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**THE DEVELOPMENT OF PIG HUSBANDRY IN
THUA THIEN HUE PROVINCE**

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**SUMMARY OF DOCTORAL THESIS IN
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INTRODUCTION

1. The research rationale

Vietnamese agriculture has been formed for a long time with two major production sectors, cultivation and husbandry. These two sectors are closely linked together, promoting each other in the process of development. In order to have a modern agriculture, it is necessary to develop simultaneously the balanced and sustainable industries. In the agricultural structure of Vietnam, production value of husbandry products accounts for over 24.6%. For the husbandry sector, pig production accounts for the largest share, accounting for 72.4% of total meat production [94].

Over the past years, the husbandry sector in general and pig raising in particular have always received the attention from the Party and the Government. Specifically, the husbandry development strategy until 2020 has identified, "*husbandry sector development becomes a commodity production industry, gradually meeting the food demand for domestic consumption and export ...*" [7]. This document also emphasized "*rapid development of cross-bred pigs in the direction of big farms, industries where there are land advantages, disease control and the environmental issue control. A certain scale of crossbred and specialty pig production in line with husbandry conditions of farmers and some regions is maintained*" [7]. In addition, the project of pig breeding innovation in the period 2007-2020 of the Ministry of Agriculture and Rural Development, the common goal is defined as: "*To develop pig production along with the development of raising other animals in the whole operation. Animal husbandry in our country, meeting the growing demand for domestic pork and export oriented; Improve husbandry performance along with productivity, quality and competitiveness of the product; To develop sustainable pig production associated with the rational exploitation of regional advantages in terms of natural, economic and social conditions*". This is the legal basis for Ministry of Agriculture and Rural Development, Ministries, Associations, professional associations concerned, to organize the implementation and concretization of strategies and schemes for the husbandry.

Thua Thien Hue has a lot of potentials and advantages to develop a comprehensive animal husbandry. It has a diversity source of raw materials for the processing of animal feed such as rice, corn, potato, cassava and seafood products. The annual grain output is over 30 thousand tons; the output of tubers is over 150 thousand tons. Increased food production has contributed to addressing the food demand of people and the husbandry development of the province. The average food output per capita is 285 kg, the average live weight of hog per capita is 17.7 kg, compared to the national average of 38.1 kg per capita per year [16] [55]. The value of husbandry products, according to the husbandry development strategy in Thua Thien Hue province up to 2020, accounts for 40% of the agricultural product value, the total number of pigs reaches 296,000 heads, and the total meat output is 31,986 tons [40]. Promoting both the quantity and quality of pigs is extremely important, as pork accounts for over 76.8% of the province's annual meat production.

However, husbandry production in general and pig raising in particular in Thua Thien Hue province are still inadequate and difficult. The scale of production is small; the number of households with less than 10 pigs makes up 94.52% [17]. Besides, the level of intensive production is low; investment resources, product quality and efficiency of husbandry production

are limited; input and output market for husbandry are not stable; production is at high risk; environment is polluted, etc.; the income of pig raising households is not high.

Hence, the development of pig husbandry in Thua Thien Hue province has attracted the attention of policy makers and scientists. In recent years, research results on pig production have been published such as Le Dinh Phung [32], Phung Thang Long [31], Nguyen Thi Minh Hoa [23], however, these studies mainly focused on pig breeding techniques, consumer perceptions of food safety in pork consumption. There is no comprehensive and systematic study on pig development in Thua Thien Hue.

It could be the reason why we chose to study the topic: "Development of pig husbandry in Thua Thien Hue province" as a doctoral dissertation.

2. Research objectives

2.1. General objective

Assessing the current situation and proposing major solutions for pig husbandry development in Thua Thien Hue province.

2.2. Specific objective

- Systematizing and clarifying the theoretical as well as practical issues of pig husbandry development;
- Assessing of the current situation and analysis of key factors affecting the development of pig production;
- Proposing the solutions to enhance pig production in Thua Thien Hue until 2020.

3. Research questions

This thesis topic will focus on the following issues:

- What are the aspects of pig husbandry development?
- What is the situation of pig development in Thua Thien Hue?
- Which factors influence the development of pig production?
- What are the strengths, weaknesses, opportunities and challenges for the development of pig production?
- Which solutions to ensure the efficient and sustainable development of pig raising in Thua Thien Hue province in the coming time?

4. The object and scope of research

4.1. Research object

- Research object: The thesis focuses on theoretical and practical issues on pig husbandry development in Thua Thien Hue province.
- Objects of survey and investigation:
 - + Farms, pig households; Units (organizations, individuals) related to input and output of pig production facilities in the study area are distributed in representative areas: hills, plains and coastal lagoons;
 - + Local officials involved in management of pig production in the area (provincial, district and commune staff).

4.2. Research scope

4.2.1. About content

Developing pig husbandry is a matter of broad scope. Thence, the research scope of the thesis only focuses on: clarifying theoretical and practical upon the development of pig production; evaluating the development of pig production in terms of size, growth and structure; developing the relationship between pig farming and the husbandry sector and agriculture; developing husbandry planning and infrastructure; Input and output markets; The economic, social and environmental performance of pigs; Analyzing factors influencing the development of pig production (mainly factors affecting technical efficiency and inefficient pork technology); Clarify strengths, weaknesses, opportunities, challenges and propose solutions to develop pig production in Thua Thien Hue province. Other related issues beyond the scope of the study may be considered as the inevitable restriction of the thesis.

4.2.2. About space

The topic has been implemented in the whole province of Thua Thien Hue. However, in the research process, in addition to contents reflecting the pig husbandry development of the whole province, the research also examined some in-depth contents in 3 districts. The commune represents three ecological zones: Nam Dong district, Huong Thuy town and Quang Dien district.

4.2.3. About time

Analyze and evaluate the situation of pig production in the period 2005-2015 and propose solutions for development to 2020. Secondary data collected from 2005 to 2015.

5. New contributions of the thesis

- The thesis systematized and clarified the theoretical and practical issues about the development of pig husbandry, influential factors to pig husbandry. On that basis, it allows to identify the research problem, approach methods, analysis framework and indicators used to evaluate the development of pig husbandry.

- The thesis analyzed and evaluated the current situation of pig husbandry in Thua Thien Hue province for the period 2005-2015 in terms of scale, growth and structure of pig production in relation to agriculture and livestock sector, to the Central of North and the whole country; to planning and infrastructure for pig husbandry development; input and output markets; the efficiency of pig production on economic, social and environmental aspects.

- The thesis also analyzed the main factors affecting the development of pig production; quantifies the factors that influence the technical efficiency of porker production by the Cobb-Douglas production function, and pointed out the factors that affect the technical efficiency of the pig husbandry farmers in Thua Thien Hue province.

- The thesis clarified the strengths, weaknesses, opportunities, threats and issues for pig husbandry development. It also proposed five major solutions and several systematic solutions for the development of pig husbandry production in Thua Thien Hue until 2020.

CHAPTER 1

LITERATURE REVIEW ON PIG HUSBANDRY DEVELOPMENT

1.1. The rationale for pig development

1.1.1. Some basic concepts

1.1.1.1. Development

1.1.1.2. Economic development

1.1.1.3. Agricultural Development

1.1.1.4. Husbandry development

1.1.1.4. Development of pig production

The development of pig production is a process of quantitative and qualitative growth with a progressive structure that is consistent with the development trend of the agricultural sector in general and the development of the husbandry sector in particular, meeting the increasing demand of consumers and ensuring economic, social and environmental efficiency.

