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HO CHICKEN BREED: MORPHO-BIOMETRIC CHARACTERISTICS AND ECONOMIC EFFICIENCY OF PRODUCTION

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ABSTRACT

This study was carried out on 34 rural households who raised Ho chickens from December 2012 to April 2013 to find out information on development status and economic efficiency of this

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chicken breed. A total of 181 individuals (46 cocks and 135 hens) were used to identify morpho-biometric characteristics according to FAO standards. The Ho chicken population is still very limited with 30.78 chickens per household. Age of the first laying is rather late (7.42 months) with 11.97 eggs in a laying cycle and 76.32% of hatchability rate. These numbers are low because Ho chickens are heavy and clumsy therefore they could easily step on and break their eggs. The body weight of a cock is 3.79kg at 9 months old while a hen is 2.63 kg at 12 months old. The body length, neck length, back length, thigh length of cock are significantly higher than those of hens ($P<0.05$). Production of these chickens requires not much initial investment costs. In which breed and chicken housing are the most important cost items in the structure of the fixed costs. To operate chicken production, the farmers have to pay the costs of 12.16 million VND per year with the average revenue of 30.85 million VND per year.

Keywords: *Native chicken, Ho breed, Morpho-biometric, economic efficiency*

1. INTRODUCTION

Vietnam Livestock Production plays an important role in household economy system. In which, up to 90% households raised poultry with the flock of 5-7 hens (FAO, 2008).

There are 16 native chicken breeds including Ri, Te, Tau Vang, Ac, Oke, H'mong, Tre, Choi, Phu Te, To, Dan Khao, Mia, Ho, Dong Tao, Van Phu, Mia (Pham *et al.*, 2013). However, due to the globalization process and livestock production development, a numerous exotic chicken breeds with high productivity has been importing which might threat to the populations of native chickens. In particular, the number of Ho chickens was decreased from 1404 heads in 2006 to 700 heads in 2012 (Bui Huu Doan and Nguyen Van Luu, 2006; Dao Thi Hiep, 2013). Ho chicken is a precious native chicken breed which has been used as King presents in the past. However, the small population size and uncontrolled mating resulted in the high inbreeding status of Ho chicken (0.179) (Le Thi Thuy, 2010). Thus, this study is essential to provide the information that could contribute to build up a new program of the gene source conservation and sustainable development of this native chicken breed.

2. MATERIAL AND METHOD

This study was carried out on 34 rural households who raised Ho chickens in Thuan Thanh district, Bac Ninh province from December 2012 to April 2013 by using semi-structured questionnaire to find out general information on development status and economic efficiency of Ho chickens' production.

A total of 181 heads (46 cocks and 135 hens) were used to identify morpho-biometric characteristics according to FAO standards (FAO, 2012). The tools include: clock scales, tape measure and electronic Palme ruler. The following parameters were measured: individual weight, neck length, back length, breast length, thoracic perimeter, wing length, thigh length, tarsus length, tarsus diameter and beak length.

The economic efficiency of Ho chickens' production was calculated basing on cost-benefit analysis with following formulas:

Profit = Total revenues - Total costs

Where:

- *Total revenues = Revenues from sales of chickens and eggs + Net value of change in he stock*

- *Total cost = Total variable cost + Total fixed cost*

- *Total fixed cost = Depreciation + Interest*

- *Total variable cost = Feeds cost + Vaccine and veterinary medicine cost + Electricity cost*

- Gross margin = Total revenues - Total variable cost

- Profit / total cost ratio = Profit / total cost

Statistical analyses were treated by R software with Mean, Median, Max and Min.

3. RESULTS AND DISCUSSION

Ho chickens population was still limited with only 135 reproductive hens within 34 households. The flock size was 30.78 individuals per household with a hen-cock ratio of 6:2.10 (Table 1). The size of Ho chicken flock was at the alarming low level.

