

STUDY ON PRODUCTION EFFICIENCY AND IMPACTS OF
NEW TECHNOLOGIES IN PIG FARM HOUSEHOLD:
EVIDENCE FROM RED RIVER DELTA OF VIETNAM

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(養豚経営における生産効率および新技術導入効果に関する研究：ベトナム紅河デルタからの証拠)

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Thesis Summary

Pig production is one of the most important sectors of livestock production in Vietnam. It brings job and income to Vietnamese farmer households who own mostly small scale. In this point, the government has built many strategies to develop this sector, especially focus on household level. Changing production scale of pig-producing household from scatter-small scale to commercial and large scale and applying new production technologies and management methods to increase production efficiency and to reduce pollution have been promoted. However, the achievement was limited for farmers at household level such low production efficiencies as well as low adoption rate in implementing new technologies. Against this background, this study aimed to measure production efficiency of household pig production and its determinant; and to assess the adoption and impacts of new technologies in pig management of households in Red River Delta of Vietnam.

This study used two data sets that were collected by face-to-face interviewed using questionnaire in two periods. The first period was from August to September in 2014. This survey was conducted in Tien Lu district, Hung Yen province with the total sample size was 161 farrow-to-finish households. The second period was in April 2018. Tien Lu and Khoai Chau were two of four districts promoting VietGAHP under LIFSAP support for HH pig production in Hung Yen province. The second data set included 114 VietGAHP households and 116 conventional households. A VietGAHP HH is defined as a pig HH who registered as a member of their district's LIFSAP group. They were randomly chosen based on lists of VietGAHP groups. A VietGAHP non-adopter is a household pig producer which was not registered as a member of LIFSAP groups. Data Envelopment Analysis approach was used to estimate the level of efficiency scores in term of technical, allocative and cost efficiency, and Tobit model was used to determine the factors associating with these efficiency scores. Especially, the results of Tobit model were combined with other tests to identify the impacts of production scales on these efficiency score. In addition to, we used Logit and Probit model to identify factors associating with Biogas adoption in manure management and VietGAHP adoption. Last, we used the t-test to show the impacts of VietGAHP adoption in implementing its criteria.

Chapter 3 showed that overall technical efficiency in farrow-to-finish pig production of the household (TEcrs) was high (80.40%) but it fluctuated in a large range, from 52.57% to 100%. And the inefficiency of overall technical efficiency in pig production was mostly the product of less efficiency of pure technical efficiency (TEvrs) rather than scale efficiency (SE). The main factors that affect the overall technical efficiency in farrow-to-finish pig production in households were the live weight per fattened pig, breeding time, education, experience, family members joining in pig production, pig income, access to credit, and access to veterinary services. From above findings, it may be concluded that households should concentrate on improving their managerial skills rather than changing their scale in order to enhance their performance. In this regard, households could reduce their inputs and

produce large quantities fattened pigs by utilizing breeding centers; also enhance their skills through training programs and by studying the best pig producers. Another option for inefficient households is to reduce their breeding time by taking better care of the sows before they become pregnant and by weaning their piglets earlier.

Chapter 4 highlighted the main factors affecting biogas adoption that were education of household heads, membership of groups, large farm size, and household income. All of these have positive impacts on the willingness to adopt biogas, except for some farmers with very high education and some households with high income, who might seek more modern manure management technologies. The results suggest that educational and awareness programs on the merits of biogas digesters, particularly via farmer support channels, should be implemented. Furthermore, financial programs should be offered to farmers, especially to low-income households.

Chapter 5 demonstrated that the factors positively contributing to VietGAHP adoption include gender, training, household income, and veterinary services, with the training factor as a substantial contributor. The factors presenting a challenge to this adoption included farm size, the number of family members participating in pig-raising, off-farm income, and biogas, with the latter an especially pivotal factor. Moreover, an expected result of the government's support was that VietGAHP adoption had a positive impact on 9 out of 15 compulsory practices and 8 of 14 optional practices. These imply that to attain food safety and environmental protection goals through a public GAP program for pig production, traditional adoption factors—including a male farmer status, training, household wealth, and veterinary services—remain key pillars on which government policies should focus.

In chapter 6, we found that high efficiency scores of TE, AE, CE and SE among the Vietnamese pig-farming households were 89.2%, 84.6%, 75.3%, and SE 95.4%, respectively. Also we found that the cost inefficiency was caused by allocative inefficiency and technical inefficiency, respectively. Moreover, there were significantly higher allocative and cost efficiencies in larger production scale and adopting VietGAHP, which is considered as new management practices, brought the higher level of technical efficiency. Based on these findings, we suggest ways that the government could improve the current system to help even among household pig production who are the main agricultural producers in developing countries such as Vietnam, scale up their farms and adopt new management practices to improve their performance.

In overall, this study has pointed out five new findings as follow: 1) The level of overall technical efficiency in pig production was high but it fluctuated substantially among households; 2) Farmers' financial ability in term of household's income became the common factor effecting on the adoption of new technology. However, there was a conflict in adopting these new technologies because they had not yet supported each others; 3) The impact of new technologies such as VietGAHP has brought the substantial changes in implementing the difficult practices/criteria that were implemented by less than 50% of all farmers, especially for compulsory criteria; 4) Also, the other impact of VietGAHP adoption was that VietGAHP brought higher level of technical efficiency for households. 5) The larger production scale has been identified to improve the allocative efficiency and cost efficiency by exploring the advantages of scale of economy.

Based on these findings, four practical implications may be formulated as follow: 1) Households should concentrate on improving their managerial skills rather than changing their scale in order to enhance their performance; 2) To encourage pig-producing households to adopt new technologies in the future, it is crucial to formulate a suitably formal credit system for household who were low income to access; 3) It can be introduced and encouraged pig-producing household who could not change their production scale in the future to adopt VietGAHP to improve their performances; 4) To increase the adoption rate of VietGAHP, traditional adoption factors—including training and veterinary services—remain key pillars on which government policies should focus.