1.1.2. The role of pig husbandry development

1.1.3. Characteristics of pig husbandry development

1.1.3.1. Economic and technical characteristics of pig husbandry development

1.1.3.2. Forms of pig husbandry production

1.1.4. Contents of pig husbandry development

The concept of pig development is reflected in the following core arguments:

First, the development of pig production is a process of growth regarding to the scale and structural improvement. It means growing pigs in terms of quantity and quality in a given time.

Second, the development of pig production must be in the overall development of husbandry and agriculture.

Third, the development of pig production must be based on socio-economic development planning and husbandry sector development planning; at the same time, the infrastructure system is developed synchronously and appropriately.

Fourth, the development of pig production must be closely linked to the input and output markets.

Fifth, the development of pig production must ensure economic, social and environmental efficiency, of which economic efficiency is a key element of pig husbandry.

1.1.5. Factors affecting the development of pig production

1.1.5.1. External factors

1.1.5.2. Internal factors

1.2. Overview of research on pig development

1.2.1. International studies

- Khem R. Sharma et al. [82], Marina Petrovska [85], Adetunji M. O and Adeyemo K. E [68] used data envelope analysis (DEA), cost-benefit analysis and the Stochastic Frontier Production Function to measure pig raising performance by using indicators (technical efficiency, distribution efficiency and economic efficiency). These research also employ ANOVA technique to identify factors affecting the performance of pig raising. However, the DEA approach may be sensitive to the unit measurement of the input and output variables. The

method of stochastic production function to estimate the efficiency of pig production is highly persuasive and can be applied to the thesis.

- The study by Simon Riedel et al., [90] uses the Categorical Principal Component Analysis (CATPCA) and Cluster Analysis, which identified 3 major combined system of pig raising includes: (1) pig sow - maize; (2) raising pigs - rubber; (3) pig raising.

- Liborio S.Cabanilla et al. [83] have focused on analyzing the total factor productivity growth in the industrial pig and poultry industry sector in two steps: Step 1, using the Stochastic Frontier Production Function to estimate the parameters that affect the production result and the technical efficiency index; Step 2, using the general formula proposed by Kumbhakar et al. to measure and analyze Total Factor Productivity growth. Thus, the researcher's method of research is very appropriate in assessing the current situation and potential of pig production in terms of output outcomes.

1.2.2. Studies in Vietnam

- Nguyen Que Coi et al., Nguyen Ngoc Xuan, Nguyen Huu Ngoan [65], Vo Trong Thanh, Vu Dinh Ton [46]. The studies used statistical description method, accounting method of production results. The advantage of these studies is that it evaluates and compares economic efficiency according to different criteria such as pig rising scales, forms, regions and VietGAP form. These studies indicate that in order to develop husbandry production, it is necessary to invest in good breeder and veterinary as well as reduce feed costs to increase profitability in pig production.

- Bui Van Trinh [56], Nguyen Thi Minh Hoa [22], Le Ngoc Huong [27]. These studies focused on analyze of actors involved in pork consumption and pork supply chains; evaluate the effectiveness of these actors. Using a structured, operated and executed approach to analyzing the distribution channel for porkers and interrelations between actors in the supply chain.

- Clem Tisdell [74], Pham Xuan Thanh et al. [45], Nguyen Ngoc Xuan [66]. These studies use systematic approaches to assess current situation, analyze variations in pig husbandry development between regions and provide economic and technical solution to develop pig husbandry.

1.3. Practical basis for the development of pig production

1.3.1. The development and experience of pig production in the world

1.1.3.1. The development of pig production in the world

1.3.1.2. Pig raising experience in some countries in the world

1.3.2. The development and experience of pig production in Vietnam

1.3.2.1. The development of pig production in Vietnam

1.3.2.2. Experience of pig production development in some provinces and cities

1.3.3. Lessons learned from the development of pig production

CHAPTER 2

CHARACTERISTICS OF RESEARCH SITE AND RESEARCH METHODS

2.1. Natural, economic and social characteristics of Thua Thien Hue province

2.2. Research methods

2.2.1. Research approach

2.2.1.1. Mixed approach

2.2.1.2. Approach to develop pig production from a system point of view

2.2.1.3. Approach to develop pig production from a comprehensive point of view

2.2.1.4. Participatory approach

2.2.2. Analytical framework

The framework 2.1 shows that the content of "Pig husbandry development in Thua Thien Hue province" is considered as complex research problem that is explained by many components including scale, growth, quality structure; planning, infrastructure; input and output market; efficiency on the economic, social and environmental aspects. In addition, pig husbandry development is directly or indirectly influenced by internal and external factors, including the technical elements (breeds, feeds, veterinary, etc.). ..); Production resources (labour, capital, etc.); Forms of pig raising; natural condition; policy; market price; international economic integration.

The purpose of the study is to propose solutions to promote the development of pig production in the research area in a sustainable manner.

2.2.3. Data collection methods

Secondary information is collected from organizations such as the US Department of Agriculture (USDA), MARD, GSO, Viet Nam Department of Husbandry Production, Thua Thien Hue Department of Agricultural and Rural Development (DARD), ...

Primary information was directly surveyed from pig raising households and local officials involved in the management of pig development in the survey sites with pre-designed questionnaires.

a. Research site selection

To ensure the representativeness of the study site, the thesis employs a multi-level sampling method as follows:

- Level 1 sampling units: select representative districts. The selection of districts is based on the following criteria:

- + Representative in pig scale, mode and type;
- + Representative of ecological areas (hilly and mountainous areas, coastal lagoons);
- + Represented geographical position compared to Hue City.

- Level 2 sample units: In each selected district, 3 representative communes were selected to collect actual data on pig production. The representative communes are full of different types, sizes and methods of animal husbandry.

Based on these criteria, we chose Huong Thuy Town, Quang Dien District and Nam Dong District to conduct the survey.

b. Sample selection

- Selection of survey samples: using classification method (disaggregation). Based on different groups, households were randomly selected (sample structure does not quite correspond to the structure of the population according to the research criteria). Distribution of survey samples is shown in Table 2.1. The total surveyed sample was 330 households, in which: Quang Dien district and Huong Thuy town have 120 samples (36.4%) in each district and the Nam Dong district surveying 90 samples (accounting for 27.2%). By farm size, big farm size is 11 farms (3.3%), 56 middle farms (17.0%) and 263 small forms (households) (79.7%). By type of pigs, 93 pigs (28.2%), 60 sows (18.2%), 177 breeding animals (53.6%). By raising mode, 15 samples (4.5%) was industrial mode, 157 samples (47.6%) was semi-industrial mode and 158 samples (47.9%) was traditional mode. Statistically, the scale and structure of the sample is guaranteed to be representative and consistent with the research objectives of the thesis.

Table 2.1. Number and structure of the survey sample

Location	No. of sample	Size			Type of husbandry			Manner of husbandry		
		Farm with large scale	Farm with medium scale	Farm with small scale	Pigs	Sorrow	Mix	Industry	Semi-industry	Tradition
Nam Dong	90	2	6	82	29	10	51	2	39	49
Huong Thuy	120	5	18	97	34	25	61	7	56	57
Quang Dien	120	4	32	84	30	25	65	6	62	52
Total	330	11	56	263	93	60	177	15	157	158

Source: Survey data for 2014

In addition, we also conducted interviews with local managers. In each district, we interviewed 20 staff, including 15 commune officials and 5 district officials. 10 provincial staff we invited for interview.

