

Characteristics and efficiency of some livestock production systems in the Red River Delta: Case study in Cam Giang district, Hai Duong province

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Abstract: This paper aimed a better understanding and determining strategies for the development of animal production systems in the Red River Delta. A total of 90 households in 3 communes of Cam Giang district, Hai Duong province were surveyed from January to July, 2007. Based on animal species and intensive levels, five main livestock production systems were typologied. Richer households having more capital and experiences on animal husbandry usually choose pig or poultry intensive system. On contrary, the households in difficulty always choose semi intensive or mixed system in order to utilize by-products of their family. The performance and the efficiency of the intensive pig production system were highest and improved in some last years in the Red River Delta (weaning age of piglets: 30.8 days, weight at 60 days: 19.20kg/head, growth rate of fattening pig: 19.24kg/month; profit for sow: 880,580 VND/litter, for fattening pig: 121,500 VND/head). The lowest performance and efficiency were found at the mixed animal production system (growth rate of fattening pig: 14.4kg/month; profit for fattening pig: 77,140 VND/head, for sow: 718,420 VND/litter). It had a lot of disadvantages that influence on the animal production of the farmers such as lack of technical knowledge, epizooties, price variation, etc. It needs comprehensive measures to solve these problems in order to have sustainable development of animal production.

Keyword: *livestock production systems, farmers, households*

1. INTRODUCTION

Livestock production plays an important role in household economic in Vietnam. Ten years ago, livestock production of Vietnam has been developing in high rate, about 8-10%/year. The value of animal production will be able to reach 30% of agriculture's GDP in 2010 (Nguyen Dang Vang, 2006)

Nowadays, applying interdisciplinary and system approach in livestock production is very necessary in order to have sustainable development because animal production often relates with other sectors and is influenced highly by socio – economical factors. Further, livestock production often has great diversity and depends highly on local conditions. The diversity of animal production is manifested by animal species, farm size, intensive level, etc. However, the application of these approaches in livestock production research in Vietnam is still not popular. Therefore, research on livestock production systems of a region aims to evaluate the current situation and to determine the disadvantages in developing household's livestock production. It is very necessary and useful for us to make an optimal decision for sustainable development on animal production of the region .

2. MATERIALS AND METHODS

Cam Giang district was divided into three comparatively homogenous zones based on its land zoning and species of livestock. The first zone is of infertile soil and raising principally poultry; the second is ancient alluvial soil and raising pig; and the third one is alluvial soil and raising cattle. In each zone we choose one commune, they are Ngoc Lien Commune (1st zone), Cam Dinh commune (2st zone) and Duc Chinh Commune (3st zone). In each zone, we choose randomly thirty households. The number of household of each system depends on the importance. The survey includes two steps: informal and formal survey. We used the semi -structure questionnaire for the formal survey.

Typology of system based on some factors that following: the importance of animal species raised, intensive levels in animal production (based on animal breed, farm size, kind of feed utilized). The data were analyzed by descriptive statistic method on Microsoft Excel.

3. RESULTS AND DISCUSSION

3.1. Typology of livestock production systems in the region

There were five main livestock production systems as showed on table 1.

Table 1. Typology of livestock production systems in Cam Giang (n=90)

Typology of system	Species and number of animal raised (head)	Number of household	Ratio (%)
Intensive pig production system (IPiS)	15-20 exotic or hybrid sows; 50-100 growing pigs	5	5.56
Semi-intensive pig production system (SIPiS)	3-5 local or hybrid sows; 20-50 growing pigs	18	20.00
Intensive poultry production system (IPoS)	500-1000 industrial chickens or French Muscovy	18	20.00
Semi-intensive poultry production system (SIPoS)	200-500 chickens or French Muscovy, ducks	29	32.22
Semi-intensive mixed production system (SIMS)	1-2 sows; 10-30 growing pigs; 10-50 chickens; 1-2 cattles	20	22.22

The diversity of animal production systems derives from animal species, farm size and intensive levels of the households. In the intensive systems, farmers often raise exotic or hybrid animal breed (such as Landrace, Yorkshire, Ross...) with important size (15-20 sows, 50-100 growing pigs for IPiS, 500-1000 poultry for IPoS). The animals are fed by 100% of industrial feed. The animal house keeping is in good condition such as *automatic watering system*, *automatic feeding system*. On contrary, in the semi intensive systems, the lower performance breeds (local sow, local chicken...) are chosen with small size (3-5 sows, 20-50 growing pigs for SIPiS, 200-500 Chinese chickens or French Muscovy, ducks for SIPoS). The farmers often use principally auto-produced feed with a little industrial feed at some critical periods. For mixed system, the farmers raise many species of animal (pig, poultry and cattle) with quite small size for each species.

