry season and therefore it is of great importance that farmers get to know more about new feedstuff available. If their pigs grow better, they will earn more money and that should be reason enough for convincing farmers' unconfident in new feedstuff to believe in it. As mentioned before, it will contribute to animal health as well.

PRA-method number four consisted of a timeline concerning pig production; over the project period from 2004 to 2011 (Figure 1). For all five classifications, there are higher results for the project period “present” and “future” than “before”. A conclusion could be that farmers participating are positive about pig production in present time and when looking at the future. However, there might have been a misunderstanding according to classification “diseases”. It is unclear if interpreters, and therefore also farmers, thought that problems with diseases had increased or if it was a better situation now than before the project started. This could be another source of error, depending on our explanation for interpreters and how they presented it for participating farmers.

Furthermore, PRA-method number five consisted of a livelihood map; one map for “before project started” and another for “in present time” (Table 3). Chosen resources could come entirely from, partly from or only from outside the village. There was no change for resource “pork”; all of it came from outside the village before project started and in present time. However, both loan and biodigester were provided by the project and therefore both resided entirely “in present time”. Other interesting changes in resources represented were vegetable, animal feed and water. Some farmers got more vegetables and animal feed from outside the village in present time comparing to before the project started. This could depend on CelAgrid projects introducing new plants and feedstuff in the villages. The change in water probably are due to a water pump that one villager invested in. After that other farmers in the village could buy water from the pump, resulting in all farmers participating in the PRA-method claiming that they got water “partly from village”. Afterwards, this PRA-method did not provide with much interesting conclusions for this particular report. Probably we should have chosen another method instead that were more suitable. It would have been interesting to investigate specific reasons for farmers not eating their own raised pigs. Maybe it would be possible to buy meat directly back from slaughterhouses from own produced animals. That could be more profitable for the farmer. When buying meat from the market, the person who sells it has to take a higher price in order to make money.

A timeline concerning disease related issues represented PRA-method number six. Vaccinations and deworming was only performed once, when the project started. As mentioned earlier, disease problems occur all year around. Vaccinations could be the solution for defeating pig diseases, but a major problem is that farmers do not believe in vaccinating their animals. Information could be the key for making farmers trust in, for them, new techniques. During 4FS, CelAgrid staff educated farmers in animal management; including animal health. Probably, farmers know more now than before project started. Still it seems to be a long way to go and it is difficult to determine however this part of the project objectives, improving animal health and educating in animal management, was accomplished or not.

When this report is done, newly found information and vital point of views will be reported back to the small scale farmers in their local language. Contributed information should inspire and be a direction for other similar projects in other countries. Hopefully, these successfully projects done by CelAgrid are only the beginning. Its achievements should inspire other organizations to do the same; to support poor people in rural areas and help farmers help themselves.

Conclusions

CelAgrid has done an aggregative successful work with the evaluated projects. They have managed to improve farmers' annual income and food security. However, there is more work to be done. Many people still suffer from poorness and hunger. The projects have partly succeeded due to improving animal health and educating farmers in animal management. On the other hand, animals still suffers from lack of feed, diseases and unacceptable transportation conditions. Among others, farmers need more education about vaccinations, new feedstuff and AI. There is additional need for further engagement, research and development projects in Cambodia.

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Appendix 1

QUESTIONNAIRE ANIMAL PRODUCTION

General questions concerning your family

1. What type of livestock is kept? More than one option can be filled in.

- Pig
- Cattle
- Poultry
- Fish
- Other: _____

2. Estimate the number of animals (of each kind) kept over the year of 2010:

Cattle:

Pig:

Poultry:

Fish:

Other: _____

3. Have there been any changes in the number of livestock since CelAgrid's intervention in your village?

- Increase
- No increase
- Decline

If increase, how many more animals?

And what type of livestock?

If no increase/decline, what type of livestock and what are the reasons?

4. Number of sold livestock in the year of 2010:

Cattle:

Pig:

Poultry:

Fish:

Other: _____

Price of livestock in the year of 2010:

- Better price than before the project started
- Same price than before the project started
- Lower price than before the project started

5. What type of crops is cultivated? More than one option can be filled in.

- Rice (bran, straw)
 - Cassava (leaves)
 - Mulberry (leaves)
 - Taro (leaves, stem)
 - Water spinach
 - Banana tree (leaves, stem)
 - Other:
- _____

6. Sources of income in the year of 2010:

Farm activities	Tick \checkmark	Monthly income (riel)
Rice		
Vegetable		
Fruit tree		
Cattle/buffalo		
Pigs		
Chickens		
Ducks		
Fish (aquaculture)		
Village shop		
Selling labors		
Government work		
Trading		
Other.....		
.....		
Total		

Income classification: *using available information from village chief, monthly income above and based data collector observation on type of house and asset, tick the category of interviewed farmer:*

- Poor
- Average
- Better-off

7. Responsibilities and decision in farm activities

Farm activities	Men (tick ✓)	Women (tick ✓)
Rice		
Vegetable		
Fruit tree		
Cattle/buffalo		
Pigs		
Chickens		
Ducks		
Fish (aquaculture)		
Village shop		
Selling labors		
Government work		
Trading		
Other.....		