2.2.4. Method of synthesis, processing and computation of documents

2.2.5. Analytical methods: using the following methods: descriptive statistics, SNA accounting method, long-term investment analysis, time series data, supply chain analysis,

2.2.6. Professional solution

2.2.7. SWOT matrix method

2.3. Indicator system for research and development of pig production

2.3.1. Group of indicators reflects the scale

2.3.2. Group of indicators reflects the structure of pig production

2.3.3. Group of norms for evaluation of planning, policies and infrastructure

2.3.4. Group of indicators reflects the growth of pig production

2.3.5. Group of indicators reflects the results and efficiency of pig production

2.3.6. Group of indicators on social and environmental impact assessment

2.3.7. Group of indicators on the level of production and consumption of pork products

Figure 2.1. Analytical framework for pig production development in Thua Thien Hue province (Source: proposed author)

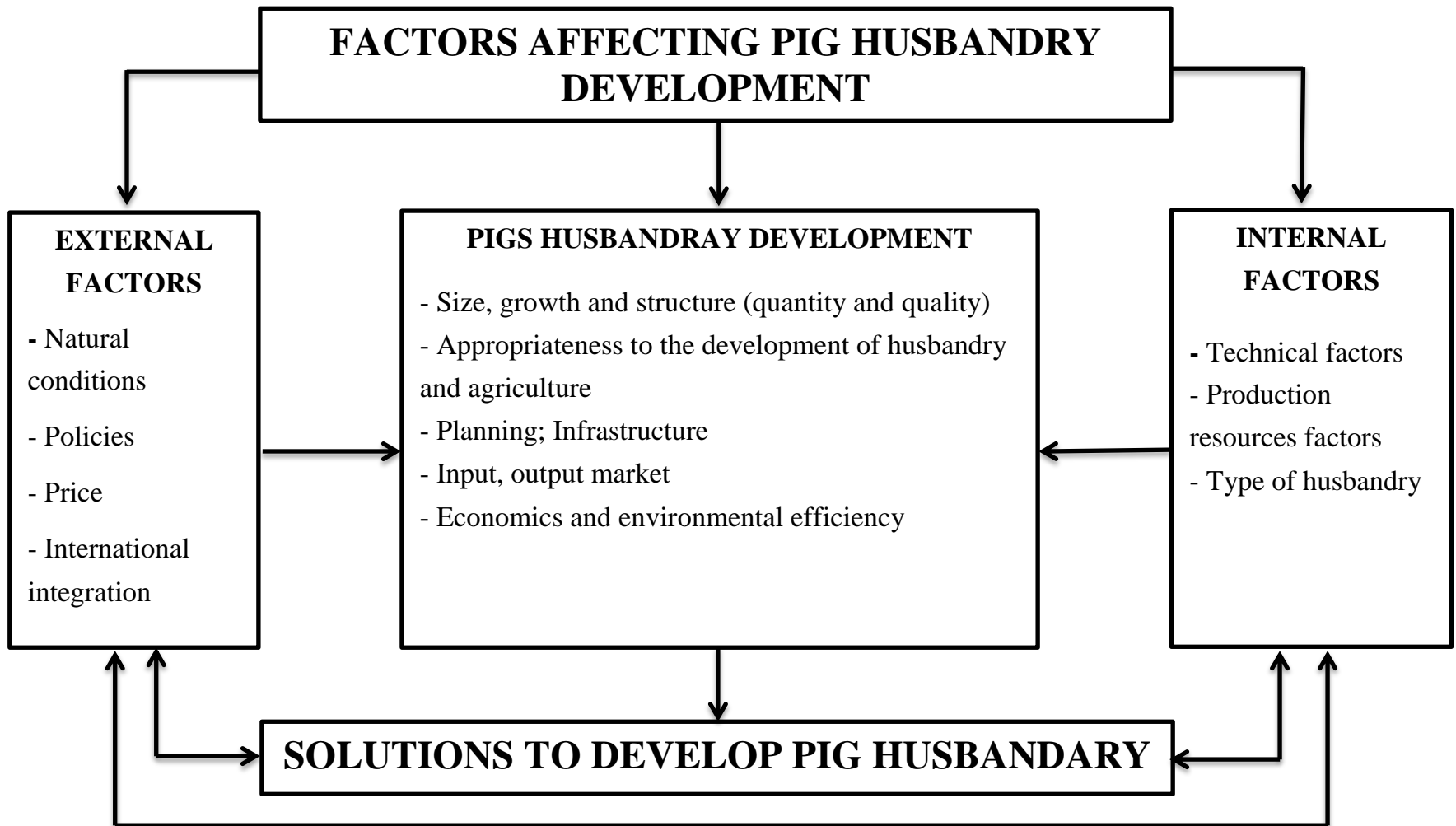


Figure 2.1. Analytic framework of pig husbandry development in Thua Thien Hue province

CHAPTER 3
THE SITUATION OF THE DEVELOPMENT OF HUSBANDRY
IN THUA THIEN HUE PROVINCE

3.1. Assess the development of pig production in Thua Thien Hue province

3.1.1. Size, growth and structure of pig production

3.1.1.1. Size and growth of pig production in the period 2005-2015

Table 3.1. Size and growth of pigs in TT. Hue period 2005-2015

No.	Indicators	Units	2005	2010	2015	Average
I	Total number of pigs	(head)	264,787	246,962	202,167	
	Growth compared to 2005	%		-6.73	- 23.65	
	Annual growth	%	2.01	1.80	0.23	- 2.70
1	Porker	(head)	238,095	203,362	160,842	
	Growth compared to 2005	%		- 14.59	- 32.45	
	Annual growth	%	1.00	2.22	0.44	- 3.80
1.1	Foreign pigs	(head)	5,698	6,888	59,762	
	Growth compared to 2005	%		20.88	948.82	
	Annual growth	%	24.52	- 11.27	6.66	26.50
1.2	Hybrids pigs	(head)	206,629	159,036	79,407	
	Growth compared to 2005	%		- 23.03	- 61.57	
	Annual growth	%	5.83	4.99	- 2.60	- 9.10
1.3	Domestic pigs	(head)	25,768	37,438	21,637	
	Growth compared to 2005	%		45.29	- 16.03	
	Annual growth	%	- 28.27	- 5.73	- 3.98	- 1.70
2	Female breeding pigs	(head)	26,647	43,540	41,232	
	Growth compared to 2005	%		63.40	54.73	
	Annual growth	%	12.49	- 0.03	- 0.69	4.50
2.1	MC sow	(head)	25,761	37,434	14,057	
	Growth compared to 2005	%		45.31	- 45.43	
	Annual growth	%	12.22	- 5.72	- 0.77	- 1.40
2.2	F1 sow	(head)	539	5,469	22,396	
	Growth compared to 2005	%		914.66	4,055.10	
	Annual growth	%	15.17	57.79	- 10.65	38.60
2.3	Foreign sow	(head)	347	637	4,779	
	Growth compared to 2005	%		83.57	1,277.23	
	Annual growth	%	30.94	67.63	48.55	30.00
3	Male breeding pigs	(head)	45	60	93	
	Growth compared to 2005	%		33.33	106.67	
	Annual growth	%	12.50	- 34.07	66.07	7.50
3.1	Foreign male pigs	(head)	38	56	93	
	Growth compared to 2005	%		47.37	144.74	
	Annual growth	%	11.76	- 34.88	69.09	9.40
3.2	Male pigs MC	(head)	7	4	0	
	Growth compared to 2005	%		- 42.86	- 100.00	
	Annual growth	%	16.67	- 20.00	- 100.00	-100.00

(Source: Hue Department of Agriculture and Rural Development and authors' calculations)

* In terms of population size: During the period 2005-2015, the total population of pigs decreased by 2.7% and the porker population declined by 3.8%, while the number of pigs and boars increased. However, considering by breeding types, foreign porkers and F1 sows, foreign sows increased, while domestic porkers, crossbred sows and Mong Cai sows are gradually and

rapidly decreased. This is a positive trend contributing to the transition of husbandry production.

