

A survey of Muscovy duck production in rural areas of Tra Vinh Province, Vietnam

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ABSTRACT

In case of livestock development in the rural areas of Tra Vinh province of Vietnam, Muscovy duck breeds are diversified by importing and breeding, which is more valuable for social and economic benefits. A total of 7,921 Muscovy ducks were observed to collect data for this survey to identify the current status of its production, feeding, and performance. Farmers, who owned at least 30 ducks, were interviewed to analyze data ownership, feeding, and growth performance of three breeds relating to the Muscovy including local Muscovy ducks (LMDs), France Muscovy duck (FMDs), and Crossbred Muscovy ducks (CMDs). The findings indicated that **most** farmers kept a small duck herd of fewer than 100 heads per householder, and the majority of Muscovy duck was LMDs. Farmers fed them **local** feed resources, with low nutritive diets (CP: 7.35 – 12.0 % and ME: 11.44 - 11.83 MJ/kg DM). A small number of farmers used a concentrate feed (CP: 16.5-19.3; ME: 11.96-12.69 MJ/kg DM) for supplementation with the daily weight gain was 16.7 g for LMDs and 22.7 g for CMDs, while the FMDs was fed a better quality of concentrate and gave the daily gain of 25.7 g.

Keywords: Muscovy duck, Local feed resources, Growth performance, Villages.

INTRODUCTION

In Vietnam, poultry production in general and duck production, in particular, is becoming the main sector in livestock production which brings income for many farmers, especially small farmers in rural areas. The Mekong River Delta accounted for a fifth of Vietnam's poultry population (GSO, 2017). Duck production mainly concentrated on Mekong River Delta and Red River Delta (Desvaux *et al.*, 2008) and most of them is a small farmer in which the scale of poultry production is average 80 to 200 heads that made up 90% farm (Thang *et al.*, 2011; GSO, 2017).

Animal genetic resources are essential for all future advancements and adaptations, and there is a global need to protect particular qualities for long-term usage. As a result, in order to adapt to future markets, production techniques, available feed supplies, environmental challenges, laws and regulations, and disease pressure (Yakubu, 2013), an understanding of the phenotypic, biochemical and production characteristics as well as the meat and egg attributes of local Muscovy ducks is a necessary need. Genetic improvement program has improved the productive performance of duck, particularly, Pekin ducks are well known as the main meat-type duck (Huang *et al.*, 2012; Zen *et al.*, 2016; Wang

et al., 2017) or Longyan laying ducks as the main egg-type breed of ducks (Xu *et al.*, 2014). Besides, Muscovy ducks are also popular, known as high breast meat, and adapt to various rearing conditions (Wu *et al.*, 2014). Muscovy duck meat is more favorable than other kinds of duck meat in most consumers due to high percentage of meat, less fat (Parkhurst and Mountney, 1988; Adesope and Nodu, 2002), and the meat is tender, tasty and nutritious with 19,6-21% crude protein (CP) and 2,47% ether extract (EE) (Dong, 2005).

In the case of small duck farmers in rural areas, ducks are not raised properly, especially for feeding and watering. Farmers mostly do not focus on how their animals grow or how outstanding their animal performance is. Besides, farmers used local feed or agricultural by-products from their surrounding house. The amount and quality of feed firmly depend on the availability of natural feed resources throughout the year. This study was aimed to clarify the status of the Muscovy duck production in small farmers, by describing the duck population, feeding, and growth performance in Tra Vinh province of Vietnam. The result study may be beneficial in further developmental effort for improving production of rural duck farming.

MATERIALS AND METHODS

Location

The study was conducted at Tra Vinh province as one of provinces in the Mekong delta. The survey was implemented in three months, with prepared questionnaires. A total of 145 duck farmers was intensely interviewed to get data at farm level and household level. There are three districts, namely, Chau Thanh, Cang Long, and Cau Ke, in which the study is implemented because of the highest number of ducks in these districts. The activity of duck industry here can perform a great picture for the whole province. The map of Tra Vinh province including three surveyed areas is presented in the Figure 1.