Table 1: The structures and size (head/household) of Ho chickens raised at households (n=34)

Size and composition	Mean	Median	Max	Min
Chicken in each household	30.87	27.00	159.00	4.00
Adult cocks	2.10	2.00	4.00	1.00
Adult hens	6.00	5.00	20.00	2.00
Chickens (>2-6 months)	15.62	10.00	85.00	2.00
Chicks (day old chick -2 months)	16.22	13.00	50.00	2.00

The number of chicks aged from one day to 2 months old and from 2 to 6 months old was varied because chick selling was the main source of household income. The body weight of a 9-month-cock was 3.79 kg and 12-month-hen was 2.63 kg (table 2). Ho chicken's weight was heavier than other chicken breeds in Vietnam. For example, Ri chicken weight was from 1.87 to 2.08 kg/cock and 1.32 to 1.50 kg/hen (Moula *et al.*, 2011). The maturity age of Ho cock was 8.43 months while it was 7.38 months for the hen. It was later than Ri, Mia, Luong Phuong breeds.

Table 2. Body weight and measurements of Ho chicken according to gender

Variables	Cock (n=46) Mean ± median	Hen (n=135) Mean ± median	P-value
Age (month)	9.00 ± 9.00	12.11 ± 12.00	***
Body weight (kg)	3.79 ± 3.77	2.63 ± 2.65	***
Maturity age (month)	8.43 ± 8.00	7.38 ± 7.00	***
Body length (cm)	55.25 ± 56.00	46.85 ± 47.00	***
Neck length (cm)	22.33 ± 22.50	19.98 ± 20.00	***
Back length (cm)	26.07 ± 26.00	22.46 ± 22.00	***
Wing length (cm)	26.90 ± 27.00	22.72 ± 23.00	***
Thoracic perimeter (cm)	36.13 ± 36.00	33.30 ± 33.00	***
Thigh length (cm)	19.85 ± 20.00	16.03 ± 16.00	***
Tarsus length (cm)	9.78 ± 10.00	7.56 ± 7.50	***
Breast length (cm)	21.05 ± 21.00	17.32 ± 17.00	***
Tarsus diameter Max (mm)	23.78 ± 23.93	18.62 ± 18.55	***
Tarsus diameter Min (mm)	19.69 ± 19.50	15.31 ± 15.22	***
Beak length (mm)	42.89 ± 10.00	37.73 ± 38.09	***

The body weight and body length of Ho cocks were always higher than Ho hens ($P<0.05$). In the previous study of Moula *et al.* (2011), Ho chicken had a large body size with the back, thigh and tarsus lengths were from 1.1 to 1.3 times longer than Ri chicken. The large body size makes Ho chickens have higher meat productivity than other native chickens.

Table 3. Reproduction performance of Ho chicken (n=135)

Variable	Mean	Median	Max	Min
Age at the first laying (months)	7.42	8.00	10.00	5.00
Egg production/hen/clutch	11.97	12.00	17.00	8.00
Number of clutches per year	4.27	4.00	8.00	2.00
Hatchability (%)	76.32	75.00	100.00	46.15
Average number of chicks clutch	8.55	8.00	12.00	3.00

The number of eggs in one laying cycle was 11.97 with 76.32% of hatchability rate. The first laying egg of Ho chicken was later from 1.4 to 1.6 times than Ri, Mia, Tau Vang, Dong Tao (Moula *et al.*, 2011). This hatchability rate was higher than Dong Tao and Mia chickens.

The scale of Ho chicken production is limited, so, the consumption channels of this chicken breed was rather simple with a small quantity of product be sold to the market. In detail, Ho chicken was distributed by direct channels from Ho chicken raisers to the consumers or other raisers without the involvement of the traders, collectors or restaurants (Figure 1). This form of distribution resulted in the limitation of consumption market as well as unstable price.

