PHENOTYPIC CHARACTERISTICS AND MEAT PRODUCTION PERFORMANCES OF DONG TAO CHICKENS IN RATIONS WITH DIFFERENT METABOLIZABLE ENERGY TO CRUDE PROTEIN RATIOS

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Chapter 1
THE PROBLEM AND ITS BACKGROUND

Introduction

The poultry population will increase from 7324.8 billion in 2015 to 7716.7 billion in 2020 and 8424.9 billion in 2030. Along with this development, the poultry meat consumption in the developed countries is expected to increase by 5.2 million tons to 48.8 million tons, while for the developing nations a 16.7 million tons increase is anticipated as the total rises to 84.2 million tons (The Poultry Site, 2016).

Vietnam is an agricultural country with 70% population living in rural area. More than 80% of the total agricultural households keep chickens (Vang, 2003; Burgos, 2008). In 2017, according to Agriculture Statistical Report, the chicken population in Vietnam was estimated at about 295.20 million heads. The distribution ranges from 2.9 million in the Northwest to 40.6 million birds in the Red River Delta (TKCN, 2017). Local chickens make up more than 70% of the country's total chicken population (Desvaux, 2008). They are mainly kept in the traditional extensive backyard/household production, representing about 94% of all poultry producers (Hong Hanh, 2007).

Chicken is the country's second most important meat source after pork (Burgos et al., 2008) and plays an integral role in the smallholder farming systems. They are used to meet the multiple social, economic and cultural needs of households (Epprecht, 2005; Burgos, 2008). Vietnamese native chicken breeds are specific for particular regions and they are assumed to shows specific

adaptation to climate, diseases are to local low input and low output production system. The native chicken breeds have low performance but they are predominant in number and are being kept in extensive scavenging systems. It is estimated that there are 12 local breeds and they make up more than 80% of the chicken population in the whole country (Vang, 2003).

The most popular local breeds are the Ri, Mia, Dong Tao and Ho which are being raised in the North and the Ta Vang (or Tau Vang) in the South. These local breeds are of low productivity in comparison to foreign imported breeds but have characteristic yellow-orange feathering and dark skin color features that are favored by consumers in both rural and urban areas, particularly for traditional festivals, family gifts, marriages and for religious offerings (Hong Hanh et al., 2007).

A rare Vietnamese chicken breed called the Dong Tao, prized for its delicious meat, has one of the thickest legs usually not seen among birds of that size. This chicken breed is endemic to the Dong Tao commune in Khoai Chau district Hung Yen province, about 30 kilometers from Hanoi.

The Dong Tao chicken has an imposing figure, a healthy body and stout legs covered with reddish scales. A newly-hatched chick takes eight months to one year to become a marketable bird of three to five kilograms. A male adult Dong Tao chicken can weigh up to 6 kilograms and develop legs as thick as a human’s wrist. The hens are generally white, while the cocks have colorful feather (Kaushik, 2015). An adult Dong Tao chicken can grow up to weigh three to six kilograms, with legs as thick as a human’s wrist. The hens are generally white, while the cocks

have colorful feathers. Dong Tao meat is considered far more delicious than regular chickens, explaining its high demand and incredibly steep price tag. The bird is in high demand but also in short supply, which explains its high price (Sumitra, 2015).

Background of the Study

Like pig breeds, native chicken breeds are mainly kept in small households in rural and remote areas and are based on scavenging or foraging and they play a very important role in the livelihood of farmers by providing daily protein from eggs and meat and as a commodity in exchanging goods.

Poultry keeping is an integral part of rural households' livelihood strategies and has been so for thousands of years. Poultry meat and eggs are major sources of animal protein for the poor (Bugos, 2007).

In 2007, it was estimated that there were about 820 heads of Dong Tao chicken in Dong Tao commune, Khoai Chau district, Hung Yen in general, these chickens have phenotypic characteristics such as the feather are light yellowish or light brown feathers on the hens and dark plum color, black tails or dark green on the cocks. The specific characteristics of Dong Tao chicken are the body big and firm, big legs and rough yellowish-red scales, pale yellow toes, light yellow scales when it is matured (VUSTA, 2010).

Apart from supplying meat and eggs, the local breeds also take part in cultural and social activities in Vietnam. For example, Ho and Choi (fighting) chicken are being used for entertainment in religious celebrations, Ac and Tre chicken are used for medical purposes, Tre chickens are raised as pet birds and

Dong Tao chicken are used for entertainment in religious celebrations. In the human livelihood, they supply daily food and protein and also bring extra income when necessary (Vang, 2003).

Dong Tao chickens were relatively high in carcass yield with average is 66.76%. The average feed intake and feed conversion ratio (FCR) were 105 g/day/head and 4.6kg of feed per one kilo of live weight, respectively (Tham, 2016).

Similar to broilers, ingredients supplying dietary energy and protein represent most of the diet cost for native chicken. Therefore, providing diets formulated to contain metabolizable energy and protein at optimum concentrations to native chicken may increase profits by decreasing feed cost and/or increasing meat yield.

Le Thi Tham (2016) reported that the requirement of Dong Tao chicken from 1 to 24 weeks of age for optimal feed conversion ratio (FCR) was 4.6 kilograms of feed per kilograms of gain's weight.

However, few studies have determined the interaction effects of dietary energy and crude protein on performance and dressing percentage, cut up part yield in Vietnam native chicken, especially in Dong Tao breed. Moreover, the optimal processing age for Dong Tao chicken under various plans for nutrition to provide guidelines to optimize ration cost, performance, and carcass yield has not yet to be determined.