Data Collection

Survey data collection

This study applied a purposive sampling method to select respondents from the introduction and data of Department of Agriculture in Tra Vinh province with criteria: duck farmers, who owned more than 30 ducks, which included local or France or crossbred Muscovy duck breeds, were chosen. A total of 145 duck farmers were selected to implement in-depth interviews with the questionnaires, which were contained information about duck growth performance, duck

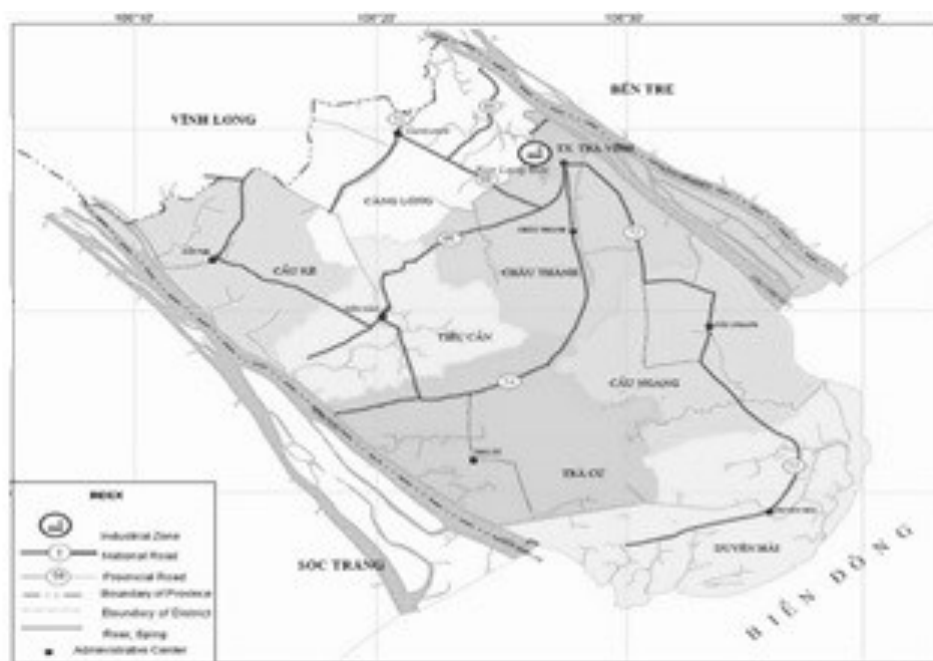


Figure 1. Tra Vinh Province and Three Areas of Survey

productivity, and feed intake.

All respondents read the questionnaires before interview to make sure there were no conflicts or sensitive information in the questionnaire. The discussion and sample collection were started when the respondent agreed.

The study used Vietnamese during the time of face-to-face interview with the criteria to collect both quantitative and qualitative data as below:

Household level was surveyed to give information about economic efficiency between three breeds of duck and feed resources. Farmers who have owned more than 30 ducks were selected as respondents.

Farm level was conducted to show duck performance. Feed ingredients in each household were collected, then analyzed at Can Tho University. At least three samples were collected and sent to Lab to analyze feed chemical composition in the diet.

Laboratory Data Collection

Dietary samples were taken and stored in a freeze box, and all samples were used to calculate the actual feed and nutrient intakes of these Muscovy ducks.

Dry matter (DM) and crude protein (CP) (N x 6.25) were analyzed from feed samples by the standard of AOAC methods (AOAC, 1990) which were collected from respondents. ME concentration of the feeds was calculated following Janssen *et al.* (1989).

Data Analysis

Descriptive data analysis was used for this study by the procedure of Minitab 16.1.0 (2010). Feed chemical composition was analyzed at Can Tho University.

RESULTS AND DISCUSSION

Duck Population in Survey Areas

The result showed that 145 households in 12 surveyed communes of three districts are small farmers (Table 1). They still raised Muscovy ducks traditionally. Cang Long district is one of three districts where the number of Muscovy ducks was much more than others. LMDs accounted for the majority of duck farming in three districts with 68.2%, CMDs for 20.8%, and the rest of FMDs with 11.0%.

