

MORPHOMETRIC AND QUALITATIVE TRAITS OF NATIVE CHICKENS IN AYUNGON, NEGROS ORIENTAL, PHILIPPINES

Michaelito A. Naldo¹, Elpidio M. Agbisit, Jr.², Agapita J. Salces²,
Mark Dondi M. Arboleda³ and Veneranda A. Magpantay²

ABSTRACT

Eighty (80) native chickens kept by small-hold farmers in mountain barangays of Ayungon, Negros Oriental, Philippines were sampled to determine phenotypic characteristics using the protocol of FAO (2012). Results showed that native chickens found in the area had high physical uniformity in terms of plumage pattern, comb type, skin and earlobe color. Comparison of morphological traits between males and females showed significant dimorphism in body weight ($P<0.01$) while no differences were observed in terms of age, body length, chest circumference, wingspan, and shank length. Further, body weight was found to be significantly correlated with body length ($r=0.44$), the circumference of the chest ($r=0.59$) and shank length ($r=0.24$). All other morphometric traits were not significantly correlated. The results of this study could provide valuable inputs to the purification of a potentially novel genetic group of native chickens from Negros Oriental.

Key words: morphology, morphometric traits, native chicken, phenotypic characteristics, production systems

INTRODUCTION

The role of native chickens in Philippine agriculture and the entire economy cannot be ignored (Lambio, 2000). To a large extent, they contribute to the year-round supply of meat and eggs and provide extra income to many farmers. Most farmers prefer to raise native chickens over commercial breeds because of low inputs and their inherent ability to survive under harsh environmental conditions (Dessie *et al.*, 2011). Many consumers also enjoy the unique flavor of meat from native chickens. A laboratory taste panel favored the color and flavor of meat from native chickens in Iloilo over meat from commercial broiler birds (Cocjin *et al.*, 2001). In the province of Negros Oriental, the famous native fried chicken in the town of Tayasan is very popular among local and foreign tourists. Native chicken meat used in this popular dish comes from small-scale native chicken (SSNC) farmers in the area and the adjacent towns.

Although the native fried chicken of Negros Oriental has been popular for many years, no study has investigated the phenotypic characteristics of these native chickens.

¹Silliman University College of Agriculture, Dumaguete City, 6200 Philippines; ²Institute of Animal Science, College of Agriculture and Food Science, University of the Philippines Los Baños, College, Laguna, 4031 Philippines; ³School of Environmental Science and Management, University of the Philippines Los Baños, College, Laguna, 4031 Philippines (email: manaldo@su.edu.ph)

Phenotypic characterization is an important step toward the evaluation of these local breeds which are genetic resources that need conservation through utilization, not only to promote biodiversity but mainly because of their economic value to the community.

Ayungon is a 2nd class municipality in the province of Negros Oriental. It has a population of 46,303 (PSA, 2016), the highest among its adjacent towns. Most of the SSNC farmers in the area reside in its low and grooved mountain ranges at least 30 to 50 km from the shoreline. Native chickens reared in these mountain barangays are considered pure and indigenous in their community due to their isolated location. These native chickens are sold in the town proper during market day when farmers bring their produce from the mountains once a week. This study aims to characterize the qualitative and morphometric traits of native chickens reared in the mountain barangays of Ayungon, Negros Oriental, Philippines. The study can be used in breeding decisions that will promote breed uniformity which can lead to increased market value, more predictable performance, and improved product quality.

