

**Review Article**

Review on Farmers' Trait Preferences for Chicken Breeding Objectives in Local Chicken Ecotypes in Ethiopia

Maticha Korato*¹ , **Amsale Hankamo²**, and **Teramaj Abebe³**

¹Department of Animal Science, Bonga University, Bonga, Ethiopia

²Department of Animal Science, Dila University, Dila, Ethiopia

³Department of Animal Science, Mekdela Amba University, Mekdela Amba, Ethiopia

ABSTRACT

Information on indigenous chickens breeding practices, breeding objectives and farmers' trait preferences require for designing, planning, implementing and sustainable genetic improvement programme of indigenous chickens. Doing this, it is possible to improve the livelihoods of small scale farmers and rural developments as whole. Therefore, research results and facts of local chicken breeding were reviewed with the aim of delivering relevant information on breeding objectives and trait preferences of farmers in local chicken ecotype in Ethiopia. According to the review, breeding objectives of the farmers were egg production, cultural/religious reasons, sale incomes, and meat. Overall farmers preferred traits are comb type, plumage color, body weight, breeding ability, body conformation, egg number and size, adaptive trait and mothering ability. In generally, these traits are considered as important for selecting chicken in a market for meat and egg for consumption and for the breeding purpose in Ethiopia. Therefore, these preference traits and breeding objectives of farmers are important to improve the genetic part of chickens in the Ethiopia.

Keywords: Breeding objectives, traits, local chicken ecotypes, Ethiopia

Corresponding Author: Maticha Korato < matchakorato2008@gmail.com >

Cite this Article: Korato, M., Hankamo, A., Abebe, T. (2021). Review on Farmers' Trait Preferences for Chicken Breeding Objectives in Local Chicken Ecotypes in Ethiopia. *Global Journal of Animal Scientific Research*, 9(1), 106-114.

Retrieved from <http://www.gjasr.com/index.php/GJASR/article/view/76>

Article History: Received: 2021.04.28 Accepted: 2021.06.18

Copyright © 2021 World Science and Research Publishing. All rights reserved



This work is licensed under a [Creative Commons Attribution-Noncommercial-No Derivatives 4.0 International License](https://creativecommons.org/licenses/by-nc-nd/4.0/).

INTRODUCTION

Poultry species include all domestic birds (*Gallus domestics*) like chickens, turkeys, ducks, geese, ostriches, guinea fowls, and pigeons. In Ethiopia, except chicken's others are found in their natural habitat (Tadelle *et al.*, 2003). Such poultry species contributed important socio-economic roles for food securities, generating additional cash incomes and religious/cultural reasons (Salam, 2005).

Base line information on production circumstances of indigenous chickens breeding practices, breeding objectives and farmers' trait preferences require for designing, planning and implementing sustainable and holistic genetic improvement programme of indigenous chickens. This is to ensure sustainable improvement, utilization and conservation of indigenous chicken genetic resources and to uplift their contributions to improve the livelihoods of small scale farmers and to rural developments as whole (Dana *et al.*, 2010; Emebet *et al.*, 2014).

Almost all rural and many per-urban families in Ethiopia keep small flock scavenging local chickens (Jens *et al.*, 2004). Farmers to increase meat and egg production follow their own breeding practice through selection based on some criteria mostly related to color, comb type, weight, egg production and growth rate (Halima, 2007; Bogale, 2008; Fisseha *et al.*, 2010). Breeding practices of farmers were allowing cocks and hens to mate indiscriminately without systematic mating where the dominant cocks in the neighborhood are used as a sire line (Nigussie, 2011).

In generally, there may be many scientific findings that have been conducted by various researchers on local chicken breeding objectives in general and trait preference of farmers. However, a comprehensive review of such results has not been reviewed. Therefore, reviewing such previous works on breeding objectives and trait preferences of farmers in local chicken production in Ethiopia and seems to be crucial to deliver information to the breeders. Based on this outlined background, the objective of this paper was to review the research findings and facts and thereby to deliver relevant information on breeding objectives and trait preferences of farmers in local chicken production.

REVIEW

Breeding Objective and Trait preferences of chicken in Ethiopia

Importance of chicken farmers' trait preference and identifying production environments are important information to implement breeding schemes in back yard chicken production systems in Ethiopia (Nigussie, 2011). Breeding objective is linked to be genetic improvement of different character as practicing selection criteria including economically important traits related to plumage color, body weight, adaptation, reproductive performance and egg number (Abdelqaderet *al.*, 2007; Muchadeyiet *al.*, 2009; Nigussie, 2011). Similarly, Bogale (2008) reported that plumage colour, comb type, body weight, age and sex have respective factors on price

of chicken at market. Solomon (2008) also reported, farmers' ratings of trait categories they preferred to be improved in indigenous poultry 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. However, according to the suggestion by Solkner *et al.*, (2008), 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. Production of eggs for consumption is the principal function of chicken production in Ethiopia followed by source of income and meat for home consumption (Halima, 2007). Similarly, Nigussie (2011) reported the function of chickens as source of cultural/religious role was rated to be the second important breeding objective of chicken, whereas egg for home consumption was more important than all. Table 1, below shows ranks for farmers' breeding objectives of indigenous chickens reported by different researchers.