3.2 General characteristics of households in different systems

The general characteristics of households in different systems were presented on table 2.

Table 2 General characteristics of households in different systems

Systems	Year school	Number of labours	Percentage of Households borrowing with interest	Percentage of Households borrowing without interest	Economic level of household (%)		
			(%)	(%)	Rich	Medium	Poor
IPiS	11.60 ± 0.40	2.00 ± 0.00	100.00	0	60.00	40.00	0.00
SIPiS	8.50 ± 0.53	2.17 ± 0.09	44.44	11.11	11.11	83.33	5.56
IPoS	8.06 ± 0.49	2.22 ± 0.10	77.78	16.67	55.56	44.44	0.00
SIPoS	8.17 ± 0.42	2.14 ± 0.07	44.83	6.90	10.34	68.97	20.69
SIMS	6.65 ± 0.41	2.15 ± 0.08	20.00	20.00	5.00	50.00	45.00

The results on table 2 showed that in IPiS, the education level of farmers is higher than others (about 11,6 years), therefore they are able to approach to new technologies better and more sensitively with market fluctuation compare to others. The number of labours in all systems is about 2 persons.

To develop animal production, most of farmers have to borrow money from several sources of credit (banks, credit funds or other households). The households borrowing from the credit organizations represent an important proportion (20-100%). On contrary, the credit source without interest is small (10 to 20% of households).

The farmers with intensive systems are often in rich or medium. On contrary, the poor households often chose semi intensive or mixed systems.

3.2 The activities of livestock production systems

3.2.1 The activities of intensive livestock production systems

Intensive systems were the open ones that exchanging regularly with other systems (breeders, feed,...). In intensive pig production system, the exotic sows were often bought from pig companies such as CP, My Van, etc. All of the piglets were continuously raised at farm. In intensive poultry production system, the farmers often raised industrial chicken for meat or French muscovy with short growing cycle and high performance. Pigs and chickens were fed completely by industrial feed. Because of lacking capital, most of the farmers had to buy the feed on credit (the price was 2-3% higher than usual), it makes the cost of production to increase.

The peasants' main objective is to produce for commercial purposes. With high quantitative and qualitative products, they were often sold in some big cities (like that Hanoi, Hai Phong and Hai Duong) or in some industrial zones in Hai Duong (like that Luong Dien, Dai An...). Actually, there is not trade contract between the producers and traders. Therefore, producers some times met the difficulties to sell their products. It is one of important factors to limit the development of households' livestock production.

Waste management is very important in intensive animal production system. With an important quantity of waste which are usually used in some ways like that for aquaculture, for cropping, for selling or using to produce biogas.

In order to have great efficiency on animal production, especial in pig production, the farmers need to know well about technical production. However, most of farmers in this system often practiced with their experiences or learned from neighbors, so their technical knowledge is not very well enough. The role of organization of extension and local vet is still limited for development of animal production.

3.2.2 The activities of semi-intensive animal production systems

The activities of semi-intensive animal production systems were more diversity than the intensive ones. The farmers here were cared about not only animal husbandry but also plant cultivation and some non agricultural activities.

Most of the farmers in SIPiS (that was 72,2% in total) raised sows to produce fattening pig. Vu Dinh Ton and Vo Trong Thanh, (2005) showed that there were 42,3% households having 1,8 hybrid sows per household and 34,0% ones having 1,3 local sows per household in the Red River delta. It is clear that the farm size in Cam Giang were increasing remarkably. The rest of households (27,8%) only have bought the piglets to fatten. The results also showed that there were 55,6% of households that have non-agricultural activities such as production of alcohol, of soybean cakes, etc. The by-products of agro-processing are utilized effectively for pig production.

3.2.3 The activities of mixed semi-intensive animal production systems

In the mixed system, with different conditions and objectives, the farmers could raised two or three animal species that they can utilize effectively most of by-products from household's crop. Because of having high diversification, the farmers can reduce the risk of price fluctuation. The animal products mostly were sold at local markets and for family

consumption.

