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Management practices and morphological characterization of the indigenous (native) chicken in Samar province

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The study focused on the management practices of raisers and the morphological characterization of indigenous (native) chickens in Samar province. A total of 330 respondents from the two districts of Samar were interviewed using a structured questionnaire. Chickens were kept on free range without shelter and fed with naturally occurring feed materials like rice and corn bran, kitchen refuse and other farm by-products. Very minimal input in terms of feed supplementation, health care, breeding and selection, housing, and other forms of intervention to improve production was observed. Chickens were raised for home consumption and sold to earn ready cash for the family, particularly during school enrolment. Eighty to ninety percent of the eggs produced were retained for incubation; the rest were sold to buyers and used for family consumption. For live chickens, 30 percent were sent to the market, 30 percent were consumed, 30 percent were left in the farm for breeding, and the remaining 10% were shared to other purposes such as for cock fighting, religious, and friends who sometimes asked for a certain heads of chicken. In terms of morphological characteristics, most of the native chickens studied showed complete feather distribution with red plumage (46.96%). Other dominant attributes included white skin (89.98%), yellow shank without polydactyls (44.22%), red earlobe (83.71%), single comb (89.90%), and red double wattles (100%). The five problems usually encountered by the native chicken raisers included the advent of diseases due to the unpredictable climatic conditions in the province, stealing by other members of the community, limited feed supply, predation, and poor transportation in the countryside. To counter some of these issues, farmer respondents identified solutions such as financial support and access to production and management information through training and seminars.

Keywords: Management practices, Indigenous, native chicken, morphological characterization.

INTRODUCTION

Developing countries have indigenous chickens with diverse uses and benefits. The origin of each breed or strain is the product of mutation and genetic drift, as well as separate adaptation and evolution, with differing selection pressures imposed by climate, endemic parasites and diseases, available nutrition and selection criteria imposed by man (Barker, 1994). Similarly, natural and directed selection; migration and mutation may lead to non-random or directional changes in the allele frequencies of the population. Thus, each breed or ecotype comprises a unique set of genes (a number of diversified adaptive and productive traits and genes) with special utility in the tropics (Hartl, 1988).

The role of native chicken in Philippine agriculture and in the entire economy cannot be ignored. Backyard native chicken production is one of complimentary farming activities contributing to the overall wellbeing of rural households. It provides income through the sale of birds and eggs.

Studies on native chicken production and characterization were carried out in other parts of the country (Magpantay et al. 2006) Bondoc (1998), Coligado (1987), and Lambio (1998) conducted biodiversity studies of livestock and poultry genetic resources by characterizing the five strains (four originated from various parts of Luzon; one from Iloilo) of the Philippine

native chickens. While indigenous fowls are widely distributed and identified all over the country, verification and characterization have not yet been studied in Eastern Visayas region most particularly in the province of Samar. Hence, this project is aimed at finding out the management practices of farmers and morphological characteristics of native chickens in Samar.

Objectives

1. Determine the general profile of native chicken raisers in Samar;
2. Determine the production, management, and marketing practices of native chicken raisers in Samar;
3. Determine the morphological characteristics of native chickens in Samar;
4. Identify issues and concerns that can be addressed by future researchers on native chickens; and
5. Collect samples of native chickens from the various barangays included in the study to serve as foundation stock for breeding conservation and improvement studies in the future.

Background to the study

Characteristics of native chickens

Native chickens in the Philippines are a mixture of different breeds believed to have descended from the domesticated red jungle fowl, *Gallus bankiva* L. (Philippine Council for Agriculture, Forestry and Natural Resources Research and Development [PCARRD] 2003), which today can still be found in many hillsides and forested areas of the country (Lambio 2000).

These indigenous fowls are small yet active, highly sensitive, resistant to diseases, and require minimal care and management. They play a vital role in augmenting the income of rural families. Their potential as an alternative food source especially at times of sudden economic difficulties has been proven by most families in the countryside (PCARRD 2001).

Although native chickens grow at a slower rate and lay fewer eggs than improved commercial breeds, meat from these fowls is preferred by many Filipinos because of its taste, leanness, pigmentation, myofibril arrangement that makes it palatable, and suitability for special dishes (Lambio, 1990). It is also believed to have therapeutic values (Aini, 1990).

In addition, native chickens utilize farm by-products, and are resistant to diseases and parasites (Bondoc, 1998). They serve as an efficient converter of leftover grain into valuable protein. They produce organic fertilizers and are also useful in weed control by grazing on young grasses and other vegetation (Aini, 1990). Due to the high cholesterol content of commercial broilers, not to mention the side effects of feed additives and antibiotics given to commercial breeds (Ramil, 2003), there is an increasing demand for native chickens even in urban areas.

For centuries, backyard native chicken production has been seen throughout the country. Management practices are almost uniform among numerous raisers in the Philippines. Some modifications, however, have been made over the years. One example is the way farmers in Western Visayas rear “Darag” chickens. “Darag” chickens are provided with simple housing made of local materials, artificial incubation and brooding, and commercial chick feeds during brooding to enable them have a good start before being let loose in the range (Pinoy, 2008). Native chickens are usually sold whole in the market live or dressed, with the head and the feet still intact (Bondoc, 1998).

Management of native chickens

Lambio (2000) reported that native chickens are predominantly raised under the free-range system, while certain farmers rear them in semi-confinement. Most farmers prefer to raise native chickens over exotic breeds because of the low management input and their inherent ability to survive in harsh environments. These birds are considered scavengers or self-sustaining. As such, they are kept confined during planting seasons to minimize destruction of crops in nearby fields. Avante (1989) reported that native chickens in the Philippines are “scavengers” since they are not raised in a sophisticated manner. Indigenous fowl roost in trees at night, and are let loose in backyards during the day. Little attention is given to feeding them.

Subsistence or backyard chicken production is basically characterized by the use of native stocks kept on free range to feed on naturally-occurring feed materials. Literally, these birds are left to fend for themselves with almost no input in terms of feed supplementation, health care, breeding and selection, housing, and other forms of intervention to improve production. Farmers in rural areas who have limited financial and material resources and limited access to information and technical services generally adopt this system. Chickens raised this way are primarily for home consumption, particularly during celebrations, and to earn ready cash for the family. Different types of native fowls are kept in backyard farms throughout the country (FAO 2003).

Philippine native chickens can be found anywhere in the country, providing a range of important direct and indirect benefits. Except for game cocks, they are kept in range with no intervention to breeding, feeding, and other management input (Crawford 1990). The archipelagic nature of the country prevented their movement and interbreeding.

Manleon and Barrion (2002) found that no system for breeding, feeding, housing, and sanitation and health, are in place. Selection for breeding has not been observed. Larger chickens that command higher prices are sold in the market, while small birds that are more difficult to catch remain in the flock, subsequently becoming the parents of the next generation (Garcia 1986).

In their study of native chicken production in Dolores, Quezon, Magpantay et al. (2006) revealed that raising these indigenous birds was an integral part of a balanced farming system in the area. In addition to their crops, farmers in Dolores also grow chickens in free range as a source of food and income.

