PARTICIPATORY APPROACH IN DEFINITION OF BREEDING OBJECTIVE TRAITS FOR BOHOLANO STRAIN OF NATIVE CHICKEN

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ABSTRACT

The research aims to define the breeding objective traits of Boholano strain of native chicken using participatory approach to be incorporated for its purification. A total of 45 households were interviewed. The questionnaire was designed to collect data covering general information on village poultry production such as socio-management characteristics, production objectives, population structure, breed choice and trait preferences, market preferences of specific traits, and farmers' selection practices. The participatory farmers' discussions were designed to involve stakeholders in defining the breeding objective traits and deriving their relative importance in the production environment based on the different functions of chickens and traits identified in the interviews. The results showed that production of eggs for consumption is the principal function of chickens in most towns followed by the use as source of income and meat for home consumption. Weight is the primary factor that dictates market price but farmers rated growth and number of eggs as the production traits that they would like to be improved. Therefore, the breeding objective should be to develop dual-purpose Boholano strain of native chicken considering the traits of number of eggs and live weight and possessing the distinct plumage color and comb type.

Keywords: breeding, native chicken, participatory approach

INTRODUCTION

The Philippine native chicken is the common fowl found in the backyards of most rural households. It is a mixture of different breeds and believed to have descended from the domesticated red jungle fowl. Indigenous chickens are raised under the free-range system of management. Under this system of management, the chickens are allowed to forage and look for their own food. The raising of native chickens is an integral part of the farming systems of the Filipino farmers as they are the main source of eggs and meat for backyard farmers. Native chickens are well

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known for the distinctive taste of its meat (Lambio *et al*., 1998; Cocjin *et al*., 2001), adaptability to local agro-climatic conditions, hardiness, ability to utilize farm-by-products (Lopez, 2008) and resistance to diseases. Moreover, they require minimal care, management and inputs.

Meat and eggs of native chickens are preferred by many Filipinos over the same products from commercial poultry because of their taste, leanness, pigmentation and suitability to Filipino special dishes. Moreover, native chicken meat and eggs are priced higher than those coming from commercial poultry, hence raising native chickens is a very good income generating activity of the farmers. Selection of the native chicken "manok bisaya" strain has been done to preserve the unique taste of the meat due to some free amino acids. The unique taste of favorable flavor in native chicken could be attributed to 1.5 times higher inosinic acid than that of the broilers. Cocjin *et al*. (2001) reported that in Darag chickens, the higher level of aspartic acid compared to broiler's meat was imputed to convey favorable flavor.

The traits traditionally considered as criteria for selecting breeding stock are important in describing the adaptive attributes and genetic merits of the indigenous chickens and in identifying farmers' choice of chicken breeds and the underlying factors that determine the choice of genetic stock used (Gondwe, 2005; Gondwe and Wolny, 2007; Dana *et al*., 2010). Under smallholder production systems, however, conventional breeding methods are constrained by the absence of records, low level of literacy, small flock sizes per household and uncontrolled breeding (Kosgey, 2004; Gizaw *et al.,* 2009). To design viable genetic improvement schemes under smallholder production conditions, the prevailing production conditions and/or systems and production goals must be fully understood and views of the targeted communities duly taken into account.

The market preferences for specific traits identified in the current study could be used to compliment or stimulate further work on economic valuation of the traits (Scarpa, 1999). However, even in the absence of economic values, the results could be used to simulate alternative breeding schemes by using appropriate genetic parameters and deriving relative weights for the breeding objective traits using the desired-gain selection-index method as suggested by Solker *et al*. (2008). Solomon (2008) found that farmers' ratings of trait categories they preferred to be improved in sheep in traditional systems were based on economic grounds and could be translated into economic weights that are comparable to economic values derived from profit equations. A similar approach could be adapted for developing breeding systems for indigenous poultry.

The objectives of this study were to: a) identify the socioeconomic characteristics of the production environments in Boholano strain of native chicken; b) document and understand the traditional selection practices; and c) identify and prioritize the breeding objective traits and trait preferences of village producers through a participatory approach.