3.3. The performance and efficiency of the systems

3.3.1. The performance of sow in different systems of animal production

The performance of sow in systems is presented on table 3

Table 3. The performance of sow in different systems

Breeds utilised	systems	Piglets born/litter (head)	Weaned piglets/litter (head)	Weaning age (day)	Age of fattening (day)	Weight of fattening age (kg/head)
		$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$
Local sow	SIPiS	12.29 ± 0.64	10.57 ± 0.37	44.29 ± 0.71	62.50 ± 1.44	14.25 ± 0.25
	SIMS	12.87 ± 0.41	10.80 ± 0.24	44.00 ± 0.72	71.43 ± 1.10	16.14 ± 0.33
Hybrid and exotic sows	IPiS	11.00 ± 0.45	9.40 ± 0.40	30.80 ± 1.71	62.00 ± 1.22	19.20 ± 0.80
	SIPiS	11.92 ± 0.26	9.92 ± 0.36	37.50 ± 0.75	62.50 ± 0.97	16.08 ± 0.38

The sows were reared in semi-intensive systems with quite good performance. The litter size varies from 12.29 to 13.88, the same as the results of Vu Dinh Ton et al (2005) in Red River delta (12.86 piglets/litter). The weight of piglet at 60 days is from 14.0 to 16.14 kg per head, higher than the result that Vu Dinh Ton et al (2005) reported (11.56kg per head). Exotic sows and crossbred ones were mostly raised in IPiS and SIPiS. The reproductive performance of sow was highest in SPiS (weaning age: 30.8 days, weight at 60 days: 19.2 kg per head). These results are better than results of Vu Dinh Ton et al reported in 2005 (16.11 kg per head for modern sow and 13.07 kg per head for crossbred).

3.3.2. The performance of fattening pigs in systems

The results are showed on table 4

Table 4. The performance of fattening pigs in systems

system	Numbers of fattening pig/year (head)	Weight of start fattening (kg/head)	Weight of finishing (kg/head)	Time of raising (day)	Weight gain (kg/head/month)
	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$	$\bar{X} \pm m\bar{x}$
IPiS	258.00 ± 32.92	18.20 ± 0.80	76.00 ± 2.92	90.00 ± 1.58	19.24 ± 0.50
SIPiS	66.28 ± 7.06	16.11 ± 0.45	66.11 ± 2.34	95.56 ± 1.66	15.62 ± 0.59
SIMS	36.07 ± 4.42	15.21 ± 0.21	63.79 ± 2.46	101.07 ± 1.67	14.40 ± 0.66

The performance of fattening pigs was highest in IPiS, (weight gain were 19.24 kg per month). This result is better than which Doan Xuan Truc reported in 2004 in Red River Delta (18.24 kg per head per month). In SIMS, the performance of fattening pigs was lowest and lower than ones in the Red River delta (17.01 kg per head, Vu Dinh Ton et al, 2005). The reasons of low performance of pig may be caused by high ratio of local breed sow (27%) and some other reasons.

3.3.3. The performance of poultry in systems

Table 5. The performance of poultry in systems

Poultry		IPoS	SIPoS	SIMS
Local chicken	Time of raising (day)	0	145.63 ± 4.38	162.50 ± 1.99
	Weight of finishing (kg/head)	0	2.21	2.24
Industrial chicken	Time of raising (day)	50.0 ± 1.67	0	0
	Weight of finishing (kg/head)	2.78	0	0
Chinese chicken	Time of raising (day)	0	71.43 ± 12.43	95.0 ± 5.0
	Weight of finishing (kg/head)	0	2.24	2.49
Duck	Time of raising (day)	0	61.0 ± 7.02	55.0 ± 0.09
	Weight of finishing (kg/head)	0	2.27	1.85
French Muscovy	Time of raising (day)	79.44 ± 1.76	76.88 ± 5.28	83.33 ± 1.67
	Weight of finishing (kg/head)	4.06	3.71	3.63

The performance of poultry in IPoS was higher than the semi-intensive systems. For example, the weight at slaughter age of French Muscovy in IPoS was 4.06 kg per head that higher than these in SIPoS (3.71 kg per head) or in mixed system (3.63 kg per head). Chinese chicken (garden chicken) were raised quite popularly in SIPoS. The performance of them in SIPoS was higher than these in SIMS.

3.3.4. The efficiency of sow and fattening pig production in different systems

The efficiency of sow and fattening pig production is presented in the table 6.