Native chicken strains

Philippine native chickens, which are believed to have originated from the red jungle fowl locally known as “Labuyo” are found all over the country. According to Manleon and Barrion (2002), the top producing regions of these birds from 1998 to 2001were Regions II,Cagayan Valley; IV, Calabarzon; VI, Western Visayas; VII, Central Visayas; and XI, Davao region. Western Visayas and Davao regions were consistently in the lead in that period.

A report on chicken meat consumption in the country revealed that 13 percent of the meat requirement of a Filipino is derived from poultry and 4 to 6 percent of that is from native chickens. Filipinos have a per capita consumption of 7.67 kilograms (kg) of chicken meat (Country report, 2003). Other studies have shown that about a tenth of the total households in the country consider native chickens as the primary source of their meat requirement.

The native chicken population in Samar stands at 303,265 heads (Bureau of Agricultural Statistics [BAS] 2008), which is very low compared to the human population in the province estimated at 700,000 as of 2007 (National Statistical Coordinating Board [NSCB] 2012).

Phenotypically, Philippine native chickens resemble their wild ancestors. The male has a shiny red plumage with a light brown hackle and black tail feathers. The female has a flat brownish plumage color. They are small, with the male weighing only 1.3 kg and the female 1 kg (Bondoc, 1998; Arboleda, 1987).

Indigenous birds usually come with a single comb and have a shank color varying from yellow, white, gray, and black. The common plumage colors and patterns of the native chickens are reddish-brown (*dalusapi* and *mayahin*), silver laced with bluish-green tint (*talisayin*), alternate barring of black, white, gray and reddish brown (*budlike*), solid white (*puti*), smokey-white to brownish gray (*abuhin*), brown to gray with white spots (*lasak*), and solid black (*itim*) (PCARRD 2003; Bondoc, 1998). Of the local breeds, only the *dalusapi*, *mayahin*, and *talisayin* are considered to be true descendants of the Philippine red jungle fowl, while the others are considered to be variations of crossbreeds (Avante 1989).

On the downside, Coligado (1985) said that native chickens are generally poor egg producers, in addition to having a small body size and a slow growth rate. Egg production is estimated at 57 percent or 103 eggs in a period of 180 days. Further, Coligado stated that the size of eggs laid by native chickens is 30.1 grams (g) for the smallest and 47 g for the largest, and the average body weight of pullets is 1.53 kg, with a growth rate of 63.15 g/week. Zaman et al. (1991), however, said that although native chickens are poor producers of both meat and eggs, they are highly adaptable to the environment and more resistant to local diseases compared to exotic types.

Native chicken have always been part of the rural sitting often turn loose to scavenge. The age at first egg is about 144-184 days. Average chicks weight was 24.2-26.4 grams. Average egg production, fertility and hatchability under semi confinement is 24-27%, 70-87%, and 30-46% respectively (Lambio & Grecia, 1998; cited by Bondoc, 1998).

Avante (1989) on the other hand, indicated an egg production of 40-50/year for the native chicken, 240-260 eggs/year for most of the exotic breeds; maturity age of 142 days for native chicken while 156 days for exotic breeds; hatching rate for native chicken was 63%, fertility 68% while 65% hatching and 71% fertility rate for most of the exotic breeds.

The native rooster is ready for breeding at age 20-24 weeks. Keep just one rooster to a flock of 5-10 hens to produce the satisfactory number of fertile eggs for hatching. The native hen start laying eggs between 18-20 weeks of age, PCARRD, 2000.

Among the identified genetic groups of native chickens in the Philippines are “Banaba” from Batangas, “Bolinao” from Pangasinan, “Camarines” from Bicol, “Paraoakan” from Palawan, and “Darag” from Panay Island. Crossbreeds and upgrades of these genetic groups also exist. In general, these indigenous birds are being utilized for home consumption by rural farming families. They are also used in some tribal rituals (FAO 2003).

Description of the project area

Samar is strategically located in eastern Philippines, separated on the northwest from the island of Luzon by the San Bernardino Strait and on the south from the island of Leyte by San Juanico Strait and Leyte Gulf. Catbalogan, on the western coast, is the capital city. It has an area of 13,100 square kilometers (km2) and a population of 695,149 as of 2007 (NSCB 2012).

The province is agricultural with abundant areas suited for diversified farming. Agricultural products include hemp, rice, coconuts, and sweet potatoes. Most of the

land is planted with coconut, which makes it suitable for coconut-based poultry production. Even with this favorable environment, the supply of native chickens in the market is still insufficient.

The areas covered in this study were six municipalities in the first district and seven in the second district of Samar province. The barangays were selected on the basis of their distance from the town center and the size of the native chicken population as determined by the respective Municipal Agriculture Offices (MAO). The study involved 330 respondents.

Researchers of the Northwest Samar State University (NwSSU) San Jorge Campus undertook the study to verify the management practices employed by native chicken raisers and identify the phenotypic characteristics of native chickens in the province of Samar. The management practices of farmer respondents were based on their responses during the personal interviews conducted. Data on the characteristics of the native chickens were taken from the samples presented by the respondents. Information also came from the demonstration project of NwSSU San Jorge Campus, which keeps a collection of native chickens from various parts of the province. The campus is situated along the national highway, 33 kilometers (km) northwest of Catbalogan City, and 36 km southeast of Calbayog City.

METHODOLOGY

Largely descriptive, the study focused on the management practices and the morphological characterization of indigenous (native) chickens in Samar Province. It determined the demographic profile of native chicken raisers, the management system, the morphological characteristics of the native chickens, and the problems and possible solutions as regards native chicken production in the province.

To gather information, interviews with farmer respondents were conducted using an Open-ended questionnaire. The interview schedule had the following sections: 1) Demographic profile of the farmer and his farm; 2) Production and management practices; 3) Marketing information; 4) Morphological characteristics of the chickens (plumage color, skin and shank color, comb type, earlobe color, skeletal variants or spur polydactylism body weight); and 5) Problems and recommended solutions. The gathered data were complemented with observation.

The study covered Districts I and II of Samar province. The barangays were chosen based on the recommendations of the MAO and City Veterinary Offices (CVO). The main criterion for the selection was the number of native chicken raisers in the area.

Respondents from District I were from the city of Calbayog, especially the district of Oquendo, and municipalities of Sta Margarita, Sto. Nino, Pagsanghan, San Jorge, and Tarangnan. District II municipalities were Jiabong, Motiong, Calbiga, Pinabacdao, Villareal, Sta. Rita, and Basey (Table 1).

Analytical procedure

Secondary data on the population of Samar province was gathered from the National Statistics Office (NSO) for the determination of the sample size. The sampling size for the interviews was computed using Slovin's formula, with a 5 percent margin of error.

$$n = \frac{N}{1 + Ne^2}$$

Where: n = refers to the sample size
N = refers to the total population
e = refers to percentage of errors which is equal to .05

The subjects of the interview were primarily the native chicken raisers, who were recommended by the barangay captains or the barangay councilors in the areas identified. The respondents' demographic profile and management practices of native chicken were consolidated in frequency tables. Problems and recommended solutions were ranked according to the frequency of responses.