MATERIALS AND METHODS

Study sites

Five municipalities were selected based on chicken population and representation of agro-ecological zone. Municipalities of Calape, Duero and Talibon to represent the coastal agro-ecologizal zone; and Bilar and Garcia Hernandez for the interior or hilly land agro-ecological zone. In each municipality, the top three barangays with the highest native chicken population were surveyed. Purposive sampling of three households per barangay were interviewed, for a total of 45 respondents.

Data collection and analysis

A questionnaire was drafted and pre-tested that would capture the information needed by the project. Results of the pre-test were used to modify the questionnaire. Qualitative traits included plumage color, shank color and comb type. Quantitative traits included shank length, egg size, body weight and other reproductive traits. A brief socio-economic survey intending to determine the factors affecting the breed choice of farmers and breeding strategies to be proposed for use in the breeding programs involving the purification of native chicken was also included.

Participatory farmers' discussions were undertaken to involve them in identifying the breeding objective traits and the relative importance with respect to its production environments. Two groups of farmers from each zone consisting of nine members were formed. Two meetings were conducted in each group and discussions were summarized to identify the purpose of raising native chickens, traits affecting consumers' preference and traits considered important in improving the performance of native chickens. Relative weights were assigned on majority vote. Consequently, averages of relative weights were finally ranked and compared using Wilcoxon signed ranked test.

In order to have an idea on the viability of populations, the effective population size was determined (Falconer and MacKay, 1996) as follows:

$$Ne = (4*Nm* Nf) / (Nm + Nf)$$

and the increase in inbreeding per generation as:

$$\Delta F = 1/ (2Ne)$$

where; Ne is the effective population size, Nm the number of breeding males, Nf the number of breeding females and ΔF the inbreeding coefficient.

RESULTS AND DISCUSSION

The majority of the respondents were males belonging to Catholic religion with high school and above level of education, except in Bilar where the respondents were in the elementary level (Table 1).

The results of the study revealed that native chicken raising in Bohol was

Table 1. Demographic characteristics of sample households raising Boholano native chicken, % respondents.

	Bilar	Calape	Duero	G-hernandez	Talibon	Total
Male household head	68.9	71.1	91.1	95.5	68.9	79
Female household head	31.1	28.9	8.9	4.5	31.3	21
Education :						
Read and write	60	44.4	8.9	48.9	15.6	35.6
Elementary level	15.6	2.2	13.3	9.4	4.4	8
High school level and above	24.4	53.3	77.8	46.7	80	56.4
Catholic	100	75.6	97.6	81.6	100	87.6
Other religions	0	7.3	2.4	5.3	0	2.4

considered as one of the major chores for men. This finding is different from the observations of Aspe *et al*. (1992) that most activities in native chicken raising were done by women and children in Caranan and Pasacao in Camarines Sur. Likewise, Barcelo (1994) reported that women and children do most of native chicken raising activities in Northern Philippines, particularly in Ilocos Norte, Ilocos Sur, Pangasinan, Abra and Benguet. The reported differences can be attributed to the culture and tradition of the people in the study area. In the study of Choe *et al.* (2002) it was found out that the family structure in the Philippines is more varied. There were families dominated by men (patriarchal), women (matriarchal) and those that involved joint decision-making by men and women. In Bohol, the native chicken raisers family structure was patriarchal in nature.

On the farmers' ratings of the relative importance of different uses of native chickens, four towns, except Calape, rated the most important use was egg for home consumption, followed by meat for home consumption. The third use was as source of income (Table 2).

Results of this study revealed that native chickens were predominantly raised for home consumption for eggs primarily and secondarily for meat. Farmers believed that raising native chicken provides the cheapest source of eggs and meat for the family. Therefore, the native chickens available in the market were an excess to their consumption or the farmers have an urgent need for cash. In the rural setting, native chickens were the cheapest source of animal protein and can easily be sold in the market when the raisers need money.

The findings of this study on the main purpose for growing native chicken were similar to the reports of Barcelo (1994), Magpantay *et al*. (2006) and Lingaya *et al*. (2007) among raisers in Northern Philippines, Southern Tagalog and Iloilo, respectively.

Table 2. Farmers' ratings of the relative importance of different uses of Boholano native chicken.

