Morphological Characterization of Pure Cuban Game Hens

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ABSTRACT

Several external, qualitative and quantitative morphological features of 102 adult pure Cuban game hens were assessed in the province of Camagüey, Cuba. The results were arranged phenotypically to calculate the total frequencies. The fowls were weighed individually and their body parts were measured. The mean, minimum, maximum, standard deviation and variation coefficients were determined for live weight and body part length. The results of the correlation coefficient for live weight, thorax characteristics and tarsus was positive but low. The external aspect was characterized by reddish plumage (60 %); single or serrated combs (82 %), and yellow-brown bills (52 %).

Key words: *hens, external morphology, Cuban breeds*

INTRODUCTION

According to Orozco (2009) the ancient origins of domestic hens (*Gallus domesticus*), are in Southeast Asia, from *Gallus bankiva*, which was divided into four primary groups for breed and lineage classification nowadays. Their names are Asian, Atlantic, Mediterranean and fighting breeds. It is currently believed that such domestication first took place in China, 7 000 years ago. Although they can be used for religious, game and productive purposes, they were first used mainly for religious and game purposes, more than for productive reasons.

According to FAO (2007) the current extinction rate is alarming, but even more critical is the fact that animal genetic resources on which there is no information available, are being lost before their features can be studied and their potential assessed. Considering that, evidence suggests that an accelerated erosive process is taking place on genetic resources, leading to their gradual loss.

Game or fighting roosters were brought to the Americas by the Conquistadors on their first voyages, and for over 500 years, they have proved their reproductive and productive adaptability to the region´s conditions. It has been thought that hens were the first European animals that set foot on the American continent, as they were part of Colombus´s second voyage´s cargo. Some of the reasons for that decision were that hens used little space, feeding was easy, and besides, they lay eggs (Juárez*et al.*, 2000).

Hernández (2014) claims that Cuban game hens have been widespread in homes of breeders associated to the National Enterprise for Wildlife Protection, or individual breeders. The animals have descended from Spanish breeds brought to Cuba during colonial times, and crossbred with other species introduced later in Cuba from other areas of the world. That process has been different according to the region of the country. The bird is very resistant to Cuban climatic conditions, well-adapted to backyard raising and wild life; however, production of eggs and meat is low, though it is not the main goal.

Pupo (1995) has said that if rooster breeders had not insisted on the genetic preservation of pureblood fighters, they might have disappeared. Only the game rooster fights out of instinct, and the referees, make sure fights are fair.

The popularity of rooster fights on the Caribbean island is such, that it might well be considered as one of the noblest and purest traditions of the Cuban people (Pérez *et al*.,2004).

Orozco (2009) points out that through time, man has been a keen admirer of the lineage of these breeds, to the extent of using every resource at hand to improve their natural warrior skills, and showing off their bravery until death. The rooster, with its early morning crow has become the signal for a new day´s break.

Within the native Cuban hen population variability and phenotypic trait frequencies are unknown; as are the genes that grant productive adaptability (Pérez*et al*.,2004), very similar to the Cuban game hen. It is known, however, that species undergo changes and that today´s life forms stem directly from pre-existing specimens.

Due to the need to preserve the genetic resources for the future, the aim of this research was to assess some of the quantitative and qualitative external morphological features of the Cuban game hen in the province of Camagüey, Cuba.

MATERIALS AND METHODS

This research covered 35 home backyards in the province of Camagüey, where native Cuban Game roosters are bred, and their owners are associated to the National Enterprise for Wildlife Protection. A number of 102 adult hens were sampled, according to their external features: plumage, kind of plumage, kind of crest, color of tarsus, eye color, beak color, shape and color of earlobe, and shape of jaw. Visual exam was used. The data were registered, according to FAO methodology (1981) for characterization of native avian resources. The results from the study were arranged according to the phenotypic traits, in order to calculate their total frequencies.