Animals used for the morphological study were scavenging local chickens kept by the respondents in the study area. Two male and female available free-range chickens for every respondent were purposively planned for equal distribution and as a representative of the chicken cared by the farmer which were provided randomly and characterized by the researchers on site

A total of 660 (272 from District I and 388 from District II) mature native chickens were observed. Qualitative traits such as plumage color, skin and shank color, comb/wattle type and color, earlobe color, skeletal variants or spur polydactyl, body weight, and tolerance were evaluated, which was determined based on farmers information towards their resistance to environmental exposure. The prevalence of the distribution of the traits among the chickens in the province was calculated by dividing the number of animals having the trait by the total number of animals examined. Percentages were used to measure the rate of each trait in the district. Data were analyzed using descriptive statistics.

RESULTS AND DISCUSSION

Demographic characteristics of native chicken raisers in Samar

A total of 330 respondents were interviewed. One

Table 1. Selected areas with registered population, number of barangays, number of respondents and number of chickens used for morphological study.

Municipalities	Population	No. of Respondent Barangays	Total No. of Respondents	No. of chickens used for Morphological study
District 1				
1. Tarangnan (Cabunga-an, Canunghan, Bangon Gote, Bahay, Barangay Poblacion B, and Tigdaranao)	22,767	5	30	60
2. Oquendo (Anislag, Guin-on, Panlayahan, Tapa-e, Patong, Guimbaoyan Sur, Begaho, and Cabugawan)	34,991	6	37	74
3. Sta. Margarita (Monbon, Napuro, and Ilo)	19,146	5	26	52
4. San Jorge (Mombon, La Paz, Rosalim, Buenavista, and Guindapunan)	14,134	5	16	32
5. Pagsanghan (Corocawayan, Bangon and Libertad)	7,350	4	12	24
6. Sto. Nino (Takut)	12,761	4	15	30
District II				
1. Basey (Cogon, San Antonio, Dulongan, and Balanti)	48,389	7	53	106
2. Sta. Rita (Maligaya, San Eduardo, Sta. Elena, and Tominamos)	28,930	7	42	84
3. Calbiga (Bacyaran, Malabal, Tinago, Macaalan, Patong, Borong, and Parasanon)	20,309	6	22	44
4. Villareal (Camucat, Tomabi, Connant, Polangi, and Patag Bulao)	25,135	5	28	56
5. Pinabacdao (Madalunot and Laygayon)	14,492	4	16	32
6. Motiong (Karanas, Kalapi, Bunga, and Inalad)	13,549	4	15	30
7. Jiabong (Camaroboan, Parina, Malino, Poblacion, Lologayan, Cantongtong and Victory)	15,968	6	18	36
Total		**68**	**330**	**660**

hundred and forty-four (144) were from District I and 186 were from District II of the province of Samar. More than a quarter of the respondents were in the 41-50 year old age group; the youngest respondents were below 25 and the oldest were in the 71-80 year old age group. Of the farmers interviewed 267 (80.91%) were fathers, while 62 (18.79%) were mothers. The respondents were predominantly married (90.91%), the rest being widow/er (4.54%), single (3.64%), or separated (0.91%). This shows that raising native chickens is generally undertaken by married individuals, with the responsibility of managing the production falling on the able-bodied family members, particularly the fathers. Of the farmers interviewed, more than a third (39.71%) reached elementary school. A fourth (25.15%) were elementary school graduates, less than a tenth (9.7%) finished high school, and only six (1.8%) were college graduates. Only a few (7.88%) respondents were exposed to animal or poultry production training; most (92.12%) have not attended any relevant seminars. It can be deduced from these results that native chicken raising is generally undertaken by farmers with low income. Village poultry production helps alleviate this condition by increasing the income and improving the food security of households (Alders and Harun, 2004).

Chickens are often the only livestock owned by the poorest people in many parts of the world (Dolberg, 2003). Native chicken raising is operated in backyards due to the poultry growers' early marriage, the number of family members or children, and the level of education that constrain production technically and financially (FAO, 2003).

Sources of income

Table 2 presents the respondents' sources of income, arranged from the most frequently mentioned to the least one. Crop farming was the main livelihood of half of the farmers interviewed. Others engaged in fishing or livestock and poultry raising (20.61%). The rest engaged in small-business enterprise (i.e., sari-sari stores) and non-farm employment (drivers, property rental, and government employee).

The results imply that while native chicken raising is common in various parts of the province, farmers do not rely on this alone to provide for the needs of their families. Native chicken production serves as complementary and supplementary source of family income (PCARRD, 2001; Magpantay et al., 2006).

Table 2. Sources of income of native chicken raisers.

Sources of Income	Frequency (N=330)	Percentage
Crop farming	167	50.60
Poultry/livestock/fish farming	68	20.61
Laborer/house/farm worker	48	14.55
Sari-sari/business	34	10.30
Drivers/property rentals	13	3.94
Government employed	1	0.30

Farm Characteristics

A total of 6,088 native chickens were surveyed. Chicks (47.55%) composed almost half the population. The rest were hens (18.13%), pullets (13.57%), roosters (10.96%), and cockerels (9.79%). It was observed that farmers owned an average of three hens, two roosters, two pullets, one cockerel, and eight chicks. This number of native chickens was just within the capability of the farmers to feed and manage. The respondents in fact, said that certain number of chickens under their care were enough for backyard production and already provide an alternative source of income for the family.

Purpose and system of production

Two-thirds (60.91%) of the respondents engaged in native chicken production both for home consumption and for the market (Table 3). Almost a quarter (24.64%) said they raised native chickens solely for profit. Nearly a tenth (8.79%) kept native chickens solely for home consumption. The rest (3.64%) raised these birds for other purposes, including rearing roosters to serve as breeders and fighting cocks. A little over three-fourths (76.36%) of native chicken raisers in Samar adopted “range without shelter” or traditional management. Others kept the chickens on free range but provide a house where they can roost during the day or at night time (14.24%). Less than a tenth (9.40%) of the respondents observed total confinement. Such a practice was employed by a few because of concern for the safety of the animals against predators and other environmental factors (Pinoy, 2008).

Housing

Farmers practicing range with shelter and confinement systems used farm sheds, the fenced ground floor of their houses, and purposely constructed shelters to house their native chickens (Table 4). In any of these prepared structures, more than half (54%) utilized the litter floor type where rice hull is spread on the ground for flooring. Others employed elevated slat floor made of bamboo, wire, or plastic screen (32.05%) and a combination of elevated slatted and litter floor system (14.10%) that is very practical for those who keep male breeders that double as fighting cocks or for those who practice artificial brooding.

For the roof, more than three-fourths (75.64%) of the respondents who practiced ranged with shelter and confinement utilized the shed type. A-type roofing was the next popular choice. The combination of shed type and A-type roofing comprised 6.41 percent, while monitor and semi monitor types were seldom used.

For the materials used, 96 percent of the farmers who provide housing for their chickens used indigenous or local materials. This is consistent with the study by PCARRD (2000) as posted by the Agri Center in 2009, describing the native chicken shelters made of bamboo, wire mesh, and other scrap materials for protection from predators and the elements.