Uses of chicken	Bilar	Calape	Duero	G-hernandez	Talibon
Egg (home consumption)	3.54 (1)	3.74 (2)	3.64 (1)	3.90 (1)	3.91 (1)
Meat (home consumption)	1.24 (3)	3.02 (3)	2.76 (2)	2.83 (2)	3.54 (2)
Source of income	2.95 (2)	4.00 (1)	3.64 (3)	0.49 (4)	3.18 (3)
Cultural/Religious	0.19 (4)	0	0	0.19 (3)	0

Numbers in parenthesis indicate ranks based on Wilcoxon signed rank test. Ranks of chicken uses within a column bearing different numbers are different ($P<0.05$).
The importance of characters was rated based on weights attributed to each function of chickens by individual respondents, least important = 1, most important = 4.

Traits of adaptive and economic importance

Plumage color, live weight and comb type were important traits affecting market price of chickens (Table 3). Live weight was the most important consideration followed by plumage color. Market for eggs is not sensitive to the egg characteristics, except that there is higher preference for eggs of native chicken compared to those of white leghorn.

These findings indicate that the raisers knew the importance of selecting the breeder stocks and they were primarily concerned with the improvement of body size, yet retaining the physical attributes of native chickens, like plumage color. The

Table 3. Farmers' ratings of trait categories that influence price of live Boholano native chicken marketed.

Trait category	Bilar	Calape	Duero	G-hernandez	Talibon
Plumage color	2.04 (2)	1.64 (2)	2.24 (2)	0.80 (3)	0.96 (3)
Weight	3.56 (1)	3.84 (1)	3.04 (1)	3.72 (1)	3.84 (1)
Comb type	1.44 (3)	1.07 (3)	1.60 (3)	1.24 (2)	1.08 (2)
Breed	0	0	0.84 (40	0.64 (4)	0.88 (4)

Numbers in parenthesis indicate ranks based on Wilcoxon signed rank test. Ranks of chicken uses within a column bearing different numbers are different ($P<0.05$).
The importance of characters was rated based on weights attributed to each function of chickens by individual respondents, least important = 1, most important = 4.

findings on selection practices were similar to the report of Magpantay *et al*. (2006) among the raisers in Southern Tagalog.

Effective population size and inbreeding in village chickens

Most of the farmers interviewed did not own breeding males or roosters. They just shared with neighbors (31 to 55%) (Table 4). Results showed that most of the raisers did not employ any reproductive control in their flock. They were raising their chicken in free range where mating is random within the cluster of neighboring flocks. Some of them were practicing selection for their replacement roosters and

Table 4. Possession of roosters, effective population size and level of inbreeding of village chicken flock.
Nm =number of males, Nf = number of females, Ne = effective population size.
ΔF = inbreeding coefficient.

Location	Farmers not possessing roosters,%	Farmers possessing roosters,%	Nm	Nf	Ne	ΔF
Bilar	40	4.40	1.26	2.79	3.47	0.14
Calape	55.6	31.1	1.75	2.58	4.17	0.12
Duero	31.1	24.4	1.84	3.76	4.94	0.10
Garcia Hernandez	44.4	22.2	1.96	3.9	5.22	0.09
Talibon	35.6	15.6	1.17	2.5	3.19	0.16

hens. This indicates that raisers were aware of the importance of selecting the next parental lines of their chickens. Mainly, they select it among the chickens within their flock because of their familiarity with the traits possessed by these chickens. There were few raisers who acquired their replacement stocks from their neighbors and in the market. They were doing this when they see greater potential in chickens to be the replacement stocks.

Most of the raisers replace their roosters and hens when these were old or when they die due to various causes. Probably, they valued most these chickens which possess the traits they wanted. The higher effective population size (Ne, 5.22) of chickens in Garcia Hernandez among the raisers compared to the other municipalities indicated that mating was limited within the chicken flock. These practices may be due to market preferences for certain meat quality which can only be found among traditional chickens. The lowest inbreeding coefficient (ΔF, 0.09) of this group was attributed to larger Ne. The findings in the selection practices and sources of replacement stocks corroborate the observations of Oñate (1991) among the raisers in Camarines Sur, and Guevarra *et al*. (1991) and Magpantay *et al*. (2006) among the raisers in Southern Tagalog.