Muscovy ducks were raised in small-scale farming in Tra Vinh Province. Raji *et al.* (2009) further argued that Muscovy ducks are particularly well-suited to scavenging systems and are more tolerant of hot weather than chickens. LMDs are also easy to raise, have a good feed intake and a great feed conversion ratio, and can adapt well to their surroundings (Dong, 2005). It led to many farmers are interested in raising these ducks. As the results of Halima *et al.* (2007), locally adapted animals are also more accessible to resource-strapped farmers, and they can be productive without a lot of disease-controlling chemicals. Furthermore, Vietnamese customers

Table 1. Muscovy duck population from 12 communes of 3 districts in Tra Vinh province

Districts	Communes	Household	LMDs	CMDs	FMDs
CangLong	Duc My	14	748	200	-
	Huyen Hoi	12	325	368	-
	Dai Phuoc	15	600	193	-
	An Truong	9	398	-	270
Chau Thanh	PhuocHao	12	435	142	-
	Luong Hoa	12	316	267	-
	Song Loc	11	533	137	-
	HoaThuan	7	233	-	250
CauKe	NinhThoi	12	342	120	-
	PhongPhu	14	549	219	-
	Chau Dien	10	491	-	200
	Thanh Phu	12	435	-	150
Total		140	5,405	1,646	870
Percentage, %		-	68.2	20.8	11.0
Average head/household		-	48.3	71.6	17.4
Standard Deviation		-	13.3	15.7	51.3

LMDs: Local Muscovy Ducks, CMDs: Crossbred Muscovy Duck, FMDs: French Muscovy Ducks

Table 2. Appearance Characteristics of The Chickens in Tra Vinh Province

Characteristics	LMDs	CMDs	FMDs
Feather color			
Head feather	Black	Black and white	White and black
Neck feather	Black	Black and white	White and black
Abdomen feather	Black	Black	White and black
Back feather	Black and white pots	Black and white	Black and white
Tail feather	Black	Black	Black
Peak color	Black	Pink and black,	Pink
Shank color	Black	Yellow and black	Yellow, white

have a strong preference for product of native chickens that are well-suited to small-scale farming (Ifft *et al.*, 2012)

Most farmers have used most of their land area to focus on agricultural works such as growing rice, fruits, vegetables, and so on. To raise Muscovy ducks, they used the rest of the land area or just the empty space in their land area. Thus, they cannot expand their duck production scale. Furthermore, small-scale duck farming operations are frequently linked to other agricultural products such as rice and fish. Their impact on rice productivity is crucial because duck flocks, when being moved into rice fields for foraging and preying on rice parasites such as the golden apple snail, insects, etc. Duck flocks are usually classified as either fixed or nomadic, depending on how far they travel outside their farm village (Minh *et al.*, 2010; Henning *et al.*, 2013).

Plumage Characteristics of Ducks from Each Breed

Through the survey, there are three duck breeds that farmers raised on their farm that are LMDs, CMDs, and FMDs. Each kind of breed owns specific features. From Table 2 and Figure 1, 2, and 3, it could be distinguished three kinds of breed through their appearances such as their feather color, peak, shank color. LMDs have

black color for whole body appearance with small white pots in body feather. CMDs and FMDs have black and white color on the feather; besides, they also have a black color with pots. It is easy to distinguish between LMDs and the other two kinds of CMDs and FMDs when looking at their feather color.

These ducks had a similar appearance to the Muscovy ducks studied by Raji *et al.* (2009), which have varying white and black plumage, shimmering plumage, and red caruncles on the bill and face. However, in the research of Oguntonji and Ayorinde (2014), predominant plumage was mottled; it is pretty similar to FMDs in this study. The different appearance between these ducks was caused by the interaction of evolutionary forces like as selection, migration, mutation, and various management and environmental problems that the animals have faced over time (Oguntonji, 2013). Besides, the observed phenotypic diversity in a population, breed, or species is the result of the interaction of evolutionary processes (Oguntonji, 2013). Additionally, the apparent variation in plumage color indicates that duck populations have not been domesticated by selective breeding (Bati *et al.*, 2014).