Feed and feeding

Table 5 shows the type and cost of feeds, and the system and frequency of feeding for native chickens. These parameters were suggested by farmer respondents who practiced semi-extensive and confinement management systems.

Forty-six percent (46%) of those who partly feed their animals utilized local feeds consisting of rice or corn grains and bran. A fourth (25%) employed domestic discards as chicken feed, while 14 percent used both commercial and local feeds. With the very limited supply of corn in the locality and little difference in cost compared with commercial feeds, some farmers have turned to commercial feeding. Despite the economic impact of its cost on production, the use of commercial feeds by few of the respondents was justified for the lack of local sources and the convenience in sourcing them.

Most (82.05%) of the respondents adopting the semi-extensive and confinement methods used restricted feeding. Moreover, 12 farmers (15.39%) adhered to *ad libitum* feeding while two farmers (2.56%) did not give feeds at all. Twice-a-day feeding was commonly observed (75.64%), although some (19.23%) fed their native chickens only once a day. These were those who practiced range with shelter where feeding is administered just once, late in the afternoon—for

Table 3. Purpose and system of raising native chickens.

	Frequency (N=330)	Percentage
Purpose of raising		
Home consumption	29	8.79
Selling	78	23.64
Home consumption and selling	201	60.91
Others (ornamentals, religious, as fighting cocks)	12	3.64
System of raising		
Ranged without shelter (traditional management)	252	76.36
Ranged with shelter (traditional with intervention)	47	14.24
Confinement (semi- or complete)	31	9.40

Table 4. Housing and housing materials used for native chickens.

	Frequency (N=78)	Percentage
Floor type		
Elevated slatted floor	25	32.05
Litter floor (ground)	42	53.85
Combination slat-litter floor	11	14.10
Roof type		
Shed	59	75.64
Monitor	1	1.28
Semi-monitor	1	1.28
A-type	12	15.39
Combination of shed and A-type	5	6.41
Materials Used		
Native/local materials	75	96.15
Concrete	3	3.85

Table 5. Type, system, frequency of feeding, and cost of feeds/week.

	Frequency (N=78)	Percentage
Types of feed		
Commercial	3	3.85
Local		
Root crops	8	10.26
Rice/corn grain/bran	36	46.15
Domestic discards	20	25.64
Both commercial and local	11	14.10
System of feeding		
Ad libitum	12	15.39
Restricted	64	82.05
No feeding	2	2.56
Frequency of feeding/week		
Once	15	19.23
Twice	59	75.64
Thrice	4	5.13
Cost of feeds/week (USD)		
Below 1	70	89.74
1 - 1.3	5	6.41
1.4 - 1.8	1	1.28
1.9-2.3	2	2.56

checking and monitoring purposes. For feeds, most (89.74%) spent less than PHP 40 per week. A few (6.41%) incurred feed expenses ranging from PHP 40 to 60 per week. This implies that most native chicken

raisers prefer to keep feed spending to a minimum, which may be due to economic reasons and feed ingredients used.

Mating systems and breeder replacement

Natural uncontrolled system of mating was primarily observed by native chicken raisers in Samar (Table 6). Depending on the male to female ratio that the farmers want to maintain, most (85.76%) of the respondents allowed male chickens to breed with the existing females in the flock until the birds become old or are sold in the market. About 14 percent of the respondents select the male and female stock to be used for controlled mating. The breeder stock used for both natural controlled and uncontrolled systems, however, only underwent basic breeding selection.

The replacement of breeder stock was normally for old birds and culls. Almost 90 percent of the farmers used their existing stock as the primary source of stock replacement. Local sources within the community were also tapped for stock replacement by about 6 percent of the native chicken growers in Samar. The rest of the respondents procured their replacement stock from distant places. The results imply that inbreeding of native chickens normally takes place in the areas of study since the replacement stocks are generated from within the flock.

More than a third (36.06%) of native chicken growers had 1:2 male to female breeder ratio. Others had 1:3 (17.27%), 1:5 (13.94%), and the least was 1:6 (7.58%). This shows that native chickens produced in a cycle are just allowed to stay until maturity, after which, the determination and disposal of males are made. The respondents may have little knowledge about the recommended male to female ratios for native chickens. Table 7 shows how often the breeders were replaced per year and the reasons for replacement. As indicated, the advent of diseases (40.91%), particularly fowl cholera, was the main reason for replacing breeders. Sickness, being unpredictable, makes the replacement of chickens undetermined. Disease outbreak occurs every two to three years.

More than three-fourths (78.48%) select breeder stock, with 35.27 percent basing the selection on the laying performance of native chickens. The survival rate against diseases and other environmental factors, and physical appearance and breed were also considered when choosing a replacement breeder stock.

Laying characteristics

Results revealed that native chickens start laying eggs at six (35.76%) and seven (35.46%) months old (Table 8). This finding is in disagreement with literature indicating that eggs are first laid at 4 to 5 months, (Bondoc, 1998; Avante, 1989; PCARRD, 2000). The longer period it takes to produce eggs may be due to the scarcity of local feeds, which affects nutrition. Almost all (99%) farmers reported that their chickens lay eggs in nests made of indigenous materials, which demonstrates the birds' instinct to lay eggs in ready-made nests. In terms of the number of eggs laid per clutch, more than half (59.7%) of the respondents said that their native chicken usually lay 9 - 12 eggs.

About 31 percent of the respondents that 5 – 8 eggs were laid per clutch. A little over 9 percent revealed that their native chickens produce 13 eggs or more per clutch. With most respondents answering 9–12 eggs per clutch, it can be surmised that 40 to 60 eggs are produced by each hen per year considering that a hen can have four reproductive cycles in a year (PCARRD 2000).

About two-thirds (62.73%) of the farmers interviewed said that their native fowls lay small eggs. A third (33.64%) claimed that the eggs were medium in size especially during the middle stage of the chickens' reproductive life. Only 3.64% of respondents considered large sized eggs laid by their chickens. Probably this observation of the few farmers might be on the later part of the laying period by which large size eggs can possibly be produced. The findings on small sized eggs produced by native chicken in Samar conform to the idea of Arboleda (1987).

Egg color, incubation, and hatchability

As indicated in Table 9, 60.3 percent of the respondents have native chickens that lay white-shelled eggs. A third (30.30%) observed the eggs of their native chickens to be dirty white, and the rest (9.39%) said that their birds lay light brown eggs.

In terms of the system of incubation applied, almost all (96.97%) farmers practiced natural incubation. Only seven followed artificial incubation using improvised incubators and three farmers adopted both natural and artificial means of incubation. From this, it can be concluded that native chickens are good brooders and that natural incubation is more economical. Artificial incubation, however, can also be employed for native eggs, except that incubation facilities are very costly. Further, the electric power supply in Samar province is unstable.

As to the number of eggs incubated, almost two-thirds (65.15%) let their hens brood 9-12 eggs per incubation period, followed by 5-8 eggs (17.88%), 13-15 eggs (14.24%), and 16-18 eggs (2.73%). Bigger hens incubated more eggs.