* Regarding to output of pig production: The output of alive hog in 2015 compared to 2005 decreased by 758.6 tons, the annual rate of reduction of 0.4%. However, the output was still increased 2.9% in the period of 2005-2010, while in the period 2010-2015 this figure went down by 6.3%. Hence, in the whole period of 2005-2015, the output is down by 3.6%. Consequently, the yield of pigs fluctuated unstably due to many reasons and one of main reason is the population of porkers in this period mainly decreased by nearly 32.5%. The output decreased but the production of pigs husbandry in 2015 compared with 2005 increased 16.8%, the average annual increase of 1.6%.

Table 3.2. Production and value of pork production in Thua Thien Hue 2005-2015

No.	Indicators	Units	2005	2010	2015	Average
1	Production of alive pigs	tons	20,967.0	21,572.0	20,208.4	
	Growth compared to 2005	%	-	2.9	- 3.6	
	Annual growth	%	3.6	2.6	1.8	- 0.4
2	Gross Output of pig husbandry	Billion VND	510.4	595.9	596.0	
	Growth compared to 2005		-	16.8	16.8	
	Annual growth		0.9	1.8	0.9	1.6

(Source: Statistics and Authorities Statistical Yearbook)

* In terms of the productivity and quality of pigs: There is a downward trend in the average weight of pigs in Thua Thien Hue province from 70.1 kg in 2010 to 59.6 kg in 2013. This figure tends to increase to 61.7 kg in 2015. The weight of sold pigs in Thua Thien Hue province is higher than Central of North but lower than the whole country,.

In 2010, Thua Thien Hue province has carried out the project of developing the pig breeds with high quality. By 2015, the number of foreign sows and F1 sows is 18,836 heads, 21.3 times compared to 2005, accounting for 45,7% of pigs reproduce. Yet, this number has not met the needs of households. The average growth rate of foreign pig herd in the period 2005-2015 is 26,5% which is very low compared to the total pig herd of the province (accounting for 27.8%), compared to pork meat herd of the province (accounting for 35.0%).

3.1.1.2. Structure of pig herds

In the structure of the herd of pigs, in the period 2005-2015, porkers account for the majority (79.6% -89.9%), sow herds 10.1% -20.4%, boar only occupies 0.02% -0.05%. Thus, porker production is still a major product in pig production.

* By species: The hybrid pigs are mainly accounting for 49.4%; Mong Cai breedings account for 54.3% of total sows.

* By type of pig husbandry: The type of small pig husbandry is very common in TT. Hue, accounting for 94.5% of households whose pigs is under 10 heads. Husbandry with the medium and large scale is limited and no big fluctuations (462-533 establishments); mainly farms with medium scale (over 87.1%). However, the proportion of farms increased sharply from 6.1% in 2010 to 12.9% in 2015. Thus, the structure of pig husbandry is changing from farms with medium scale to larger and concentrated one. The change is adequate with the trend of concentrated pig production, productivity and quality to meet the demand.

* By ecological region: There is a big difference among region in the size of the pig herd. In the midland delta, the size of pig herd occupies 55,3% of the total herd. Additionally, there is a downward trend in the size of pig herd due to the urbanization process. In contrast, in the coastal lagoon and mountainous areas, there is an upward trend in the total population. This is a reasonable transition to exploit fully the advantage of the region and develop comprehensively the pig husbandry.

3.1.2. Development relationship between pig production and the agricultural sector.

Table 3.7 shows that the pig production in the period 2005-2015 increased slowly. The average growth rate in this period was 1.6%/year being lower than that of husbandry and agriculture. The pig production accounts for over 61.5%, demonstrating that pig production played the most important role in the husbandry sector of Thus Thin Hue province from 2005 to 2015.

Table 3.7. GO size and structure of the pig production in the agriculture and husbandry of T.T. Hue 2005-2015 (at price of 2010)

Indicators	2005		2010		2015		Annual average growth (%)
	Quantity (Billion VND)	%	Quantity (Billion VND)	%	Quantity (Billion VND)	%	
1. Agriculture sector	3,169.37	100.0	3,695.29	100.0	4,077.1	100.0	102.6
2. Husbandry sector	802.60	25.32	887.28	24.01	969.85	23.79	101.9
3. Pig production	510.39	16.10	595.92	16.13	596.04	14.62	101.6
4. Proportion of pig production in comparison with husbandry sector	-	63.6	-	67.2	-	61.5	-

(Source: Statistical Office of Thua Thien Hue Province and author's calculations)

In relation to food production, the per capita cereal grain production over the years tends to increase from 267 kg in 2010 to 285 kg in 2015. The growth rate fluctuates over the years. Meanwhile pork output per capita tends to decrease from 19.8 kg in 2010 to 17.0 kg in 2013 and up to 17.7 kg in 2014, fluctuating growth rate is also unstable. Thus, in the specific conditions TT. Hue's growth of food production is still higher than that of alive hogs. That is, the development of husbandry does not hinder the production of food but rather ensures a balanced relationship for the development of agriculture.

Table 3.8. Relationship between pigs and food production

No.	Indicators	Units	2010	2011	2013	2014	2015
1	Gross output of grain production per capita	Kg	267	277	258	285	285
2	Growth of grain production per capita	%	0.9	3.7	- 5.8	10.5	-
3	Production of alive pigs per capita	Kg	19.8	18.8	17.0	17.5	17.7
4	Growth rate of alive pigs per capita	%	2.4	- 4.7	- 6.6	2.9	1.1

(Source: Statistical Office of Thua Thien Hue Province and author's calculations)

3.1.3. Planning and infrastructure for pig production development

3.1.3.1. Planning for pig development

In the past few years, Thua Thien Hue province has paid much attention to the planning such as promulgating the long-term plan for husbandry development until 2020. Nevertheless, the implementation of this plan is still slow. In 2015, the total pigs herd only reached 60.8% compared to the plan. In the development plan for husbandry up to 2020, 296,000 heads; of which total foreign porkers and F2 pigs accounted for 75% of the total; number of foreign sows accounted for 25% of total sow herd, number of F1 sows accounted for 52%; meat yield was slightly 32 thousand tons;

Planning the number of farms with medium and large scale increased especially for sow and pork meat farms.

3.1.3.2. Key infrastructure for pig development

a. Veterinary services and prevention of diseases

In terms of veterinary staff, by the end of 2014, 535 vets were granted practice certificates by the whole province. The number of primary vets was very high (74, at the same time, only 19 vets had bachelor degrees. The number of vets with intermediate level accounted for 22.24%. With the quality of veterinary staff, at present, it cannot meet the development needs of the general husbandry and pig production in particular in Thua Thien Hue.

Regarding to disease situation: In 2005-2009, the epidemic situation was very complicated. Especially due to the blue ear disease in 2007-2008, the number of pigs was destroyed nearly 20 thousand heads [17]. In the period from 2010 to 2015, people are gradually raised awareness on the safety of epidemic so the epidemic situation is no longer complicated as before. The mortality rate of animal due to septicemia, septicemia, diarrhea, sepsis, pneumonia caused by this is relatively low, easy to control.