Table 6. The efficiency of sow and fattening pig production in different systems

		Local sow		Hybrid or exotic sow		Fattening Pig (1000VND/head)	
		(1000VND/sow)		(1000VND/sow)			
		SIMS	IPiS	IPiS	SIPiS	SIMS	
Feed	1000 VND	1290.24	1724.22	655.05	567.71	569.64	
	%	88.36	87.63	62.75	60.77	61.17	
Veterinary	1000 VND	57.01	77.13	9.06	7.98	7.00	
	%	3.90	3.92	0.87	0.85	0.75	
Insemination	1000 VND	23.17	36.12	315.64	303.25	305.19	
	%	1.59	1.84	30.23	32.46	32.77	
Others	1000 VND	89.73	132.05	64.21	55.19	50.43	
	%	5.70	6.62	6.15	5.91	5.30	
Total cost		1460.15	1967.72	1043.96	934.13	931.26	
Total Income	1000 VND	2111.32	2848.30	1165.46	1032.67	1008.40	
Profit		657.14	880.58	121.5	98.54	77.14	

The table 6 showed that the local sows are often reared in semi-intensive system and the hybrid or exotic sows are usually reared in intensive one. The profit of semi-intensive system was generally lower than that in the intensive one (657,140 VND/liter/sow compare to 880,580 VND or 77,140VND/fattening pig compare to 121,500 VND). However, the investment in the intensive system is always more important than others.

3.3.5. Efficiency of poultry production systems

Table 7. The efficiency of poultry production in different systems*Unit: 1000VND/year*

		IPoS	SIPoS	SIMS
Feed	1000 VND	72111.11	19081.39	3041.67
	%	75.17	77.98	76.92
Veterinary	1000 VND	4677.78	808.58	268.33
	%	4.88	3.30	6.79
Insemination	1000 VND	18500.0	4305.00	561.25
	%	19.29	17.59	14.19
Others	1000 VND	639.22	275.69	83.00
	%	0.67	1.13	2.10
Total cost		95928.11	24470.65	3954.25
Total Income	1000 VND	104305.56	26964.14	4307.00
Profit		8377.45	2493.49	352.75

Like to performance of pig production, the profit of the intensive system of poultry production is also more important other ones (8377,450 VND/year compare to 2493,490 and 352,750 VND in SIPoS and SIMS respectively).

3.3.6. Comparison the efficiency of systems

Table 8. The efficiency of different livestock production systems*(Unit: 1000VND/year)*

Systems	Total cost	Total Income	Profit
IPiS	297394.50	329334.38	31939.88
SIPiS	84763.44	97235.03	12471.59
IPoS	130194.95	142669.80	12474.85
SIPoS	58047.22	66759.12	8711.90
SIMS	42591.53	49592.41	7000.87

As the results showed on table 8, the farmers in intensive systems always invest more money on production, therefore they get total income and profit are higher than semi-intensive ones.

4. CONCLUSIONS

There are five main animal production systems in Cam Giang Distric based on animal species, farm size and intensive levels. The richer households have more capital to invest and more experience on animal production than the others, so they often apply intensive pig or poultry production systems. On contrary, the poor households always choose semi-intensive or mixed system because of lacking of capital and experience on animal production.

The performance and the efficiency of the intensive pig production system were highest and improved in some last years in the Red River Delta (weaning age of piglets: 30.8 days, weight at 60 days: 19.20kg/head, growth rate of fattening pig: 19.24kg/month; profit for sow: 880,580 VND/litter, for fattening pig: 121,500 VND/head).

Beside some problems influencing on household animal production such as poor technical knowledge of the farmers, epizootics, price fluctuation, we can see there is not a good linkage between producers, between producers and other agents in the commodity chain of animal products. Other hand, the service in animal production limited is so far to meet the producers' need. Therefore, we should have comprehensive measures to solve all those problems in order to reach a sustainable development of animal production.

REFERENCES

1. Vu Trong Binh (1995), *Hog-rearing systems in the Red River delta*, Vietnamese studies, Special new peasants of the Red River delta, published in English and French No 115, p 126.
2. Nguyen Thien et al (2005). Pigs in Vietnam, Agricultural publishing house, Hanoi, pp 422-423
3. Vu Dinh Ton, Vo Trong Thanh (2005), Performance of pig production of households in the Red River delta, *Journal of Agricultural Science and Technology*, No III, 5/2005, pp 390-396
4. Nguyen Dang Vang (2006), *The priority factors on research to develop household income in household animal production*, National Institute of Animal Husbandry, www.vcn.vnn.vn