In terms of hatchability of incubated eggs, the highest was 81-90 percent as revealed by a little over a third (37.58%) of the respondents, followed by 71-80 percent

Table 6. Mating systems and breeder replacement stocks.

	Frequency (N=330)	Percentage
System of Mating		
Natural uncontrolled	283	89.70
Natural controlled	47	6.06
Artificial insemination	0	4.24
Source of Breeders/Replacement Stock		
Within the flock	296	15.39
Local	20	82.05
Outside locality provincial/regional/national	14	2.56
Male to Female Ratio		
1:1	45	13.64
1:2	119	36.06
1:3	57	17.27
1:4	38	11.52
1:5	46	13.94
1:6	25	7.58

Table 7. Selection of replacement stock of native chickens.

	Frequency (N=330)	Percentage
Frequency of replacement		
Every year	74	22.42
Every 2 years	17	5.15
Every 3 years	9	2.73
Every 4 years	8	2.42
As need arises	87	26.36
Once disease comes in	135	40.91
Do they select breeder stock?		
Yes	258	78.48
No	72	21.52
On what basis?		
Based on breed	38	14.73
Survival/livability	75	29.07
Physical appearance	40	15.50
Laying performance	91	35.27
Based on number of wins in cockfights	5	1.94
As need arises 9 3.49	9	3.49

hatchability (26.36%). The difference could be due to the improper handling of eggs after being laid, the kind of nesting materials used, weather conditions, and the incubation management practices employed.

More than half (56.36%) of the respondents said native chickens could have three batches of incubations a year. Three or four hatchings a year conform to the normal production cycle. Farmers who have fowls that incubate once or twice per year comprise 2.42 percent and 10.91 percent, respectively. Fewer hatches (one or two per year) may be attributed to improper care and management practices.

Egg management

Most respondents (86.06%) allowed the eggs to remain in the nest until incubation or hatching (Table 10). A tenth (10.91%) collected the eggs immediately after laying, leaving only one or two in the nest believing that doing so may increase the number of eggs per clutch. The rest of the respondents, who raise native chickens in free range, did not collect the eggs because they assume that after some time the chicks would become part of the flock. When farmers find dead embryos in incubated eggs, more than half (59.09%) said they throw away the eggs. The rest cooked and ate the eggs (33.4%), cooked the eggs and fed them to pigs, dogs, and cats (5.15%), or buried the eggs (2.12%).

Three-fourths of the respondents cooked excess or un-incubated eggs, 18.79 percent sold the eggs, while the rest (5.76%) gave them to relatives and friends. These findings imply that respondents do not give time and attention to egg management. This is probably because

Table 8. Laying characteristics of native chickens.

	Frequency (N=330)	Percentage
Age at first laying (months)		
4	15	4.54
5	37	11.21
6	118	35.76
7	117	35.46
8	30	9.09
9	10	3.03
12	3	0.01
Laying area		
Nest	327	99.09
Anywhere	3	0.01
No. of eggs per clutch		
Once	102	30.91
Twice	197	59.7
Thrice	31	9.39
Egg size		
Small	207	62.73
Medium	111	33.64
Large	12	3.64

Table 9. Characteristics of native chicken eggs.

	Frequency (N=330)	Percentage
Egg color (shell)		
White	199	60.30
Light brown	31	9.39
Dirty white	100	30.30
System of Incubation		
Natural	320	96.97
Artificial	7	2.12
Both	3	0.91
No. of eggs incubated		
5-8	59	17.88
9-12	215	65.15
13-15	47	14.24
16-18	9	2.73
Hatchability (%)		
Below 50%	6	1.82
50-60	14	4.24
61-70	40	12.12
71-80	87	26.36
81-90	124	37.58
91-100	79	23.94

raising native chickens is considered a secondary occupation.

Brooding

More than three-fourths (76.36%) of the respondents practiced natural brooding, where the mother hen supplies heat to the chicks. The rest adapted artificial brooding (20.30%), or a combination of both (3.33%). The preference for natural brooding could be because of insufficient knowledge about the artificial method, lack of funds for brooding facilities, and the absence of electricity in some of the areas studied.

More than half (57.58%) experienced less than 30 percent brooding mortality rate, while 26.67 percent estimated brooding mortality to be at 30 - 40 percent. The rest of the respondents said 50 - 75 percent of their native chickens die during brooding. Unfavorable weather and predation by animals were the main causes of the high brooding mortality rate; conditions which exist in an uncontrolled environment where natural brooding takes

Table 10. Native chicken egg management.

	Frequency (N=330)	Percentage
Egg management		
Remain in nest	284	86.06
Collected every lay	36	10.91
Uncollected	10	3.03
Egg with dead embryo		
Cooked and eaten	111	33.64
Cooked and given to animals	17	5.15
Thrown away	195	59.09
Buried	7	2.12
Management of non-brooded eggs		
Cooked/eaten	249	75.45
Sold	62	18.79
Given to others	19	5.76

Table 11. Brooding system and mortality rate of native chickens.

	Frequency (N=330)	Percentage
System of brooding		
Natural	252	76.36
Artificial	67	20.30
Both	11	3.33
Mortality (%)		
Below 30%	190	57.58
30-40	88	26.67
41-50	29	8.79
51-60	15	4.54
61-70	8	2.42
Lighting supply (n=78)		
Kerosene lamp	45	57.69
Electricity	31	39.74
Others (charcoal, rice hulls etc.	2	2.57

place.

Table 11 shows that 57.69 percent of those who practice artificial brooding and a combination of natural and artificial methods utilized kerosene lamps, with 39.74 percent relying on electricity and the rest (2.57%) on other lighting sources.

Health and sanitation management

Water, vitamins, and biologics supplementation

Health and sanitation management covers care given by the raisers to their flock, how farmers manage sick birds, and the mode of disposal of dead birds.

Most (87.27%) of the farmers interviewed provided water to their native chickens (Table 12). The rest let the birds fend for themselves. For those who supply water to their chickens, 88.54 percent gave water once a day, usually in the morning after roosting. Biologics were not usually provided, with almost three-fourths (74%) of the respondents foregoing the practice. For the few respondents who do give medication to their flock, vetracin/supplement (52.87%) administered orally, was commonly given. Eight percent vaccinated their flock through intranasal application and the same number (8%) dewormed their birds. Nearly all raisers acknowledged that they did not observe a regular treatment schedule; biologics were only given when needed – only when the birds were unwell.

Management of sick and dead birds

More than half (51.21%) of the respondents treated their sick birds. Almost a fifth (18.48%) said that they dress sick birds and use these as food; 14.85% percent threw sick birds in the trash and waterways. Nine percent ignored chickens that were in poor health (Table 12).

More than half (59.39%) of the respondents bury the remains of dead chickens, while a third (33.33%) threw these away. Only 4.85 percent used these as food. A few (2.12%) disclosed that they burn the dead chickens. The

Table 12. Health and sanitation management of native chickens.