The birds were weighed separately and their body parts were measured, according to Francesch *et al*. (2010). The measurement instruments used were scales, measure tape, and slide gauge. Measurements included body length; thoracic perimeter; leg´s length; tarsus length, wing length and width; comb height, width and length; beak length, width and length; earlobe length; jaw length and width; and tail length, as follows,

Body length. Between the beak end and the tail (without the feathers). The bird must be drawn entirely. *Bodyline length*.

Thoracic perimeter. The breast diameter taken up to the top of the breast.

Thigh length. Between the mean coxal bone area, to the femorotibial joint.

Leg length. Between the femorotibial joint, up to tarsus articulation.

Tarsus length. Between tarsus and plantar joints.

External variable occurrence percents were determined. The thoracic perimeter values, live weight and tarsus length, were studied for correlation coefficient.

SPSS (2006), version 15.0 was used for data processing.

RESULTS AND DISCUSSION

Qualitative features

The predominant feather colors in the studied population were red (60 %) cinnamon red (10 %), black and gold (10 %), mixed (8 %), ash (6 %), white (4 %), and yellow (2 %) (Table 1).

Similar results were presented by Espinosa (1991) and Segura (1998), after studying birds in Yucatan, Michoacan, and Oaxaca. These results are similar to Mendez (2011), with JEREZANA and SEVILLANA fighting lines, which have a wide variety of colors, especially dark.

These results coincide with Mwanza (1991) and Martínez (1999), in that the native Cuban hen populations are predominantly dark feathered, which makes them less visible to natural predators.

The remaining colors, like white, ash, yellow and mixed, account for 20 % of the sample. The white and yellow feathers suggest the degree of mixture with exotic species (Hernández, 2011).

The wide variety of colored feathers observed in the hens is especially important, since it has not been observed in other birds, supporting Peña (2007), who claimed that the fighting Spanish roosters have numberless variants of feathers and colors. However, special mention should be made to brown; black breast; black and gold; hen-like and a wide range of feathers that when mingled, confer the rooster, the breeder and lineage, a personal and particular character.

Comb kind occurrence was 82 % for the serrated or single comb, and 18 % for the rose comb (Table 2).

The greatest percents were for the serrated comb animals, coinciding with Medina (2006), when reference is made to Cuban-line animals that preserve these phenotypes, used by Central American breeders.

The serrated comb prevailed over rose comb. Several papers associate them to low fertility, especially in homozygote males (RR), caused by a decrease in sperm viability, in comparison to other phenotypes (Kirby, 1994).

Likewise, Espinosa (1991) and Segura (1998), reported 87 % and 100 % frequency responses in the populations studied by them, thus corroborating ideas about other types of combs associated to fertility.

Table 3 shows the respective frequencies for eye color, where the highest percent was achieved by red-eyed animals, a trait acquired from the fighting Spanish rooster, according to Méndez *et al.* (2010) in related studies. They must have a small palpebral opening, almost circular, probably

located on the upper part and face caudal, which must be red. Iris must be red or orange.

Quantitative features

Bird measurements are a relatively recent practice, which have not been thoroughly documented yet. The first references found refer to six zoometric measurements (live weight, body length, pectoral perimeter, femur length, tarsus length, and tarsus metatarsal length, indigenous Senegalese males and females chickens (Guèye *et al*., 1998).

Table 4 shows the results achieved for 18 of the morphometric variables assessed.

Higher values for zoometric measurements had been previously reported on Local Hens, in the central part of the province of Villa Clara, Cuba (Pérez *et al.*, 2004).

There are also similar Works on Yellow Chickens from Jinghai (Yang *et al.*, 2006), in which body length, keel length, thoracic perimeter, tarsus length, tarsus perimeter and live weight, were measured.

This anatomical measurement collection has also been practiced in other species of birds, such as ducks and geese. Particularly, in a Turkish Native geese study (Saatci and Tülkü, 2007) eight zoometric measurements were taken (live weight, skull diameter, neck length, body length, trunk length, pectoral perimeter, wing length and metatarsal length).