MATERIALS AND METHODS

The protocol of this study was approved by the Institutional Animal Care and Use Committee of the University of the Philippines Los Baños (Approval No. CAFS-2020-004). A total of eighty (80) sexually matured native chickens (i.e., 18 males and 62 females) from the six (6) mountain barangays of Ayugon, Negros Oriental, Philippines (i.e., Bgy. Carol-an, Kilaban, Mabato, Nabhang, Tambo, and Tibyawan) were phenotypically characterized using the guidelines of FAO (2012). One native chicken was randomly selected from among the flock of each of the eighty (80) small-scale farmers surveyed by Naldo *et al.* (2021). All these farmers have attested that no exotic nor “foreign” breed was ever crossed with their native chickens. The phenotypic characteristics included were qualitative traits (i.e., plumage color and pattern, feather morphology and distribution, earlobe, skin, and shank color, comb type and size) and morphometric traits such as body weight, length, circumference of chest, wingspan, and shank length. Qualitative traits were recorded as observations of the enumerator and confirmed by the farmer, while morphometric characteristics were obtained using a tape measure. All data were analyzed for descriptive statistics (i.e., counts, frequencies, mean, maximum, minimum, standard deviation). An Independent sample t-test was done to compare the morphometric measurements between male and female chickens while correlation analysis was performed to establish the direction and magnitude of relationships among morphometric traits and age of the chickens. All data analyses were done using IBM® SPSS version 25.0 (IBM Corp., 2017).

RESULTS AND DISCUSSION

Of the 80 native chickens characterized in Ayungon, Negros Oriental, 77.5% were females. This is due, not only to the bigger population of females among the native chickens raised by farmers in Ayungon, but also to the apparent difficulty of catching males for sampling, which were flightier compared to females. There were also more female native chickens surveyed by Cabarles *et al.* (2012) in Western Visayas (66.6%), by Lopez *et al.* (2013) in Palawan (66.11% females), as well as by Picardal *et al.* (2015) in Eastern Samar (63.6% females), and by Salces, *et al.* (2015) in Bohol (78% females). Some of these

authors mentioned that the number of males and females sampled followed the common rooster to hen mating ratio observed in their areas of study.

Table 1 shows that majority of native chickens sampled in Ayungon, Negros Oriental had plain plumage pattern. Only 6.30% have barred plumage pattern. These barred native chickens are incidentally all females. This observation conformed to the observation of Cabarles *et al.* (2012) that around 5.8 % of all native chickens they sampled in Western Visayas region had barred plumage. In Palawan, Lopez, *et al.* (2013) reported that 11.06% of native hens are barred, as well as 23% of native roosters. In Bohol, Salces *et al.* (2015) observed four plumage patterns among native chickens: plain, laced, penciled, and mottled.

Table 1. Cross tabulation of morphological characteristics of native chickens in Ayungon, Negros, Oriental, Philippines.

Characteristics	Male (n=18)	Female (n=62)	Total (n=80)
Plumage pattern			
Plain	100.00%	91.90%	93.80%
Barred	0.00%	8.10%	6.30%
Plumage color			
Red	66.67%	27.42%	36.25%
White	16.67%	32.26%	28.75%
Blue	5.56%	9.67%	8.75%
Black	11.11%	29.03%	25.00%
Brown	0.00%	1.61%	1.25%
Comb type			
Single	94.44%	98.39%	97.50%
Double	0.00%	1.61%	1.25%
Pea	5.56%	0.00%	1.25%
Skin color			
White	88.88%	93.54%	92.50%
Yellow	5.56%	3.23%	3.75%
Black	5.56%	3.23%	3.75%
Shank color			
White	33.33%	20.97%	23.75%
Yellow	38.89%	51.61%	48.80%
Blue	0.00%	4.83%	3.75%
Black	27.78%	22.58%	23.75%
Earlobe color			
White	94.44%	95.16%	95.00%
Red	5.56%	4.84%	5.00%

They observed that 54% of hens have plain plumage pattern, while only 44% of roosters have plain plumage pattern.

Except for two females with frizzled feathers, all (n=80) sampled native chickens raised by SSNC farmers in Ayungon, Negros Oriental have normal feather morphology. No literature has ever described native chickens in the Philippines with frizzled feather morphology before.