8. Have the amount of meat or fish (protein) in the human diet increased since the beginning of CelAgrid's projects in your village?

- Yes
- No change
- No

9. Do you get access to meat or fish (protein-rich food) in the human diet all year round?

- Yes
- No

If yes, how: _____

If no, why: _____

10. Purpose of the animals:

	Cattle	Pig	Poultry	Fish	Other	Other
Meat						
Egg						
Milk						
Skin/Feathers						
Draft						
Plowing						
Other						

11. Do you sell your animals to slaughterhouses at your farm gate?

- Yes
- No

Or, do you slaughter them at the farm?

- Yes
- No

If yes, what type of livestock do you slaughter at the farm?

12. To whom do you sell the animals for slaughter? More than one option can be filled in.

- Slaughterhouse
 - Middleman
 - Neighbor
 - Market
 - Other:
-

13. How much of the produced meat at the farm are consumed by your family?

- Nothing
- Less than half
- Half
- More than half
- Everything

If more than nothing, what type of meat?

14. What type of meat is mostly consumed by your family?

- Pig
- Cattle
- Poultry

- Fish
- Other: _____

Questions focusing on pig (in your family)

1. What breed are the pigs?

2. Number of animals at the moment:

Boars:

Sows:

Gilts:

Piglets:

3. If both boar and sow/gilt, do they reproduce and have offspring?

- Yes
- No

If yes, is the offspring:

- Kept
- Sold
- Given to another family (POG)

4. What type of housing system? More than one option can be filled in.

- Free – range (without fence or shelter)
- Free – range (without fence, with shelter)
- Pen (with fence, without shelter)
- Pen (with fence, with shelter)
- Tied- up outside (without shelter)
- Tied- up inside (with shelter)
- Other:

5. Which feeding stuff dominates the rations for the pigs? More than one option can be filled in.

- Rice bran
- Cassava leaves
- Mulberry leaves
- Taro stem/leaves
- Water spinach
- Concentrate (for the piglets)
- Kitchen waste
- Banana stem/leaves

Other:

6. Do the fractions of the ration for the pigs change depending on season? (Rain season / dry season)

Yes

No

7. Is there lack of usual/suitable feed for the pigs during the dry season?

Yes

No

If yes, what do you feed the pigs with instead?