Feed Resources of Muscovy Ducks in Surveyed Areas



Figure 1. Local Muscovy Duck



Figure 2. Crossbred Muscovy Duck



Figure 3. French Muscovy Duck

Table 3. Common Feeds Used for Muscovy Ducks in 3 Districts

Districts	LMDs	CMDs	FMDs
Cang Long	Rice, rice bran, commercial feed, water morning glory, water hyacinth, banana trunk, grass, fermented rice, basa-fish waste.	Rice, rice bran, commercial feed, waste cooked rice, water morning glory, banana trunk, fish waste	Rice bran, commercial feed, water morning glory, banana trunk tree.
Chau Thanh	Rice, rice bran, commercial feed, waste cooked rice, water morning glory, water hyacinth, banana trunk, grass, soybean meal.	Rice, rice bran, commercial feed, water morning glory, banana trunk, soybean meal, fermented rice.	Rice bran, commercial feed, water morning glory, banana trunk.
Cau Ke	Rice, rice bran, commercial feed, waste cooked rice, water morning glory, water hyacinth, banana trunk, fermented rice and, basa-fish waste	Rice, rice bran, commercial feed, water morning glory, banana trunk, fish meal.	Rice bran, commercial feed, rice, water morning glory, banana trunk.

LMDs: Local Muscovy Ducks, CMDs: Crossbred Muscovy Ducks, FMDs: French Muscovy Ducks.

Most farmers have utilized the available feeds which are available around their houses or their living areas to feed for Muscovy ducks (Table 3). About feeding method, the ducks were given commercial feed or rice, rice bran first after that, they were provided other feed supplements such as crop residues, vegetables or other kitchen waste, agriculture industrial by-products. Most feed ingredients were chopped into small pieces before feeding, then ducks were fed 2-3 times per day. Commercial feed is the one that farmers must pay, for others, they got them from their area for free. Natural feed sources are the most important for small duck farmers here.

Because it is freely to access and eat such as banana trunk, water morning glory, or water hyacinth, the use of natural feed helps small farmers reduce their feed costs for raising Muscovy ducks and get more benefits for their production.

Besides, ducks are easy to raise, can consume on leftovers, take less care, have high body resistance to diseases than other fowls. They consume more green forages than other fowls. This foraging ability shows that ducks can make greater use of agricultural byproducts (Tadjong *et al.*, 2020).

The chemical composition of feed for duck breeds was analyzed and presented in Table 4. Feed chemical composition of feed samples from 3 districts showed that the nutrient value (was low. For LMDs, the nutrient value was the lowest, CP from 1.15-1.19 with 7.28-9.08 MJ ME. The FMDs were fed diets containing high nutrients (Table 5).

Growth Performance of Duck Breeds in Tra Vinh Province

Table 4 showed that the growth performance

Table 4. Feed composition of Muscovy ducks at smallholders in Tra Vinh Province (g/head/day)

Item	LMDs			CMDs			FMDs		
	F1	F2	F3	F4	F5	F6	F7	F8	F9
Rice	92	105	-	92	98,6	-	20	-	50
Rice bran	-	-	120	-	-	130	-	120	-
Commercial feed	15	-	-	25	30	10	110	40	80
Water morning glory	20	-	-	80	-	-	-	60	-
Banana trunk	55	100	-	-	108	100	100	-	100
Fermented rice	-	-	100	-	-	-	-	-	-

F: feed, F1-F3 (LMDs), F4-F6 (CMDs), F7-F9 (FMDs), 5 samples/feed

Table 5. Daily DM, CP and ME Intakes (g/bird) of Different Muscovy Duck Breeds

Item	LMDs			CMDs			FMDs		
	Diet 1	Diet 2	Diet 3	Diet 4	Diet 5	Diet 6	Diet 7	Diet 8	Diet 9
M	102	101	110	114	122	131	122	149	123
P	9.20	7.35	9.99	12.0	11.8	11.9	19.3	17.0	16.5
IE, MJ	1.19	1.15	1.28	1.34	1.44	1.53	1.55	1.78	1.51
P, %	9.02	7.28	9.08	10.5	9.67	9.08	15.8	11.4	13.4

LMDs: Local Muscovy Ducks, CMDs: Crossbred Muscovy Ducks, FMDs: French Muscovy Ducks.