Table 3.10. Vaccination results for pig herds in Thua Thien Hue province in the period 2010-2015

No.	Vaccination	Units	2010	2011	2013	2014	2015
1	Tam Lien disease						
1.1	Spring crop	%	86.7	75.7	71.3	71.1	92.9
1.2.	Autumn crop	%	78.2	67.9	61.2	74.4	93.0
2	Foot-and-mouth disease						
2.1	Spring crop	%	99.3	99.3	99.0	100.0	100.0
2.2	Autumn crop	%	99.5	99.5	100.0	100.0	100.0
3	Green ears (sows + male breeding pig)	Dose		1,390	2,020	3,350	2,000

(Source: Thua Thien Hue Department of Animal Health, DARD)

Vaccination is organized regularly and actively by farmers, meeting more than 70% of the total pig population for infectious diseases such as hemorrhoids, cholera, typhoid fever; Over 99% of foot-and-mouth disease contributes to limiting the outbreak of dangerous diseases;

b. Infrastructure system and service facilities

* Regarding the traffic system: rural transport infrastructure in 2010-2014 has been invested and upgraded, the rate of district roads has been solidified 51,7%, commune roads 40.1% [36].

* Service establishments: At present, the is no more small and manual slaughterhouses and the concentrated slaughterhouses have been encouraged instead. The number of slaughterhouses under 20 heads per day tended to decrease over the years, while the number of slaughterhouses with a capacity of 21 or more tended to increase. The system of veterinary medicine services, animal food meet the needs of farmers. Now 108 first-class agent supplying food in all districts, have met the demand for food supply.

c. Resources and production conditions.

In terms of pig production establishments, the average of people in the households is 5.38 people, but the average household labor is only 2.54 people. In addition, the age of the owners is relatively young, concentrated in the age of 43 to 47, most of the owners has completed grade 7.

The investment capital of agriculture, forestry and fishery through the years have increased. The capital growth rate is higher than the growth rate of GO in agriculture sector, GO in

husbandry. In 2010, to increase 1% GO in agriculture sector, GO in husbandry sector and GO in pig raising, the investment capital for agricultural and forestry production increased by 3.46%, 2.37% and 5.10%, respectively. This shows that the pig sector has a greater need for capital than the agricultural and husbandry sectors. By 2015, investment in agriculture, forestry and fisheries will decrease, to increase 1% GO agriculture, GO husbandry and pig GO, investment capital for agriculture, forestry and fishery will decrease by 3.19%, 2.42% and 11.05%.

Table 3.12. Impact of agricultural, forestry and fishery investment on pig production in Thua Thien Hue for the period 2010-2015 (at price of 2010)

No.	Indicators	2010	2011	2013	2014	2015
1	Growth of agricultural, forestry and natural resources	9.18	-16.92	28.98	-11.43	-10.17
2	GO of Agriculture	2.65	3.05	-1.84	4.27	3.19
3	GO of Husbandry	3.87	0.25	-3.38	7.02	4.2
4	GO of Pigs	1.8	-4.49	-5.6	6.24	0.92
5	Relationship Ratio (1)/(2)	3.46	-5.55	-15.75	-2.68	-3.19
6	Relationship Ratio (1)/(3)	2.37	-67.68	-8.57	-1.63	-2.42
7	Relation coefficients (1)/(4)	5.10	3.77	-5.18	-1.83	-11.05

(Source: Thua Thien Hue Provincial Statistical Yearbook, 2015)

The results of the survey of pig farms found that the average capital for pig production was VND 405 million, of which loans accounted for 29.3%;

The area of farms of the surveyed establishments is quite large, on average 93.71m², of which the area of big farms is 518.75m², 1.92 times higher than the medium size and 14.33 times compared to the household. Most pig farms are built solidly; especially some farms and farms are equipped with automatic drinking system for pigs.

3.1.4. Input market and product market

3.1.4.1. Input market

* Breeds: Pig breeds is mainly self-supply, accounting for 53.63% of breeding facilities, the number of breeders bought out 46.4%, of which the purchase from other breeding households was 23.6%, buying pigs from pig farms accounting for 7.0%, buying from traders 15.8%. Pig raising households were being able to save breeding costs when compared to external purchase. In particular, the quality of pig was well controlled and reduced disease.

Table 3.13. Source of breeding supply in surveyed farms

Indicators	Farm with large scale	Farm with medium scale	Farm with small scale	Overall average
Self-produced	54.5	69.6	50.2	53.6
Purchase from other husbandry facilities	18.2	14.3	25.9	23.6
Purchase from breeding pig farm	27.3	12.5	4.9	7.0
Purchase from traders	-	3.6	19.0	15.8

(Source: Survey data for 2014)

* Feed: Currently TT. Hue province does not have a feed processing factory; husbandry farmers mainly buy from the main sources: the first-class agents of the company, 46.1% of husbandry farms, second-class agents, 29.4% of husbandry establishments. With the different geographical location and husbandry type, the choice of food for husbandry is different.

Table 3.14. Food supply of surveyed farms

Feed source				Unit: %
	Farm with large scale	Farm with medium scale	Farm with small scale	Average
Self-produced feed	-	5.4	29.7	24.5
Purchase from agents (level 1)	90.9	82.1	36.5	46.1
Purchase from agents (level 2)	9.1	12.5	33.8	29.4

(Source: Survey data in 2014)

3.1.4.2. Output market

Pig husbandry of TT. Hue province serves mainly the needs of local market (about 70%). The number of pigs sold to the other provinces is very little. Annually, slaughterhouses have to import porkers from the provinces such as Nghe An, Quang Nam, Binh Dinh ect. There are more than 157,000 pigs per year to meet the demand in the province. The number of porkers exported to other provinces was about 7,689 heads per year. In 2015, more than 27,000 porkers and 22,000 breeding pigs were sold to other provinces.

Table 3.15. The situation of importing, exporting and slaughtering porkers in Thua Thien Hue in the period 2010-2015

Years	Input		Output			Slaughtering		Unit: head
	Pork meat	Breeding pigs	Pork meat	Piglets	Breeding pigs	Pork meat	Piglets	
	2010	115,000	896	1,950	13,325		469,694	20,407
2011	120,000	759	3,480	8,500	128	426,045	7,065	
2012	127,227	670	5,219	6,365		455,699	21,262	
2013	198,972	570	3,739	7,200		533,526	19,834	
2014	189,632	7,212	4,356	2,870		561,420	12,901	
2015	193,190	21,262	27,391	10,090	22,176	595,252	11,108	
Average/year	157,337	5,228	7,689	8,058	3,717	506,939	15,430	

(Source: TTAH Thua Thien Hue)

It can be seen that, with 1% growth of pork consumption in 2010, the pork production increased by only 0.12%. In contrast, the consumption growth decreased by 1% in 2012, the production declined more slowly (down 0.4%). By 2015, the comparative relationship changes when 1% of consumption growth corresponds to 0.15% of production growth. Thus, the production, in the period 2010-2013, has not met the consumption demand. Even though, the production growth in 2015 has exceeded the pork consumption in Thua Thien Hue province.

Table 3.16. Production and consumption of pork in Thua Thien Hue in the period of 2010 - 2015

No	Indicators	Units	2010	2011	2013	2014	2015
1	Production of pork per capita production	Kg/person	13.84	13.19	11.91	12.24	12.37
2	Growth in pork production per capita	%	2.41	- 4.75	- 6.58	2.77	1.09
3	Consumption of pork per capita	Kg/person	21.22	18.76	19.80	21.04	22.52
4	Growth of pork consumption per capita	%	20.06	- 11.56	15.42	6.28	7.04
5	Relationship coefficient (2)/(4)	%	0.12	0.41	- 0.43	0.44	0.15

(Source: Statistical Yearbook, SDAH and Author's calculations)

For porkers: Farms with large scale sold mainly to slaughterhouses and collectors. 56.03% of sold porks to large slaughterhouses and 26.71% of that to collectors. The farms with medium and small scale mainly sell porks to collectors and small slaughterers (from 45% to 47% of porks sold to collectors, from 39% to 43% of porks sold to slaughterhouses). While there was a few of farms with medium scale selling products to the slaughterhouses.