CONCLUSION

It can be concluded that the production of eggs for home consumption is the principal function of native chickens in most towns followed by the use as source of income and meat for home consumption. Weight is the primary factor that dictates market price but farmers rated growth and number of eggs as the production traits they would like the most to be improved. Therefore, the ultimate breeding objective should be to develop dual-purpose Boholano strain of native chicken considering the trait of number of eggs and live weight and possessing the distinct plumage color and comb type.

REFERENCES

Aspe EH, Morano M, Nasol G, de Corbier E, Walters D and Evnard MJ .1992. Involvement of rural women in agricultural livelihood projects of three selected sitios of Caranan, Pasacao, Camarines Sur. *Phil J Crop Sci* 17 (Supp. # 1): S38.

Barcelo P. 1994. Poultry survey in semi-urban region in Northern Philippines. *Don Mariano Marcos Memorial State University Res Ext J* 1-12.

Choe M, Westley SB and Retherford RD. 2002. Tradition and change in marriage and family life. In: East-West Center. *The Future of Population in Asia*. Honolulu, HI: East-West Center.

Cocjin BB, Roxas GFA, Casiple CG and Arenga, RL. 2001. Organoleptic test and chemical analyses of meats of Philippine chicken (Darag type) and commercial broiler. *Philipp J Vet Anim Sci* 27 (2): 192-200.

Dana N, van der Waail LH, Dessie T and van Arendonk JAM. 2010. Production objectives and trait preferences of village poultry producers of Ethiopia: Implication for designing breeding schemes utilizing indigenous chicken genetic resources. *Trop Anim Hlth Prod* 42: 1519-1529.

Falconer DS and Mackay TFC. 1996. *Introduction to Quantitative Genetics*. Essex, UK: Longman Group.

Gizaw S, Komen H and van Arendonk JAM. 2009. Optimal village breeding schemes under smallholder sheep farming systems. *Livestock Sci* 124: 82-88.

Gondwe TNP. 2005. Characterization of local chicken in low input-low output production systems: Is there scope for appropriate production and breeding strategies in Malawi? *PhD Dissertation*, Georg-August-Universitat Gottingen.

Gondwe. TNP and Wollny CBA. 2007. Local chicken production system in Malawi: Household flock structure, dynamics, management and health. *Trop Anim Hlth Prod* 39: 103-113.

Guevarra LA, Lambio AL and Peñalba FF. 1991. Management practices of indigenous chicken in the Southern Tagalog Region. *Philipp J Vet Anim Sci* 17 (1): 67-68.

Kosgey IS 2004. Breeding objectives and breeding strategies for small ruminants in the tropics. *PhD Dissertation*, Wageningen University.

Lambio AL, Bondoc OL and Grecia MC . 1998. Brooding and growing performance of four genetic groups of Philippine native chicken. *Philipp J Vet Anim Sci* 24 (1): 1-8.

Lingaya RAIN, Oliveros MCR and Magpantay VA. 2007. Production performance and marketing of native chicken in the first and fourth districts of Iloilo. *Philipp J Vet Anim Sci* 33 (2):163-171.

Lopez CJ. 2008. Performance of free-range "Darag" chickens under different farming systems. *Philippine Council for Agriculture, Forestry and Natural Resources Research and Development Highlights 2007*, pp. 136-138.

Magpantay VA, Supangco EP, Pacificador Jr. AY, Sevilla CC, Lambio AL and Gayeta EC. 2006. Characterization of native chicken production system in a coconut-based farming system in Dolores, Quezon. *Philipp J Vet Anim Sci* 32 (2): 195-202.

Oñate WT. 1991. Estimated population, management practices and performance of chicken in Camarines Sur. *PhD Dissertation*. University of the Philippines Los Baños.

Scarpa R. 1999. Revealed preference valuation methods for farm and animal genetic material: principles, strengths and weaknesses. In: Rege JEO (ed.). *Proc FAO/ILRI Workshop Economic Valuation Animal Genetic Resources*, Rome, 1999. (International Livestock Research Institute, Nairobi), pp. 40-47.

Solker J, Grausgruber H, Okeyo AM, Ruckenbauer P and Wurzinger M. 2008. Breeding objectives and relative importance in plant and animal breeding: a comparative review. *Euphytica* 161: 273-282.

Solomon G. 2008. Sheep resources of Ethiopia: genetic diversity and breeding strategy. *PhD Dissertation*, Wageningen University.