8. What problems do you encounter with your pig production?

Diseases

Lack of feed

Lack of knowledge

Lack of water

Credit

Breeding

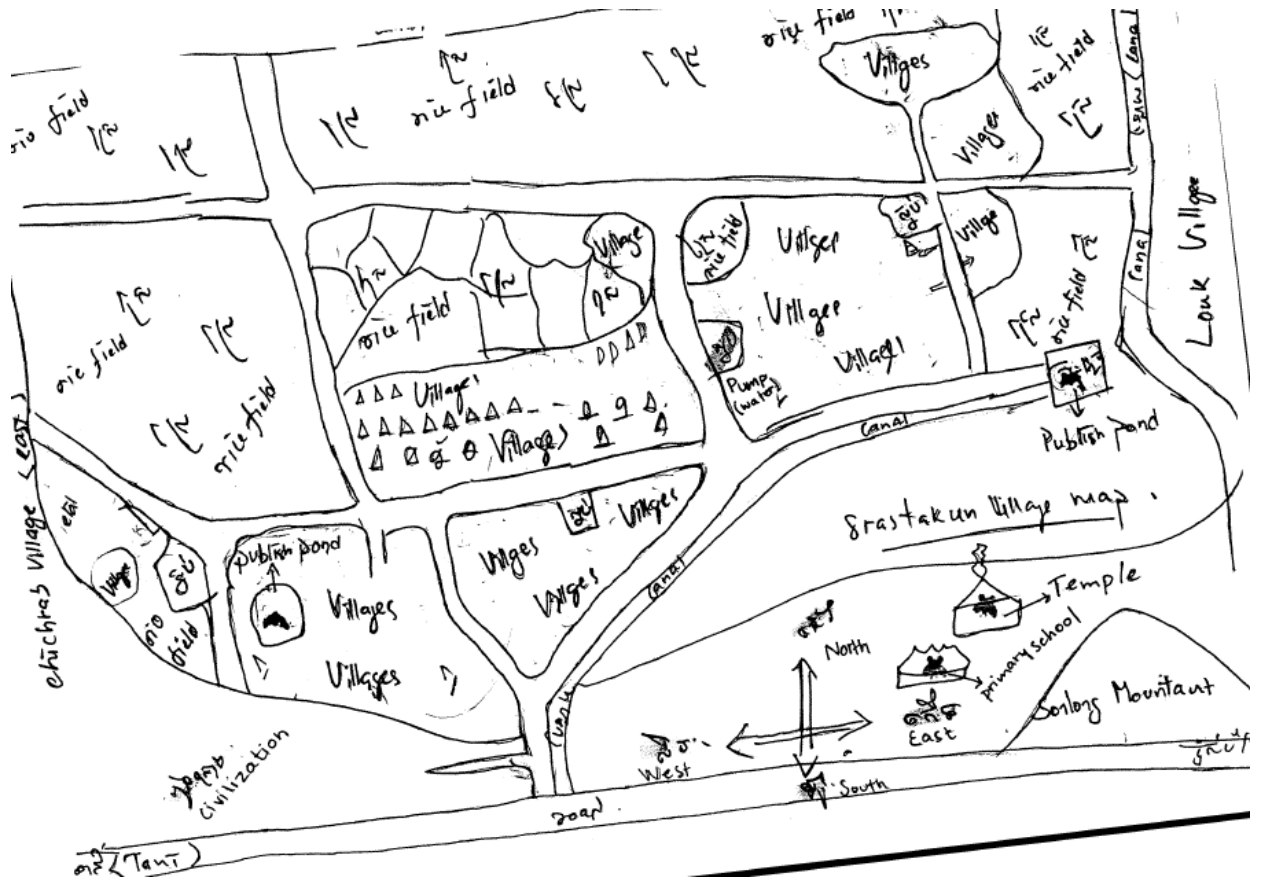
Selling the animals at the market

Other: _____

9. What are the most common diseases in your pig production?

How do you solve these disease problems?

Appendix 2



Appendix 3

Criteria for the classification of the family's wealth made by CelAgrid:

Better-off	Middle	Poor	Poorest
<ul style="list-style-type: none"> - big house with concrete floor and good roof - rice milling machine - capital for investment - more animal- cattle - vehicle: car and motorbike - more land for rice 	<ul style="list-style-type: none"> - big house with improved roof - motorbike, ox cart - sufficient land for rice 	<ul style="list-style-type: none"> - house with leaf or zinc roof - work mainly on farming - less land for rice - sale of labors - small business 	<ul style="list-style-type: none"> - small house with leaf roof - labor work - small income - sale labors - no land for rice

At the beginning of the project, 2005:

Village	Total of families	Better-off	Better-off, %	Middle	Middle, %	Poor	Poor, %	Poorest	Poorest, %
Ang Tapouk	80	5	6,25	58	72,5	10	12,5	7	8,75
Krom	167	10	6,2	139	83,2	11	6,6	7	4,2
Sras Takoun	78	4	5	49	62,8	20	25,7	5	6,4
Louk	100	11	11	77	77	8	8	4	4
Krang Thnort	105	15	14,2	55	52,4	20	19,1	15	14,3

Year 2010:

Village	Total of families	Better-off	Better-off, %	Middle	Middle, %	Poor	Poor, %	Poorest	Poorest, %
Ang Tapouk	95	7	7,4	73	76,8	8	8,4	7	7,4
Krom	186	10	5,4	158	84,9	11	5,9	7	3,8
Sras Takoun	97	5	5,2	67	69	20	20,6	5	5,2
Louk	119	15	12,6	92	77,3	8	6,7	4	3,4
Krang Thnort	145	20	13,8	92	63,5	18	12,4	15	10,3

Changes in percentage between 2005 and 2010:

Village	Better-off, %	Middle, %	Poor, %	Poorest, %
Ang Tapouk	+1,15	+4,3	-4,1	-1,35
Krom	-0,8	+1,7	-0,7	-0,4
Sras Takoun	+0,2	+6,2	-5,1	-1,2
Louk	+1,6	+0,3	-1,3	-0,6
Krang Thnort	-0,4	+11,1	-6,7	-4