For piglets: piglets are mainly sold to farmers and collectors in which are farms with large scale (over 35% of piglets), farms with medium scale (over 40% of piglets). The farms with small scale sold mainly to collectors (over 49% of piglets).

3.1.5. Effectiveness of pig husbandry

3.1.5.1 Economic aspects

* At macro level:

Table 3.17. The contribution of the pig raising to economic development of Thua Thien Hue Province in the period of 2005-2015

Year	Pig production value at current prices (million VND)	Ratio of pig production value in production value (%)	Ratio of pig production value in agricultural production value (%)	Ratio of production value of pig raising in total production value (%)
2005	252,045	58.30	17.28	2.00
2010	541,909	61.08	14.66	1.46
2015	1,016,778	64.26	18.27	1.28
BQ	702,901	62.64	17.28	1.69

(Source: Thua Thien Hue Statistical Review and author's calculations)

From 2005 to 2015, production value of pig husbandry always contributes to the province's agricultural sector being quite large (from 14.66% to 18.53%). On average, the production value of pigs contributed 17.28% of agricultural sector GO or 1.69% of total production in the province. This shows that the development of pig production is an important factor in the economic development of Thua Thien Hue province.

The output of alive pigs in TT Hue province, in the period of 2005-2015, is over 20,600 tons. If the average price is 45,000 VND / kg, the total value of the pig production is nearly 1,000 billion VND. If the proportion of processed products is increased, the number will increase significantly.

* At a micro level:

- The results and efficiency of pig production

According to the table 3.18, we find that the average GO/IC index of the surveyed farms is 1.22 times. It means that 1 VND of intermediate costs is paid; there will be 1.22 VND of production being received. In other words, the growth rate of production value is more rapid than that of intermediate costs. Thus, among the three groups of pig husbandry, the farms with large scale (from 30 to less than 100 heads) have the highest efficiency.

Table 3.18. The results and efficiency of pig husbandry in the surveyed establishments

Indicators	Units	Farm with large scale (I)	Farm with medium scale (J)	Farm with small scale (K)	Overall average	(ANOVA:Post Hoc Multiple Comparisons)		
						I-J	I-K	J-K
1. GO	1000VND	5,137.50	4,707.00	4,379.72	4,462.78	430.50*** (0.000)	757.78*** (0.000)	327.28*** (0.000)
2. VA	1000VND	1,093.49	1,063.30	720.62	795.13	30.19 ^{ns} (0.922)	372.86*** (0.000)	342.68*** (0.000)
3. MI	1000VND	926.57	930.33	613.97	681.82	-3.75 ^{ns} (0.999)	312.60*** (0.000)	316.35*** (0.000)
4. GO/IC	Times	1.27	1.29	1.20	1.22	-0.02 ^{ns} (0.700)	0.07*** (0.004)	0.09*** (0.000)
5. VA/IC	Times	0.27	0.29	0.20	0.22	-0.02 ^{ns} (0.700)	0.07*** (0.004)	0.09*** (0.000)
6. MI/IC	Times	0.23	0.26	0.17	0.19	-0.02 ^{ns} (0.555)	0.06*** (0.022)	0.09*** (0.000)

(Source: Survey data for 2014)

Note: ***, **, *, ns: Mean difference with significance of 1%, 5%, 10% and no statistical significance

By types of pig husbandry, it can be seen the type of industrial husbandry brought the highest effectiveness thanks to the mixed income from 1 VND of costs. Additionally, there is a difference of husbandry types. Obviously, the results of testing ANOVA show that most of indicators are tested having statistical significance from 90% to 99%.

Table 3.20. Results and efficiency of sow production by scale

Indicators	Units	Farm with large scale (I)	Farm with medium scale (J)	Farm with small scale (K)	Overall average	(ANOVA:Post Hoc Multiple Comparisons)		
						I-J	I-K	J-K
1. GO	1000 VND	58.20	54.17	49.60	50.84	4.033 ^{ns} (0.412)	8.599*** (0.001)	4.565* (0.093)
2. VA	1000 VND	24.72	22.62	17.60	18.81	2.102 ^{ns} (0.731)	7.118*** (0.002)	5.017** (0.026)
3. MI	1000 VND	15.71	16.31	15.03	15.90	-0.602 ^{ns} (0.971)	0.675 ^{ns} (0.936)	1.277 ^{ns} (0.753)
4. GO/IC	Times	1.74	1.71	1.55	1.59	0.024 ^{ns} (0.958)	0.187** (0.013)	0.163** (0.019)
5. VA/IC	Times	0.74	0.71	0.55	0.59	0.024 ^{ns} (0.958)	0.187** (0.013)	0.163** (0.019)
6. MI/IC	Times	0.47	0.51	0.47	0.50	-0.044 ^{ns} (0.852)	-0.002 ^{ns} (0.999)	0.042 ^{ns} (0.737)

(Source: Survey data for 2014)

Note: ***, **, *, ns: Mean difference with significance is 1%; 5%; 10%; No statistical significance

By scale of farms, sow husbandry with large scale achieved the highest results by GO, VA, GO / IC and VA / IC. The average GO of 1 kg of sold piglets is 50,840 VND and there is a big difference between farm sizes (58,200 VND), farms with medium scale (54,170 VND) and farms with small scale (49,600 VND).

By husbandry method, the results and efficiency of sow production in the surveyed establishments show that the efficiency of intermediary cost based on the value added (VA / IC) of the industrial husbandry is the highest and there are differences between husbandry methods.

**Table 3.22. Results of sow production with different discount rates
(Long-term investment method)**

Discount rate (%)	NPV (1000VND/unit/year)	BCR (Times)
8	6,330.09	1.12
10	5,308.49	1.11
12	4,404.61	1.10
14	3,603.40	1.09
16	2,891.97	1.07
18	2,259.26	1.06
20	1,695.72	1.05
22	1,193.11	1.04
24	744.29	1.02
26	343.05	1.01
IRR = 27.91%		

(Source: Survey data for 2014 and authors' calculations)

The analysis of financial results of reproductive sow production show that both NPV and IRR are indicative of the effect of sow farming. NPV reached 4,404.61 thousand VND per head with a discount rate of 12% (corresponding to the interest rate that many households pay) and IRR = 27.91% which is higher than the current interest rate.

3.1.5.2. Society

Development of pig production contributes to increasing the income for laborers, creating jobs, especially for idle labors in rural areas, reducing the seasonality in agriculture. There are 51,905 households that raise pigs in the whole province. On average, one household devotes time to care for pigs by 0.5 laborers. The pig production has created stable jobs for over 25,000 laborers. In addition, there are thousands of other households involved in slaughtering, selling, wholesale, collecting and processing agents. This has contributed greatly to the creation of jobs for the rural people. The village, in particular, can easily use sub-labor, unskilled labor.

Table 3.23. Income situation and structure of surveyed establishments

Unit: Million VND

Indicators	Farm with large scale (I)		Farm with medium scale (J)		Farm with small scale (K)		Overall average	
	Value	%	Value	%	Value	%	Value	%
1. Average income of the household	263.9	100.0	109.2	100.0	39.5	100.0	59.0	100.0
1.1 Income from pigs husbandry	228.7	86.7	66.0	60.4	8.4	21.4	25.6	43.4
1.2. Other incomes	35.2	13.3	43.2	39.6	31.0	78.6	33.4	56.6
2. Average income of pig husbandry								
2.1. Average income per farm's member	39.8	-	11.6	-	1.6	-	4.3	-
2.2. Average income per labor	171.9	-	37.7	-	5.9	-	17.1	-

(Source: Survey data for 2014)

* Increasing the income for farmers: the average income of households reached 59.0 million, of which, income from pig production accounted for 43.4%, equivalent to 25.6 million VND / household, 4. , 3 million / person and 17.1 million / labor. Farms with large and medium scale get income mainly from pigs husbandry making up 86.7% and 60.4% respectively while farms with small scale is vice versa.