	Frequency (N=330)	Percentage
Do they give water?		
Yes	288	87.27
No	42	12.73
If yes, how often?		
Once a day	255	88.54
Twice	15	5.21
Thrice	4	1.39
As need arises	14	4.86
Do they give biologics?		
Yes	87	26.36
No	243	73.64
Type of biologics		
Natural or local	10	11.49
Vetracin/supplement	46	52.87
Vaccine	7	8.05
Dewormer	7	8.05
Antibiotics	17	19.54
How often biologics are given?		
Once a day	6	6.9
Twice a day	12	2.3
Once a week	14	16.09
Once a month	8	9.2
Once a year	10	11.49
As need arises	47	54.02
Mode of application		
Intranasal	6	6.9
Wing web	1	1.15
Oral	78	89.65
Intracloacal	0	0
Intramuscular	2	2.3
Intravenous	0	0
Intraocular	0	0
Management of sick birds		
Buried	21	6.36
Used as food	61	18.48
Taken for granted	30	9.09
Treated	169	51.21
Others (thrown)	49	14.85
Management of dead birds		
Buried	196	59.39
Used as food	16	4.85
Taken for granted	110	33.33
Treated	7	2.12
Others (thrown)	1	0.30

result implies that proper management and disposal of sick and dead birds are given enough emphasis or consideration by the native chicken farmers in Samar.

Marketing Information

Respondents' perception of native chicken buyers

Most (83.03%) of the respondents said that their customers prefer live chickens (Table 13). These farmers revealed that their buyers purchase chickens over eggs because native chicken eggs are smaller compared to those of commercial breeds. Respondents also said customers prefer live chickens because of the meat's taste (62.77%), high nutrient content (34.31%), and low cholesterol content (2.92%). This is supported by literature concerning the organoleptic and biochemical characteristics of native chickens (Lambio 1990; Lambio et al., 1999; Ramil, 2003).

Only 16.97 percent of the respondents reported that their customers buy mostly eggs. Of these, almost 46.43 percent said the palatability or taste of the native chicken eggs was the main reason for buyers' interest while 14.28

Table 13. Respondents' perception of native chicken buyers' preferences.

	Frequency (N=330)	Percentage
Buyers preferences		
Egg	56	16.97
Live chicken	274	83.03
Because of its taste	26	46.43
Because of its yolk color	8	14.28
Because of its low price	12	21.43
For use of sick family member	10	17.86
Reason for not Buying Eggs		
Because of small size	201	73.36
Not sold by the owner	73	26.64
Reason for live chicken preference		
Because of its taste	172	62.77
Because it is nutritious	94	34.31
Because of its low cholesterol content	8	2.92

percent preferred the yolk color.

Egg and live chicken utilization by the respondents

More than half (54.9%) of the respondents indicated that 5-10 percent of the eggs produced by their hens were sold to buyers while 2-5 percent were consumed by the farmers themselves (60.3%). About 81 - 90 percent were retained for incubation (40.9%). This implies that native chicken growers place more importance on retention and sustainability than sale and consumption. Results indicate that 42.4 percent of the farmers interviewed sold at least 30 percent of their chickens for additional income. About one-third (32%) said that 30 percent of their native chickens were consumed by the family to cover their protein requirements. The rest retain 30 percent for breeding purposes.

Marketing of native chickens

Half of the farmers said that selling eggs was done only as the need arose (Table 14). Almost a fourth (23.9%) indicated selling their eggs every semester, and 12.7 percent market the eggs annually. About 47.3 percent of the respondents sold live chickens for meat every semester. Selling chicken "as the need arose" and "annually" come next at 16.4 percent and 15.8 percent, respectively. The results imply that farmers sold their chickens when the family was in need of money, especially during their children's school enrollment period.

These also conform to the report of Alders and Spradbrow (2001) that village poultry is often sold to generate cash to pay for children's education in poor families. Furthermore, poultry production has helped keep many poor communities above the poverty line (Bell 2009).

Mode of selling

As indicated in Table 14, the majority of the respondents sold eggs (71.2%) and live chickens (59.7%) per head basis. This is because classifying eggs and live chickens based on size and weight was not possible due to the unavailability of a weighing scale in the farm. Only 25.5 percent of the farmers sold their live chickens by weight. Data also shows that chickens sold by weight weighed approximately 1 to 1.5 kg (57.6%). The average price was PHP 100 to PHP 120 per kilogram of live weight. Nearly half (49.1%) of the respondents sold only adult chickens, in addition, 20.3 percent marketed unproductive, low grade, or culled chickens; while the rest sold pullets (16.7%) and cockerels (11.5%).

Sales and volume

Results show that about a third (39%) of the respondents sold an average of three heads of chicken per marketing day. Buyers usually come when supply is available according to 39.7 percent of the native chicken raisers. The majority said that buyers prefer live (84.5%) than dressed (15.5%) chickens.

Morphological characteristics of native chickens in Samar province

Data on morphological characterization were obtained based on the dominance of a particular trait or variable among the matured native chickens studied within the two districts of Samar. The plumage of the sampled native chickens varied in color. Red (46.96%) was found to be dominant, followed by brown (18.58%), and black (10.23%). Red plumage constituted 50.73 percent of the chickens sampled from District I and 43.18 percent from District II. The brown color made up 14.96 percent of the

Table 14. Frequency of egg and native chicken marketing.

	Frequency (N=330)	Percentage
Frequency of egg marketing		
Once a month	20	6.1
Quarterly	24	7.3
Semester	79	23.9
Annually	42	12.7
As need arises	165	50.0
Frequency of chicken meat marketing		
Once a month	18	5.5
Twice a month	24	7.3
Quarterly	26	7.9
Semester	156	47.3
Annually	52	15.8
As need arises	54	16.4
Mode of selling (egg)		
By weight	10	3.0
By piece	235	71.2
By dozen	60	18.2
By dozen and by piece	25	7.6
Mode of selling (meat)		
By weight	84	25.5
By piece	197	59.7
Both	30	9.1
Wholesale	19	5.8
Marketing age		
Pullet age (4-5 months)	55	16.7
Cockerel age (4-5 months)	38	11.5
Adult age (8-24 months)	162	49.1
Culled (> 2 years)	67	20.3
Others (chicks/young age–below 4 months	8	2.4
Marketing weight		
Below 1 kg	94	28.5
1-1.5 kg	190	57.6
2 kg	46	13.9
Price/kilo live weight/head (in PHP=peso)		
Below 100	96	29.1
100-120	170	51.5
121-150	47	14.2
151-200	17	5.2
Number sold		
1	37	11.2
2	61	18.5
3	129	39.1
4	55	16.7
5	28	8.5
Above 5	20	6.1
Buyer frequency		
Do not come	44	13.3
Seldom come	47	14.2
Sometimes/oftentimes	50	15.2
Always	28	8.5
Comes depending on supply	131	39.7
As need arises	30	9.1
Product preference		
Live	279	84.5
Dressed	51	15.5

chickens from District I and 22.19 percent from District II. Such large variations in plumage colors reveal that much genetic dilutions have occurred in native chickens (Bhuiyan et al., 2005).

Table 15. Morphological characteristics of native chickens.