Plumage color was distributed mainly among red (36%), white (29%), or black (25%). Few birds were observed to have blue or brown plumage color. More than half of the males have red plumage, while a majority of the females have white plumage color. In Samar province, Bejar *et al.* (2012) reported that almost half (47%) of native chickens have red plumage color. According to Lopez *et al.* (2013), red plumage is also the most frequent among native chickens in Palawan. In Western Visayas, brown plumage color had the highest frequency among native chickens at 23.7% (Cabarles *et al.*, 2012). In Eastern Samar, red is the most frequent plumage color for male native chickens, while brown plumage color is the most frequent among females (Picardal *et al.*, 2015). Red plumage color is also the most frequent both in male and female native chickens in Bohol, according to Salces *et al.* (2015). Except for Cabarles *et al.* (2012), all these authors have observed the same highest frequency of red plumage color.

There were only three (3) comb types observed among native chickens in Ayungon, Negros Oriental: single, double and pea. Results showed that majority of the chickens, both male and female, possess single comb. There was one female chicken and one male chicken observed to have double comb type and pea comb, respectively. Except for roosters in Palawan, where the most frequent comb type observed was rose (Lopez *et al.*, 2013), single type of comb was most frequently observed in Samar Province (Bejar *et al.*, 2012), in Western Visayas (Cabarles *et al.*, 2012), in Eastern Samar (Picardal *et al.*, 2015), and in Bohol (Salces *et al.*, 2015).

The skin color of male and female native chickens in Ayungon, Negros Oriental was mostly white (92%), although there were very few samples with yellow and black skin color. Bejar *et al.* (2012) found that 89.98% of native chickens sampled in Samar Province have white-colored skin, followed by 7.51% with yellow skin, 1.73% with blue-black skin, and 0.79% with gray skin. The same four skin colors were also observed in Eastern Samar where Picardal *et al.* (2015) recorded up to 92% of sampled chickens having white skin. In Western Visayas, 65.19% of sampled native chickens were found by Cabarles *et al.* (2012) to have white skin, 34.2% have yellow skin, and the remaining 0.61% have black skin. In Palawan, only white and yellow skin colors were observed in native chickens, with two-thirds (2/3rd) having white skin (Lopez *et al.*, 2013). This is also true in Bohol where 96% of hens and 85% of roosters have white skin, with the rest having yellow skin (Salces *et al.*, 2015).

Shank color was mostly yellow for both sexes. This agrees with the findings of Bejar *et al.* (2012) who observed that 44% of all native chickens sampled in Samar province had yellow-colored shanks, followed by black (33%) and white (20%). Similar to native chickens in Samar Province, the yellow-colored shank is also the most frequent among native chickens in Western Visayas, observed in 32.72% of those sampled by Cabarles *et al.* (2012). This is also the case in Palawan where 46.08% of male and 40.2% of female native chickens had yellow-colored shank (Lopez *et al.*, 2013), as well as in Bohol, where 53% of hens and 62% of roosters had yellow-colored shank (Salces *et al.*, 2015). It is only in Eastern Samar where yellow-colored shank was not as frequently observed. Picardal *et al.* (2015)

reported that gray was the most frequent, observed in 41% of native chickens there, followed far behind by, white (24%), yellow (18%), and black (15%). The authors explained that it is possible these native chickens in Eastern Samar possess phenotypic markers from Red Jungle Fowl which has a gray-colored shank.

Only two (2) ear lobe colors were observed among sampled native chickens raised by SSNC farmers in Ayungon, Negros Oriental: white and red. About 95% have white-colored ear lobes, while only 5% have red-colored ear lobes. Native chickens sampled in Samar Province had mostly (84%) colored red earlobes (Bejar *et al.*, 2012). Similarly in Palawan, the majority of roosters and hens had red earlobes (Lopez *et al.*, 2013). Salces *et al.* (2015) also observed that red-colored earlobes are the most frequent among chickens in Bohol, found in 64% of hens and 88% of roosters. However, some authors observed a combination of the colors red and white among the earlobes of native chickens. In Western Visayas, Cabarles *et al.* (2012) found that 57% of sampled chickens had red with white earlobes, and in Eastern Samar, Picardal *et al.* (2015) observed that the most dominant earlobe color is the combination of red and white. The frequency of ear lobe color among native chickens in Ayungon, Negros Oriental does not agree with observations from other regions discussed above.