* Contributing to reducing the rate of poor households in rural Thua Thien Hue province: the correlation coefficient between pig GO growth and poverty reduction rate shows that in order to reduce 1% , 4% (actual increase of 1.8%), GO pigs need to increase by 0.96% by 2015 (actual increase 0.92%). That proves that pig growth has a certain impact on reducing the rate of poor households in T.T. Hue.

Table 3.24. Poverty reduction in Thua Thien Hue province

No.	Indicators	Units	2010	2011	2013	2014	2015
1	Poor household rate	%	11.16	9.16	6.5	5.06	4.1
2	Poverty rate	%	-1.29	-2.0	-1.5	-1.44	-0.96
3	Production value of pig husbandry	Billion VND	595.9	569.1	556.0	590.6	596.0
4	Production value growth of pig husbandrys	%	1.8	-4.49	-5.6	6.24	0.92
5	Relationship Ratio = (4)/(2)	%	1.40	2.25	3.73	4.33	0.96

*(Source: Statistical Office of Thua Thien Hue Province, 2015)***3.6.1.3. About environment**

In recent years, TT. Hue province has made efforts to encourage large farm in the area to use biogas technology to process waste and have built 3,498 works.

* Handle and use waste

The results show that the waste of pig husbandry in farms with large and medium scale was 100% processed completely by biogas technology. While, in farms with small scale, the proportion of waste was processed is only 40.19%, of which Biogas treatment is 28.85% and the incubation method is 11.34%. Thence, the larger the scale of husbandry, the more waste disposal is paid much attention and vice versa.

3.2. Factors affecting the development of pig production

3.2.1. External factors

3.2.1.1. Natural condition

The development of pig husbandry usually face with unfavorable conditions such as disease; preservation of feed; Prevention of hot sun for pigs in the delta and coastal areas and cold prevention for pigs in mountainous areas.

3.2.1.2. Policies

The policies in both national and Thua Thien Hue province level are encouraging the development of pig husbandry such as: Credit policy for agricultural development, the strategy for pig husbandry with high quality in Thua Thien Hue province ect.

3.2.1.3. Market price

The fluctuations of input prices and hog prices in the market, often make farmers facing great difficulties. The channel system also depends much on the intermediate stage leading to unstable output, affecting the efficiency of pig production.

3.2.1.4. International economic integration

The impact of international economic integration will reduce husbandry in which pigs are severely damaged in terms of value. With the current low productivity and competitiveness of the husbandry, farmers will suffer the most losses in productivity and welfare.

3.2.2. Internal factors

3.2.2.1. Factors affecting the weight of alive pigs

The results production function in Table 3.27 show that pork production of farms with small scale is not only affected by the inputs but also the characteristics of farmers and the socio-economic conditions,.

Considering the marginal impact of each factor on the farmer's pig production, it was found that the cost of feed, breeds was a variable that negatively influenced the weight of alive hogs. Labor and veterinary costs are two factors that have a positive influence on the weight of alive hogs.

3.2.2.2. Technical efficiency index

Estimated results of the production function show that the technical efficiency index ranges from 50% to 99%. The average technical efficiency of husbandry producers was 68.9%, while the average technical efficiency index of the farm was 93.5%.

No pig meat production base has an index of less than 40%. The technical efficiency index is as low as 40.9% for farm with small scale and the average for the middle scale farms is 65.7%. Most husbandry producers have efficiency indexes from 55% to 75%, accounting for 78.30%. For middle scale farms, the number of farm achieving the technical efficiency index of 90% to less than 100% accounted for 88%.

3.2.2.3. Factors affecting technical inefficiency:

The results of the Tobit regression model on the effects of factors on inefficient pork production techniques of smallholder farmers showed that factors such as: The culture of the household head, husbandry experience, the number of family labor, husbandry technical training and access to credit services all negatively affect technical inefficiencies, in other words All variables increase the technical efficiency index. In contrast, the age of the household head has a positive effect on technical inefficiencies, ie, reduced technical efficiency.

**Table 3.27. Cobb-Douglas production Function
and Technical inefficiency function**

Variable Abbreviation	Variables	Coefficient	
		Farm with large scale	Farm with medium scale
<i>Stochastic Frontier Production Function</i>			
	Constant	1.896 ^{***} (0.534)	2.279 ^{***} (0.440)
LnX ₁	Breeding cost (million VND /household)	-0.116 [*] (0.060)	0.161 ^{***} (0.050)
LnX ₂	Feed cost (million VND /household)	-0.197 ^{***} (0.040)	-0.082 ^{**} (0.038)
LnX ₃	Labor cost (labor / household)	0.304 ^{***} (0.097)	0.125 [*] (0.072)
LnX ₄	Veterinary expense (million VND /household)	0.228 ^{***} (0.036)	0.289 ^{***} (0.026)
LnX ₅	Size of porker (head/household)	0.025 ^{ns} (0.028)	0.032 ^{ns} (0.032)
<i>Technical inefficiency function</i>			
	Constant	0.657 ^{***} (0.136)	0.701 [*] (0.419)
Z ₁	Households age	0.006 ^{**} (0.003)	0.006 ^{ns} (0.011)
Z ₂	Households qualification	-0.033 ^{***} (0.006)	-0.006 ^{ns} (0.024)
Z ₃	Year of pig husbandry	-0.012 ^{***} (0.004)	-0.058 ^{**} (0.024)
Z ₄	Number of family's labor	-0.015 [*] (0.008)	-0.065 [*] (0.034)
Z ₅	Participation in training (1 = Yes; 0=No)	-0.058 ^{**} (0.028)	-0.356 ^{**} (0.178)
Z ₆	Credit (1 = borrow; 0 = no borrow)	-0.073 ^{**} (0.029)	-0.277 [*] (0.157)
Sigma-squared (δ^2)		0.029 ^{***} (0.003)	0.019 ^{***} (0.007)
Gamma (γ)		0.878 ^{***} (0.141)	0.884 ^{***} (0.050)
LR test of the one-sided error		78.565	42.300

(Source: Survey data for 2014 and processed by Frontier Program 4.1)

*Note: ***, ** and * respectively statistically significant at 1%, 5% and 10%.*

3.3. Strengths, weaknesses, opportunities, threats and issues to be addressed in the development of pig husbandry in Thua Thien Hue province

3.3.1. Strengths, weaknesses, opportunities and threats

3.3.1.1. Strengths

- TT. Hue province has paid attention to the development planning of the husbandry;
- The abundance of land resources and labor resources;
- Local authorities are encouraging the development of pig production with large scale;

3.3.1.2. Weakness

- Small scale of pig raising, low quality of pig productions;
- The infrastructure system is not sufficient; the facilities of most slaughters were poor;
- The feed was entirely depends on the supply of processed feed; the main market was within the province and the cooperation between households and collectors is limited;
- The level and capacity of pig production is weak and lack of necessary conditions for pig husbandry;
- The lack of human resources for implementation of pig husbandry activities;
- Lack of capital for the development of pig husbandry and the access to loans is difficult.