	District 1 (n=272)		District 2 (n=388)		Mean
	F	%	F	%	
Plumage color					
White	33	12.04	27	7.67	9.87
Black	29	10.58	36	10.23	10.23
Blue	3	1.09	14	4.05	2.57
Red	139	50.73	152	43.18	46.96
Brown	41	14.96	78	22.19	18.58
Wheaten (Pale yellow)	20	7.3	19	5.40	6.23
Gray	9	3.28	26	7.35	5.31
Skin color					
White	251	91.61	311	88.35	89.98
Yellow	17	6.20	31	8.81	7.51
Blue-black	4	1.46	7	1.99	1.73
Gray	2	0.73	3	0.85	0.79
Shank color					
Yellow	108	39.42	159	45.02	44.22
Black	93	33.94	110	31.7	32.82
Green	16	5.84	13	3.67	4.76
Blue	3	1.09	2	0.61	0.85
White	54	19.71	68	19.60	19.66
Earlobe color					
Red	226	82.48	299	84.94	83.71
White	48	17.52	53	15.06	16.29
Wattle color					
Red	255	93.07	328	93.18	93.13
White	19	6.93	24	6.82	6.87
Type of comb					
Single	216	78.83	285	80.97	79.90
Pea	49	17.88	52	14.77	16.33
Rose	9	3.29	15	4.26	3.78
Feather distribution					
Complete	274	100	352	100	100
Incomplete	0	0	0	0	0
Shank feather					
Present	2	0.73	0	0	0.37
Absent	272	99.27	352	100	99.64
Wattle type					
Single	0	0	0	0	0
Double	274	100	352	100	100
Skeletal variants					
Polydactyl	6	2.19	5	1.42	1.81
Multiple spurs	0	0	0	0	0
Crested	0	0	0	0	0
Frizzled	2	0.73	1	0.28	0.51
Naked neck	0	0	0	0	0
Absent	266	97.08	346	98.3	97.65
Tolerance					
Tolerant	1083	100	640	100	100
Not tolerant	0	0	0	0	0
Body size (kg)					
Light (1.0-1.5)	192	70.07	242	68.75	69.71
Medium (1.6-2.0)	58	21.27	71	20.17	20.17
Heavy (2.1 and above)	24	8.76	39	11.08	9.92

As shown in Table 15, the most common skin color was white, observed in 89.98 percent of the sampled native chickens. Birds with yellow skin comprised 7.51 percent. Those with blue-black and gray skin made up 1.73 percent and 0.79 percent, respectively. For the shank, yellow (44.22%) was the predominant color. Black shank was found on 32.82 percent of the native chickens, white on 19.66 percent, green on 4.76 percent, and blue on

Table 16. Problems encountered by native chicken raisers.

	Frequency (N=330)	Percentage
Diseases	667	40.42
Pilferage	325	19.70
Feeds and medicines	278	16.85
Predation/wild animals	133	8.06
Poor transportation	68	4.12
Destruction to agricultural crops	56	3.39
Weather condition	44	2.67
Lack of technical knowledge	29	1.76
Social disturbance	21	1.27
Lack of Area	18	1.09
Vehicular accidents	11	0.67

0.85 percent. In terms of earlobe color, red (83.71%) dominated over white (16.29%). Red (93.13%) was the dominant wattle color. The rest (6.87%) of the sampled birds had white wattles.

These findings agree with literature stating the varied characteristics of various strains of native chickens, Bondoc, 1998. Single comb was the most common comb variation, comprising almost 80 percent of the sampled fowls. The feathers of the chickens were completely or normally distributed. Double wattle was observed on all native chickens sampled. Shank feathers were absent on most (99.64%) sampled birds. Only 0.37 percent were found to have feathers in their shanks.

In terms of skeletal variants observed (such as polydactyl, multiple spurs, crested, frizzled feathers, and naked neck), only polydactyl (1.81%) and frizzled feathers (0.51%) were found on sampled birds. As for heat tolerance, results indicate that all mature native chickens in the areas studied can withstand high temperatures.

In terms of size, 69.71 percent of the fowls observed were light. Medium birds comprised 2.17 percent, with heavy chickens (9.92%) making up the rest. These results conform to various literature cited in this report. The overall findings on the morphological characteristics of the chickens studied prove the existence of the indigenous species of chickens in Samar province. The complete identity and authenticity, however, require more complicated studies such as genetic or biomolecular characterization.

Problems encountered by farmer respondents

Table 16 presents the main problems encountered by respondents in relation to raising native chickens in Samar province. The issues identified were ranked according to the frequency with which they were mentioned by the farmers interviewed.

Diseases (40.42%) were the most common problem confronting native chicken growers. While native chickens are said to have strong resistance to diseases, the study was not able to test this trait as it can only be observed and compared with commercial breeds. Pilferage (19.70%) was the second concern of farmers. This probably occurs because native chickens were raised in open spaces, presenting an opportunity to thieves. Completing the top five problems of native chicken growers were the insufficiency of feeds and medicines (16.85%), predation by wild animals (8.06%), and poor transportation (4.12%). Other issues identified that influence production were chickens destroying agricultural crops, unpredictable weather, lack of knowledge on native chicken production, fowls causing social disturbances, the unavailability of production area, and chicken mortality due to vehicular accidents especially in villages near provincial and national roads.

These findings agree with the studies of Alemu (1987; 1995), which found that low production potential can be attributed to lack of improved poultry breeds, the presence of predators, the high incidence of diseases, and poor feeding and management.

Support needed by farmer respondents

Shown in Table 17 are the forms of support needed by farmer respondents that could help them solve the issues identified and increase production efficiency. Feeds and biologics were on top of the list, mentioned by 45.45 percent of the respondents. These are directly related to the first and third problems frequently encountered by native chicken growers. Although native chickens are self-supporting, most farmers have expressed interest in management modifications, specifically in providing simple housing, a little feeding, and disease control. Their capital, however, is insufficient to implement such changes. This is one of the reasons why additional capital (18.48%) was the next form of support mentioned by the respondents. These results imply that native chicken growers are eager to increase native chicken production but are hindered by financial and other

Table 17. Support needed to improve native chicken production.

	Frequency (N=330)	Percentage
Feeds and Biologics	750	45.45
Capital	305	18.48
Training	223	13.49
Housing Support	168	10.17
Breeding Stock	116	7.02
Transportation facilities	37	2.22
Organization	40	2.40
Market Outlets	12	0.74

management problems.

Conclusion

Based on the results of the study, the following conclusions were drawn:

1. Native chicken keepers are mostly farmers with elementary level education, who consider crop farming as their main occupation. They, therefore, belong to marginal families.
2. Feeding, breeding, and other management practices on native chicken raising are traditionally kept without regard to increasing production, genetic improvement and conservation, resulting in low egg and meat output. A few of the native chicken keepers
have partly shifted their production system, combining the traditional with interventions such as providing chickens with commercial feeds, vitamin supplements, vaccines and dewormers, and providing simple housing.
3. Native chickens in Samar are generally raised for market and home consumption and mostly preferred by consumers due to its distinct meat characteristics and palatability. As such, improved production and sustainability should be given more attention.
4. Breeding strategies toward increasing productivity of the birds is imperative.
5. Production input, environmental issues, and concerns relating to animal production are among the farmers' limitations and weaknesses. Diseases, feeds and medicines, pilferage, predation and marketing channels were the major problems identified by native chicken keepers in Samar that need attention and support.