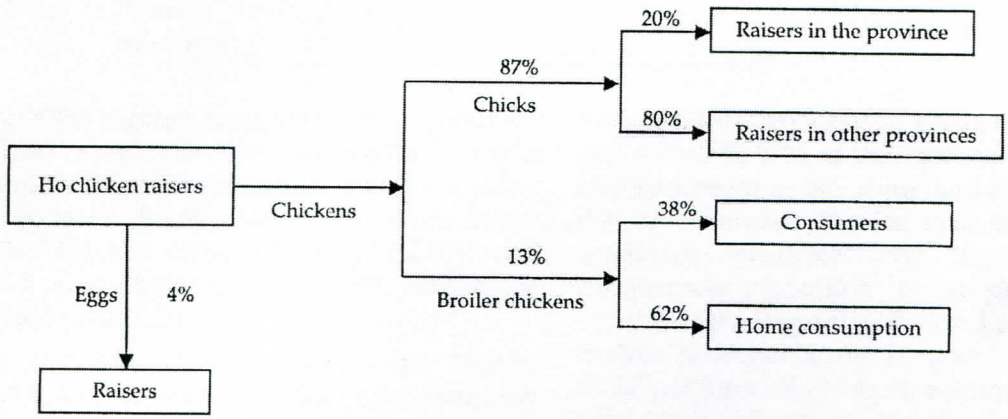

Figure 1. The consumption channels of Ho chicken

It can be seen that majority of Ho people raise chickens to sell the chicks accounting for 87% of total number of selling chickens. A large quantity of chicks were then sold to the raisers in other provinces while a small proportion was consumed inside the province. The chicks were normally sold at the age of around one month old. However, depend on the demand as well as the price paid by the buyers; the older-age-chicks could be sold. Similarly, the broiler chickens were sold directly to the consumers (38%) (mainly from other provinces) and an important part was used for the home consumption (62%). Besides that, a small percentage of the eggs for hatching purpose (4% of total egg production) was consumed by the raisers in other provinces (mostly from the South of Vietnam) who might get difficulties to transport the chicks by the airplane.

Thus, to enhance the consumption situation of Ho chickens, beside of increasing the production, the farmers should pay special attention to improve the marketing of products because it is an effective way to attract the consumers and other actors involving in its distribution channels.

For Ho production, the fixed costs includes the costs for breed, housing, interest charge and some raising tools such as: incubator, electric generator, power line installation (Table 4).

Table 4. The cost items of Ho chicken production (million VND/household/year)

Cost items	Mean	Proportion (%)
Total fixed costs	1.72	100.00
Breed	0.65	37.59
Chicken housing	0.89	51.57
Raising tools	0.19	10.84
Total variable costs	10.44	100.00
Veterinary medicine	0.64	6.10
Electricity	0.45	4.32
Feed	9.04	86.58
Others	0.31	2.99
Total costs	12.16	100.00

The average fixed cost was 1.72 million VND (Table 4). The investigated results revealed that Ho chicken production requires not much initial investment costs. Breed (37.59%) and chicken housing (51.57) were the most important cost items among the fixed costs (Table 4).

Chicken housing shares the highest proportion of more than 50% of the total fixed costs per household per year. The raising tools represent the smallest proportion (10.84%) of the total fixed costs. Variable costs are part of chicken production costs which are changed according to how much output it produce and contrary to the fixed costs. Applying in Ho chicken production, variable costs include the costs for veterinary medicine, rice husk, electricity, feed and some other costs such as lights, incubation rent. The average variable cost of Ho chicken households is 10.44 million VND per household per year. In which, the feed cost represents the highest proportion of 86.58% of the total variable costs and 74.04% of the total costs. According to Nguyen Hoang Viet (2013), in Ho chicken production, the feed cost shares 56.06% of the total costs. So, the feed cost result in our study was higher than that of the author. Besides that, the cost for veterinary medicine also represents a considerable proportion in the structure of variable costs. Regarding the total costs of Ho chicken households, the variable costs share 85.86% of the total production costs while the fixed costs contribute 14.14% to the total production cost. This demonstrates that local chicken production strongly depends on investments of variable costs. The output therefore highly influenced by variable cost items. Averagely, to operate chicken production, Ho raisers have to pay approximately 12 million VND per year.