The market demand of Dong Tao chicken meat production is increasing, which emphasizes the need for knowledge about responses to nutrients for feed formulations to allow possible meat production. Therefore, comparing the

performance and carcass traits of Dong Tao chicken at 90 days ages to market weight with various nutrient profiles can provide substantial information to model nutrient input and carcass trait outcomes. However, this information is limited in the Dong Tao chicken. Therefore, the objective of this study was to determine the performances of Dong Tao chickens in rations with different metabolizable energy to crude protein ratios.

Theoretical Framework of the Study

Poultry is an important source of cash income for village families and provides cheap source of protein for rural dwellers. In Viet Nam almost 80% of rural households participate in poultry production through backyard and garden raising (Hong Hanh, 2007).

The non-intensive system of rearing chicken is popularly being used in traditional small households in Viet Nam. Farmers pay little attention to their chickens and poultry production yield is low. The farmers' knowledge on the extensive system in poultry production is passed from generation to generation. The few who received training in poultry husbandry could not apply it into their farms due to limited investment.

The poultry industry plays an important role in farmers' lives, contributing a large part of total household income. In the rural areas, income from poultry production accounted for 32.5 percent of total husbandry income, which followed pig production, with 54.72 percent (Nho L.T, 2001). H has been mentioned that the production performance of a farm animal depends upon the combined effects of its genetic or external factors it experienced (Bourdon, 1997; Bondoc, 2008).

The conservation of the genetic purity of a farm animal is very important especially in the development of genetic improvement and utilization program of the commodity. Thus, there is a need to characterize phenotypically the population of Dong Tao chickens in the Hung Yen province where the breed belongs. Likewise, it is also important to establish how diverse the breed is and determine the structure and the effective size of population.

On the other hand, it is also important to determine the current practices of the raisers in the production, management and marketing of Dong Tao chicken in order to elucidate useful information that could provide hints on how these raisers could be assisted in order to optimize the performance of their stocks and the profitability of their farming operation.

In addition, in the absence of a feeding standard for the Dong Tao chicken, there is also a need to determine an optional metabolizable energy to crude protein ratio that could improve the efficiency of the production performance of the chicken breed.

Conceptual Framework of the Study

The research activity is composed of three independent studies. Study 1 is an among on the production, management and marketing practices employed by the Dong Tao chicken raisers in Hung Yen province, Vietnam. Study 2 deals with the phenotypic characterization and diversity analysis on the current population of Dong Tao chickens in the area. It also includes the determination of the structure and the effective size of the population of the Dong Tao chickens that are being kept by raisers in the province. Study 3, on the other hand, is an experiment that

deals with the determination of the effects of different metabolizable energy to crude protein ratios on the meat production performance of Dong Tao chickens. The research paradigms of the mentioned studies are presented in Figure 1.

Study 1

INPUT	PROCESS	OUTPUT
Profile of Dong Tao chicken raisers in Dong Tao Commune	Survey; Data Analysis	Production, Management, and Marketing Practices

Study 2

INPUT	PROCESS	OUTPUT
Dong Tao chicken population	Census Data Analysis	• Phenotypic characteristics and diversity; • Population structure and effective population size

Study 3

INDEPENDENT VARIABLES	DEPENDENT VARIABLES
• Grower (day 21th- 56th) Treatment 1- ME/CP: 2800/17% Treatment 2- ME/CP: 2900/19% Treatment 3- ME/CP: 3000/21% • Finisher (Day 57th- 90th) Treatment 1- ME/CP: 2900/16% Treatment 2- ME/CP: 3000/18% Treatment 3- ME/CP: 3100/20%	Meat production performance in term of: • Weight gain • Weight gain • Feed Conversion Ratio • Average weekly gain • Carcass percentage • Cut up part yield percentage. • Gross profit margin

Figure 1. Research Paradigm of the three activities in this research

Statement of the Problem

Study 1. Production, management and marketing practices of Dong Tao chicken raisers in Hung Yen province, Vietnam

1. What is the profile of Dong Tao chicken raisers in Dong Tao Commune, Khoai Chau district, Hung Yen province, Vietnam in term of:
    a. age;
    b. sex;
    c. educational attainment;
    d. civil status;
    e. family size;
    f. occupation;
    g. number of year experience in raising Dong Tao chicken;
    h. attendant to seminars/ training in relation to chicken raising; and
    i. number of Dong Tao chickens being kept?
2. What are the production and management practices employed by the Dong Tao chicken raisers in relation to housing management, feeding, breeding management and health and sanitation?
3. What are the marketing practices employed by the Dong Tao chicken raisers?
4. Are there significant relationships between the production, management and marketing practices and the demographic profile of Dong Tao chicken raisers?

Study 2. Phenotypic characteristics and phenotypic diversity and population structure analyses of Dong Tao chickens in Hung Yen province, Vietnam.

1. What are the phenotypic characteristics of the Dong Tao chickens with respect to plumage color and comb type?

2. What are the morphometric traits of Dong Tao chickens in term of body weight, body length, wing span, feet diameter, shank length and chest perimeter?

3. What is the population structure of Dong Tao chicken in Dong Tao commune, Khoai Chau district, Hung Yen province, Vietnam?

4. What is the effective population size of Dong Tao chicken in Dong Tao commune, Khoai Chau district, Hung Yen province, Vietnam?

Study 3. Meat production performances of Dong Tao chicken in rations with different metabolizable energy to crude protein ratios

1. What are the effects of different metabolizable energy to crude protein ratios on the growth performance of Dong Tao chicken in terms of

a. body weight;

b. feed consumption;

c. feed efficiency ratio;

d. average daily gain;

e. dressing percentage;

f. cut up part yield; and

g. gross profit margin of production?

2. Are there significant differences in the effects of the different metabolizable energy to crude protein ratios in the ration on the growth performance of the Dong Tao chickens?