POLICY IMPLICATIONS AND RECOMMENDATIONS

Based on the findings and the conclusions made, the following recommendations are hereby presented:

1. The farmer respondents in this study were dependent on crop farming, relying mostly on the sale of various farm commodities produced for their family income. While native chicken production was a supplementary source of income, it is imperative that appropriate training programs be made to help native chicken keepers better understand the technology and the economic impact of their production practices.
2. Improved management method is the key to improving production performance. This cannot be addressed by training alone. Financial assistance should be provided native chicken keepers in this area. Additional capital can be particularly helpful in procuring medicines to control disease outbreaks.
3. Marketing is an important part of the native chicken industry. Government and private intervention in this aspect is recommended, especially with the proliferation of competition from growers and distributors of commercial chickens.
4. Assistance from private institutions and the government, especially the Department of Health, is also recommended. They can help particularly in initiating an information drive about the detrimental effects of eating sick and dead chickens.
5. Proper disposal of dead animals must be given attention to avoid animal and human sickness.
6. Improved security measures by the local chicken keepers is needed to help prevent theft of native chickens.
7. The native chickens studied manifested variations morphological characteristics. Their origin, however, can be further studied. Follow up research can include genetic marking and biomolecular characterization to identify the specific strain of the native chickens.
8. Establishment of an animal database, conducting modest collection, and conservation and improvement of native chickens by creating ex situ conservation or breeding centers in the province of Samar are also recommended.

REFERENCES

AACMC (Australian Agricultural Consulting and Management Company) (1984). *Livestock Subsector Review* 1 (Annex 3). Addis Ababa, Ethiopia: Ministry of Agriculture.

Aini I (1990). Indigenous Chicken Production in Southeast Asia. *World's Poultry Science Journal.* 46 (1): 51-57.

Alders R, M Harun (2004). Rural Poultry Center. Poster Presented at the XXII World's Poultry Science Congress. Istanbul. Turkey, June 8-13, 2004.

Alders R, P Spradbrow (2001). Controlling Newcastle Disease in Village Chickens: A Field Manual. *Australian Centre for International Agricultural Research* (*ACIAR) Monograph* No. 82:112.

Alemu Y (1987). *Small Scale Poultry Production*. In *Proceedings of the First National Livestock Improvements Conference. Addis Ababa. Ethiopia. February 11-13, 1987*. 100-101.

Alemu Y (1995). "Poultry Production in Ethiopia." World's Poultry Sci. J., 51 (2):197-200.

Arboleda CR (1987). Animal Genetic Resources Conservation and Development in the Philippines. Animal Prod. Technol. J., 3(2): 2-7.

Avante DC (1989). *The Performance of the Philippine Native Chicken and Other Breeds for Eggs and Meat in the Philippines*. Food and Fertilizer Technology Center Extension Bulletin No. 290. pp 11-14.

Barker JSF (1994). Conservation and Management of Genetic Diversity. In *Proceedings of the 5th World Congress on Genetics Applied to Livestock Production*. *Guelph. Ontario. Canada,* 501- 508.

Bureau of Agricultural Statistics (2008). *Native Poultry Production in Samar 2008*. Bureau of Agricultural Statistics. Quezon City. Philippines.

Bell JG (2009). Factors Limiting Production Efficiency and Profitability from Smallholder Poultry Production. *World's Poultry Sci. J.,* 65 (2): 207-215.

Bhuiyan AKFH, MSA Bhuiyan, GK Deb (2005). Indigenous Chicken Genetic Resources in Bangladesh. Current Status and Future Outlook. *Animal Genetic Resources Information.* 36: 73-84.

Bondoc OL (1998). *Biodiversity of Livestock and Poultry Genetic Resources in the Philippines*. IAS-CA/UPLB and PCARRDDOST.

Coligado EC (1985). Potentials of the Philippine Native Chickens. Animal Prod. Technol., 1: 29-30.

Country Report, 2003. Status of the Philippine Animal Genetic Resources. P. 49.

Crawford RD (1990). *Poultry Breeding and Genetics*. New York. Elsevier.

Dolberg F (2003). *Review of Household Poultry Production as a Tool in Poverty Reduction with Focus on Bangladesh and India*. FAO Pro-Poor Livestock Policy Initiative Working Paper. No. 6. Rome, Italy. FAO.

Food and Agriculture Organization of the United Nations (FAO) (2003). *Status of the Philippine Animal Genetic Resources. A Country Report.* Rome. Italy. FAO.

Garcia MM (1986). Comparative Performance of Native Laying Hens and F1 Grades. Master's Thesis. University of the Philippines. Los Baños. College. Laguna.

Hartl LD (1988). *A Primer of Population Genetics*. 2nd Edition. Sinauer Associates. Inc. Publishers. Sunderland. Massachusetts.

Lambio AL (1990). Studies on Poultry Breeding in the Philippines. *Animal Prod. Technol. J.,* 5 (1): 18-23.

Lambio AL, MC Grecio (1998). *Reproductive Performance of Five Genetic Groups of Philippine Native Chickens Under Semi-confinement Condition*. Proceedings of the PSAS National Convention. 15-16 October 1998. Metro Manila. Philippines pp. 187-189.

Lambio AL (2000). Germplasm and New Breeds of the Philippine Native Chickens. *The Philippine Agric. Scientist.* 83(1): 12-117.

Magpantay VA, EP Supangco, AY Pacificador Jr, CC Sevilla, AL Lambio, EC Gayeta (2005). Characterization of Native Chicken Production System in a Coconut-Based Farming System in Dolores Quezon. Proceedings of the PSAS 42nd Scientific Seminar and Annual Convention. 20-21 October 2005. Manila Philippines. P.32.

Manleon AM, AA Barrion (2002). Evolutionary Genetics of the

Philippine Native Chickens. *Ani. Husb. Agric. J.* 36 (9): 6-8.

National Statistical Coordination Board [NSCB] (2012). The Province of Samar. Accessed August 24 2012 http://www.nscb.gov.ph/ru8/ Profiles/Provincial Profiles/Samar.htm.

PCARRD (2001). Breeding Resilient Native Chickens to Become More Productive. *An. Husb. Agri. J.,* 35(5): 28-29.

PCARRD (2000). Improved Management of Philippine Native Chickens. Accessed June 16 2009. http://www.countrysidemag. com/adv/ads.pl.

PCARRD (2003). The Philippine Native Chickens. In *Greenfields Magazine*. September 2003. pp. 10-11

Pinoy Farmer (2008). *Native Chicken Production in the Philippines*.

Ramil MM (2003). Why Native Chicken is Tastier than Commercial Broiler. *An. Husb. Agri.J.37*.

Zaman S, A Ali, MO Faruque, AKFH Bhuiyan (1991). Transferring Polymorphism and Growth Rate in Rhode Island Red, Crossbred and Native Chickens. *Asian-Australasian J. An. Sci.,* 4(3):231-234.