Table 6. Growth performance of different breeds of ducks

Item	LMDs (n=30)		CMDs (n=30)		FMDs (n=30)	
	Mean	SD	Mean	SD	Mean	SD
Initial weight, g	45.0	5.79	52.3	8.72	60.9	4.21
Live weight at 13-week-age, g	2,234	156	2,939	175.1	3,113	213.9
Raising time, day	134	20.6	119.5	11.15	110.6	8.28
Daily weight gain, g	16.7	3.12	24.3	2.594	27.7	2.76

SD: Standard Deviation, LMDs: Local Muscovy Ducks, CMDs: Crossbred Muscovy Ducks, FMDs: French Muscovy Ducks.

of three breeds was different. The highest performance was FMDs with large weight at 13-week-age of 3,010 g and better daily weight gain of 25.7 g/day. The weights of FMDs were higher than those of other breeds, possibly due to their genetics and higher feed and nutrient intakes. The lesser the consumption of feeds, the slower the growth rate signifies overall development (Widianingrum *et al.*, 2020).

Depend on the availability of feed ingredients from their house and their area, ducks were fed without any nutrient analysis. Feed for FMDs provided more nutrients than feed for other breeds. It is due to more commercial feed in the diets. However, all feed compositions in three districts had nutrient composition less than the recommendation of NRC (1994) about nutrient requirement for poultry performance. Because the use of forages did not provide enough nutrients for duck growth performance. The recommendation of Zeng *et al.* (2015) for Pekin ducks was 19% CP and 13.8 MJ/kg for ME, it helped ducks improve growth performance. At least 18% CP was provided for Muscovy ducks for growth performance in finishing period from 6-12 weeks of age (Abdel-Hamid and Abdelfattah, 2020).

The initial weight of one-day-old Muscovy ducks was around 46.39 g (Rashid *et al.*, 2009) that was similar to the value of this study. Daily weight gain of Muscovy ducks ranged from 8.29 – 26.83 for average until 13 weeks of age. The study also reported that DWG depended on the management methods of these ducks (Etuk *et al.*,

2006).

The survey results were found in a range of the study of Kleczek *et al.* (2006), from France to Poland, Muscovy ducks imported had an average weight of 2,750-5,147 g. However, there were different weights between three breeds of Muscovy duck in this research when compared with Muscovy ducks in other countries. The results from this study were higher than a mean live weight of Muscovy duck in Nigeria, which was 2.73 kg (Yakubu, 2013). It was also higher than white-plumaged Muscovy ducks, which were heaviest with an average of 2.02 kg, mottled Muscovy ducks were 1.91 kg (Oguntunji and Ayorinde, 2014). It is due to growth performance of ducks depends on many factors such as breeds, conditions, feeding, nutrition, age, gender, and other factors. In table 3, the feed composition in three districts did not provide enough nutrients for these animals. In addition, the sensitivity of these features to environmental changes such as temperature and nutrition might be related to the body weight of birds from both agro-ecological zones in the current study. The information was also recorded in the study of Yakubu *et al.* (2011).

CONCLUSION

Muscovy duck farming in Tra Vinh province has emerged as small-scale farming with low performance. Local Muscovy ducks accounted for a large proportion of duck farming. French Muscovy ducks had the highest performance

with rich nutrient diets as compared to those of other breeds. However, the feed sources used for feeding Muscovy ducks in surveyed areas still depended too much on available feed resources without paying attention to the nutrient requirement. Based on the observed variances, there is a possibility for genetic improvement and nutrient advancement.

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