3.3.1.3. Opportunity

- There are many policies of the state and the province to encourage the development of pig husbandry;
- The province has implemented the plan for husbandry development to 2015,;
- Husbandry producers can access advanced husbandry processes;
- The market demand for pork products is increasing;

3.3.1.4. Challenge

- The husbandry sector will face increasingly competition because Vietnam integrates more deeply in the world economy;
- Disease, climate change and environmental pollution are still major threats;
- The market price is not stable; the link between production and consumption is poor;
- The quality of processed feed is difficult to control;
- Husbandry products are mainly consumed in fresh form and sold everywhere; hence, it is difficult to control food hygiene.

3.3.2. Issues that need to be addressed in the development of pigs in TT. Hue

- Environmental pollution, disease handling and quality control of pig breeds;
- Input price and product price.
- Other factors such as medicine, husbandry knowledge, market information, capital and land.

CHAPTER 4

ORIENTATION AND SOLUTIONS FOR THE DEVELOPMENT OF PIG HUSBANDRY IN THUA THIEN HUE PROVINCE

4.1. Orientations and objectives of the development of pig husbandry in Thua Thien Hue province

4.1.1. Point of view

- The development of pig husbandry must be consistent with the general planning on socio-economic development of the province and the whole country;
- Developing the sustainable pig production in Thua Thien Hue;
- Identifying pigs as the main husbandry of the province; therefore it is necessary to focus on the development of pig production in terms of quantity and quality;
- Creating favorable conditions for all organizations, individuals and economic sectors to invest in husbandry development; supporting and create conditions for traditional raising households to gradually change to large scale farms.

4.1.2. Orientation

- The gradual shift from small-scale husbandry -to-large scale husbandry and adoption of advanced technology on pig raising;
- Promoting the application of technical advances in breeding, feeds, veterinary in order to improve productivity, quality and reduce production costs.
- The government supports investment on breeding facilities;
- Carrying out the policy of investment in line with the strategy on husbandry development for all organizations, individuals;
- Gradually setting up the production of raw materials for animal feed;
- Strengthening the capacity of the state management system on animal husbandry

4.1.3. Target

By 2020 the target of the total pig population is 296,000, of which pigs have 75% foreign blood or more is 221,700, sows is 61,350 (Mong Cai sows 14,200 , F1 sows 31,700, foreign sucks 15,450) And the output of live hogs is 31,968 tons. The whole province has 53 sow farms, 51 pig farms and 546 pig farms.

4.2. Major solutions for pig raising development in Thua Thien Hue province

4.2.1. Planning solutions

- Planning the seed production and seedling establishment
- Planning pig raising farms

4.2.2. Technical solutions

4.2.2.1. Breeding solution

- Establishment of pig breed farms with the size of 50 - 200 pigs
- Strict management and planning on sow farms
- Importing foreign-blood parents

4.2.2.2. Solution on pigpen

- Promoting the application of technical advances in pig production.
- Constructing a breeding system that meets veterinary hygienic conditions and treating waste water.

4.2.2.3. Feed solutions

- Building a new factory producing and processing animal feed;
- Planning raw material areas for feed production;
- Promoting the management of processed feeds;

4.2.2.4. Solutions for technical assistance, extension

- Transferring of new scientific and technical advances to animal husbandry;
- Introduction new models of pig husbandry, and development of extension activities.

4.2.2.5. Solutions on veterinary and the environment

- Promoting vaccination for pigs; fully supply of quantities and types of veterinary drugs.
- Strengthening and develop the veterinary network at commune level.
- Strictly control farms violated environmental regulations.

4.2.3. Market solutions

4.2.3.1. Market organization

- Develop policies to stabilize input and output price
- Encourage households to participate in husbandry co-operatives

- Build linkages to sell products, regularly update input and output market information.
- Organize well the association of among government, farmers, entrepreneurs, scientists.

4.2.3.2. Slaughtering and processing solutions

- The establishment of scattered slaughter stations is strictly forbidden in localities;
- Encourage organizations and individuals to invest in the establishment and development of pork processing plants with advanced and modern production lines.

4.2.4. Policy solution

4.2.4.1. Human resource development policy

- Develop policies to attract qualified human resources
- Improve the technical skills for the governmental staff

4.2.4.2. Land policy

- To create conditions for organizations and individuals to lease land for raising pigs at least 30 years. .
- Encourage farmers to form concentrated husbandry areas.

4.2.4.3. Infrastructure policy

- Supporting for development of transport infrastructure
- Investment in the construction of breeding areas, feed production, concentrated farm construction, etc.

4.2.4.4 Credit policy

- The government should support capital for husbandry development according to the state's regulations;
- The government should create favorable conditions for farmers to access credit services of agricultural and rural development.

4.2.5. Solutions related to the development models of husbandry production

- Maintain and develop the form of household production;
- Promote and encourage the development of farm economy;
- Attract businesses to develop pig production.

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusion

1. The development of pig production is a process of quantitative and qualitative growth with a progressive structure that is consistent with the development trend of the agricultural sector in general and the development of the husbandry sector. It also meets the increasing needs of consumers in the market for pig products and ensures economic, social and environmental efficiency.

2. Productivity, yield, and size of domestic pigs tended to decrease sharply, but the number and size of exotic pigs increased sharply, affecting the shift of pig production towards reducing the proportion of domestic pigs with low productivity and quality to exotic pigs with higher in productivity and quality. However, in the herd of sows, Mong Cai domestic sow still occupies a high proportion (over 54%), small scale and scattered farmed households still do not make a real change in quality. Production value of pigs accounted for 61.5% of production value and 76.9% of meat production.

3. Pig raising planning has been implemented but still slow. The infrastructure is limited so it does not meet well demand. Market price input, output fluctuations continuously, unstable makes it hard for people to work. Pig production in the province of Hue recently mainly meet the needs in the province (70%).

4. Effectiveness of pig production: In terms of economy, the development of pig production has contributed positively to the overall growth of the economy, the agricultural sector and the husbandry sector, resulting in a shift in economic structure as plan of the province Thua Thien Hue; Husbandry farms in Thua Thien Hue have achieved certain results. In terms of social efficiency, pig production contributes to increase income, create jobs for farmers and other stakeholders, and reduce the rate of poor households in rural areas. Regarding environmental efficiency, using biogas technology reduced the impact of environmental pollution, but the amount of untreated waste is still large.

5. Analysis of the major factors affecting the development of pigs by using the Cobb-Douglas function has identify factors that affect technical inefficiencies for husbandry producers in Thua thien Hue province.

6. Clarify strengths, weaknesses, opportunities, threats and issues for pigs development; On that basis, proposing 5 groups of solutions for the development of pig raising in Thua Thien Hue until 2020.

2. Recommendations

2.1. For state and local government

- It is necessary to implement policies such as land policies; credit policies; subsidy policies for input market (feeds, veterinary) and staff training.

- Regular assessment of the actual implementation of the husbandry development plan in Thua Thien Hue.

- To prioritize the development of transport, electricity and water systems in concentrated pig raising areas. Renovation and upgrading of slaughterhouses, with emphasis on the construction of waste treatment systems.

- It is necessary to have policies to attract domestic and foreign investors to build and develop feed processing factories in the province.

2.2. For husbandry farms

- It is necessary to supplement knowledge, improve the link between pig raising farmers and collectors.

- Follow the process of disease control, food safety and hygiene. Attention should be paid to the cleaning of stables and waste treatment in pig raising process.

- Regularly monitor market developments such as input price, output price, epidemic ... to make a rational investment decision.

- Small and medium scale husbandry should be gradually shifted to medium- and large-scale husbandry and application of waste treatment solutions to raise productivity, quality, economic efficiency and environmental protection.

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