The average revenue from Ho chicken farms was 30.85 million VND per year. Chickens for meat and chicks were the most important output items among the product types which account for 35.71% and 43.82% of total revenues respectively (Table 5).

Table 5. Revenues of Ho chicken households (million VND/household/year)

Product type	Mean	Proportion (%)
Chicken for meat	11.02	35.71
Chick	13.52	43.82
Egg	0.11	0.37
Home consumption	6.20	20.11
Total revenues	30.85	100.00

One distinctive point in surveyed location is that the eggs are mainly sold for hatching not for eating. Consequently, income from egg selling accounts for insignificant proportion in the structure of output value in the surveyed households. Otherwise, home consumption is taken into accounts to fully reflect economic values that chicken production brought to farmers. In Ho surveyed households, chickens serve for familial food demand account for 20.11% of total revenue. Thus, food demand is not very important reason leading to production decision of Ho farmers. Compared to research of Fisseha (2009), the purpose of local chickens in Bure Woreda, North-West Amhara, Ethiopia, in order of importance, were: sale for cash income (51.4%), egg hatching for replacement (45%), home consumption (44.3%), use of birds for socio-cultural and/or religious ceremonies (36.4%) and egg production (40.7%). While, the purpose of eggs, in order of importance, were hatching for replacement (71.7%), sale for income (58%) and home consumption (68.6%). Thus, home consumption is a significant part in production purposes of the local chicken raisers in this research.

From the costs and revenues of Ho chicken production, the cost-benefit analysis of Ho surveyed households was carried out and shown in Table 6. The profit of Ho raisers was 18.69 million VND per household. According to Nguyen Hoang Viet (2013), Ho chicken raisers got a high profit of 0.64 million VND/chicken. These pointed out Ho chicken production brings considerable economic efficiency for the farmers.

Table 6. Economic efficiency of Ho chicken production (million VND/household/year)

Items	Mean
Total costs	12.16
Total revenues	30.85
Total variable costs	10.44
Gross margin	20.41
Profit	18.69
Profit/hen/year	4.95

The profit to total cost ratio was 1.54 (Table 6). This means with one VND invested in Ho chicken production in one year will receive 1.54 VND. Local chicken production at household level like Ho chickens is not very profitable in compared with large-scale production with exotic breeds. However, according to Mammo (2013), despite technology will favor the intensification of poultry production in developing countries, local poultry is still profitable and play an important role in poverty reduction and has no market problems.

4. CONCLUSION

The scale of Ho chicken production is small with the average flock size of 30.78 individuals per household. The body weight of Ho cock is 3.79 kg at 9.00 months and Ho hen is 2.63 kg at 12.11 months old. The first laying age is late (7.42 months) with 11.97 eggs in one laying cycle.

Production requires not much initial investment costs. In which breed and chicken housing are the most important cost items in the structure of the fixed costs. To operate chicken production, Ho raisers have to pay the costs of approximately 12 million VND per year and get the average annual revenue of 30.85 million VND.

Ho chicken population and its consumption channels are still limited. Besides that, the extinction threat of this chicken breed is rather high due to the disease and inbreeding status which would lead to its low productivity. Therefore, the results on development situation and

economic efficiency of Ho chicken population in this study might provide the necessary information in order to find out a solution for the stable development and conservation of this indigenous chicken breed.

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CATTLE FARMING SYSTEMS IN NORTHERN MOUNTAINOUS REGION OF VIETNAM AND THEIR ECONOMIC EFFICIENCY

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ABSTRACT

In Vietnam beef production has continuously increased, but just sharing a small part of total meat production. Cattle are mainly raised in household farms. The potential for beef production is

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