Concerning the standard pattern to follow, the Spanish fighter has a short and strong beak, long wings inherited from ancient bankivas flying rosters (Steane, 1992andMerida, 2010), very similar to the Cuban animals studied.

Table 5 shows correlations between live weight, thoracic perimeter and tarsus length, which were positive. Orozco (2009) and Oscar (2007) reported similar results in studies of bankiva animals, when these variables were correlated.

One of the most commonly studied relations was live weight with other zoometric measurements, in order to know if any could be used to make reliable predictions of live weight. A study made by Badubi *et al.* (2006) showed a highly significant correlation between live weight and tarsus length. The results achieved in that paper show that the correlation between the two variables was low, different for the results of tarsus length and thoracic perimeter.

Previously described (Guèye *et al.* 1998; Saatci and Tülkü, 2007), the correlation among different zoometric measurements made of live weight was analyzed, and it was concluded that body length and pectoral perimeter are the most suitable measurements to predict live weight.

Tarsus length had a similar behavior to live weight, coinciding to descriptions made by Campo and Orozco (1982) for different Spanish breeds; the results presented by Martínez (1999), in Black Maltese; Campo and Orozco (1982), in Prat Anteada, Castellana, Villafranquina Roja and Vasca Barrada; and Msoffe *et al.* (2002), in local Tanzanian hens. The results are better thanin other studies, (Guèye *et al.* (1998) and Missohou (1998), in local Senegalese breeds.

CONCLUSIONS

Out of the game hens studied, the predominant feather color was reddish/orange (60 %), which might contribute to better camouflaging of animals in the presence of predators.

All the body features, all together and combined proved that this bird is clearly adapted to flying.

Evidence was provided that the Cuban game hen has a particular body phenotype.

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Table 1. Frequency of feather color appearance in FINA hens in the province of Camagüey

Color	Frequency	Percent
Reddish/orange	61.2	60
Brown	10.2	10
Black and gold	10.2	10
Mixed	8.1	8
Ash	6.1	6
White	4.1	4
Yellow	2.1	2
Total	102	100

Table 2. Frequency in the type of comb of game hens in Camagüey

Type of comb	%
Serrated	82
Rose	18

Table 3. Descriptive statistics for eye color

	Frequency	Percentage
Red	58	56.9
Orange	23	22.5
Yellow	21	20.6
Total	102	100

Table 4. Live weight and measurements of different parts of the body in game hens in Camagüey

Variable	Mean	Max	Min
Live weight (lb.)	2.35	2.7	2
Thoracic perimeter (cm)	27	30	24
Tarsus length (cm)	7.95	9,.2	6.7
Leg length (cm)	10.5	12	9
Thigh length (cm)	8.55	10	7.1
Wing length (cm)	16.25	17.5	15
Wing width (cm)	19.75	22.5	17
Body length (cm)	34.5	38	31
Comb length (cm)	3.25	4.3	2.2
Comb width (cm)	0.7	1.1	0.3
Comb height (cm)	1.6	2.5	0.7
Jaw length (cm)	2.2	2.3	2.1
Jaw width (cm)	0.85	1.3	0.4
Earlobe length (cm)	1.15	1.6	0.7
Earlobe width (cm)	0.75	1	0.5
Beak length (cm)	1.5	1.9	1.1
Beak length (cm)	0.9	1.3	0.5
Beak width (cm)	0.85	1.3	0.4

Table 5. Tarsus length correlations, thoracic perimeter and live weight

		Tarsus length	Thoracic perimeter	Live weight
Tarsus length	Pearson correlation	1	.743(**)	.252(*)
	Sig. (bilateral)		.000	.011
	N	100	100	100
Thoracic perimeter	Pearson correlation	.743(**)	.1	.247(*)
	Sig. (bilateral)	.000		.012
	N	100	102	102
weight	Pearson correlation	.252(*)	.247(*)	1
	Sig. (bilateral)	.011	.012	
	N	100	102	102

** Correlation is significant at 0.01 (bilateral).
* Correlation is significant at 0.05 (bilateral).