Table 2 shows the mean age, body weight, and morphometric measurements of the chickens from SSNC in Ayungon, Negros Oriental. Results showed that the average age of male and female native chickens sampled in this study was not significantly different. However, it can be observed that the body weight of female native chickens was found to be significantly lower compared to male native chickens ($P < 0.01$). Overall, the mean body weight was 1.32 ± 0.35 kg. Female native chickens had an average weight of 1.25 ± 0.29 kg, while male native chickens weighed 1.55 ± 0.45 kg. According to Naldo *et al.* (2021), these native chickens are free-ranged, thus they scavenge for food and water throughout the day and are given supplemental feed once or twice a day with whatever the farmers produce, including corn, coconut meat, and cassava root.

Female native chickens surveyed in Aklan, Antique, and Negros Occidental, had lower mean body weights compared to what was obtained in this study, while those in Capiz, Guimaras, and Iloilo had higher body weights (Cabarles *et al.*, 2012). On the other hand, male native chickens surveyed in all 6 provinces of Western Visayas, had heavier

Table 2. Comparison of mean \pm standard deviation morphometric measurements between sex of native chickens in Ayungon, Negros Oriental, Philippines.

Morphometric trait	Male (n=18)	Female (n=62)	Total (n=80)
Age, months	9.28 \pm 2.67	10.66 \pm 2.80	0.066
Body weight, kg	1.55 \pm 0.45	1.25 \pm 0.29	0.001**
Body length, cm	34.72 \pm 2.22	33.40 \pm 2.85	0.075
Chest circumference, cm	26.78 \pm 2.98	26.72 \pm 2.49	0.940
Wing span, cm	37.68 \pm 4.53	37.18 \pm 3.31	0.622
Shank length, cm	5.29 \pm 0.62	5.43 \pm 0.60	0.407

**Means are significantly different at the 0.01 level.

mean body weights than those in Ayungon, Negros Oriental, except the ones in Aklan, which had a slightly lower mean body weight. It appears that the observed heavier body weights of males compared to female native chickens in Ayungon, Negros Oriental is consistent with those observed among chickens in the provinces of Western Visayas. Other morphometric measurements taken were not significantly different between male and female chickens.

Table 3 shows the results of the correlation analysis. It shows that none of the morphometric traits was significantly correlated with age. However, several morphometric traits were observed to be significantly correlated with body weight. Both body length and circumference of the chest were found to have a significant moderate positive correlation with body weight, while shank length had a significantly low positive correlation also with body weight. This means that in this sampled population, heavier native chickens will certainly have longer body lengths, larger chests, and longer shanks as well.

Circumference of chest and wingspan were also found to be moderately correlated with body length. This implies that native chickens with longer body length will certainly have larger chests, and wider wingspan as well. All other morphometric traits were not significantly correlated with each other.

The phenotypic characteristics of native chickens found in the mountain barangays of Ayungon, Negros Oriental appear to show high uniformity in terms of plumage pattern, comb type, skin and earlobe color. These characteristics make these native chickens unique from those found in other parts of the country, even from those in the adjacent province of Negros Occidental. The location of their habitat in mountain barangays could have prevented the introduction of exotic breeds from other places. Inbreeding among these native chickens may have “purified” their genetic makeup. Purification of this potentially novel genetic group should be done. Such a study should lead to the establishment of community-based breeding farms and the establishment of a breed standard for these unique native chickens. These efforts would ensure that only quality breeding stocks will be used to sustain and perpetuate these SSNC production systems which are so vital to the survival of subsistence farmers in the province.

Table 3. Correlation between age of native chicken and its morphometric traits.

Variable	Age	Body weight	Body length	Chest circumference	Wing span	Shank length
Age	1.00	0.05	-0.11	0.09	-0.21	0.10
Body weight		1.00	0.44**	0.59**	0.04	0.24*
Body length			1.00	0.33**	0.30**	-0.01
Chest circumference				1.00	-0.04	0.11
Wing span					1.00	0.08
Shank length						1.00

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial, personal, or other relationships with other people or organizations related to the material discussed in the manuscript.

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