Table1. Breeding objectives of chickens and ranks in the Ethiopia

Breeding objectives	Ranks (R)	Source
Meat	R4	Nugussie (2011)
Egg	R1	
Cultural/Religious	R2	
Source of income	R3	
Egg	R1	Bekele <i>et al.</i> (2020)
Meat	R3	
Both egg and meat	R2	
Income	R1	Markos <i>et al.</i> (2016)
Consumption & ceremony	R2	
Ceremony	R3	
Breeding	R4	
		Kassa <i>et al.</i> (2020)
Egg	R1	
For Festival/ceremony	R3	
To sales	R2	

R1, R2 and R3=Rank 1, 2 and 3 respectively.

Traditional breeding practice of chicken and trait preference in small scale farming in Ethiopia

Farmers have their own criteria and strategies of culling and selecting chickens that are being practiced at any time of the year (Halima, 2007). Mainly farmers cull their

chickens for home consumption, religious sacrifices and as a source of income through selling. All farmers in different regions traditionally give greater selection emphasis for breeding and replacement males and females such as plumage color, live weight, comb type, conformation and laying performance of their parents (Halima, 2007; Nigussie, 2011). Breeding farmers in the Amhara (Farta) and Oromia (Horro) regions give the highest emphasis for plumage color while in the southern region (Konso and Sheka) live weight is used as the most important selection criteria. The emphasis given to each trait category is largely similar across the sexes except that, unlike for males, live weight is most important in Mandura and almost equally important to comb type in Farta for selecting breeding females (Nigussie, 2011). Even if farmers have their own breeding and selection criteria, there is no designed selection and controlled breeding of village chickens. Thus, breeding of village chickens is completely uncontrolled (Meseret, 2010). Those local chickens are small in number per household (HH) and the number of breeding male birds in each household was less than required for breeding purpose that alleviate inbreeding rate (Tadelle, 1996; Tadelle *et al.*, 2003).

Practices of improving local chickens in Ethiopia

It is widely believed that the importation of the first batch of exotic breeds of chickens into Ethiopia for genetic improvement was done by missionaries (Meseret, 2010). According to (Solomon, 2007), the first four breeds of exotic chicken (Rhode Island Red, Australoup, New Hampshire and White Leghorns) were imported to Jimma and Alemaya College of Agriculture in 1953 and 1956 respectively under USAID project. In the 1980s the Ministry of Agriculture initiated importation and distribution of cockerels to be used as breeding males in villages. This scheme failed because farmers were unwilling to remove their local cocks and the exotic cocks failed to adapt in the village environments (Nigussie, 2011). According to (Teklewold *et al.*, 2006), increased productivity of the poultry subsector by using exotic breeds in Ethiopia failed to become a sustainable option mainly because this strategy recurrently faced the problem of birds not being adopted widely by the rural farmers due to several socio-economic and environmental challenges. Hence the indigenous chickens are better in adapting harsh environment, disease tolerance and brooders but poor in reproductive performance (Nigussie, 2011). To improve the performance of local chicken additional exotic breeds were imported such as (White and brown Leghorns, Rhode Island Red, New Hampshire, Cornish, Australoup, Light Sussex etc.) to cross with local chicken (Nigussie, 2011). According to many evaluations done on crossbred chickens at the Debre Zeit agricultural research centre, white leghorn crosses showed superior performance by 62.5% to the locals as well as pure white leghorns in terms of egg production in a cross breeding program at Assela (Brannang and Persson, 1990). According to (Nigussie, 2011), this increasing level of exotic

inheritance (>50%) resulted in loss of broody behavior, a trait of considerable economic value under village systems. Exotic breeds require high input and thus promoting them only if farmers packaged in improved business potentials. That means accesses to markets, transport facilities, veterinary products and timely availability of replacement new stock using high-yielding breeds cannot be a sustainable option for improving village poultry. This required defining production environments and identifying the breeding practices, production objectives and trait choices of village farmers as inputs for developing appropriate breeding strategies in the country (Nigussie, 2011).

Trait preferences of farmers in different regions of the country

The goal traits, which are used in designing of the forthcoming breeding program, should logical be based on preferred traits identified by farmers Zewdu (2004). According to the report of Nigussie (2011), farmers in different part of Ethiopia mainly select adaptive traits, meat and egg test as their preferred traits. According to the report of Chenchu and Hailemichael (2016) from Southern Zone of Tigray, majority of farmers were selecting breeding hens for traits, such as egg production, good sitter and brooder (mothering ability), hatchability, large body size, plumage color and comb type. Egg production appeared to be the most preferable trait because of the obvious benefits of selling eggs, consumption and hatching for replacement stock. Similarly, Kibret (2008) indicated that 66.7% of the respondents selected hens based on egg production in Fogera. Dana *et al.*, (2010) also reported egg production as the most important selection criterion in different parts of Ethiopia.

According to Addis (2014), farmers in three regions (South Region, Amahara and Tigray) give the highest emphasis for conformation, breeding ability, comb type, live weight and plumage color and used as the most important selection criteria with index value of 0.08, 0.22, 0.25, 0.22, and 0.23 for males and 0.26, 0.23, 0.09, 0.20, and 0.22 for female chickens, respectively. According to his report from South Region, Amhara and Tigray regions, each of the preferred traits consisted different components as used for selection criteria. Multi and red colors were the two important preferred traits used for selecting of chickens on the basis of body plumage colors. Whereas, chickens having black, white, red brownish, white with red tips, black with white tips and white black red trips plumage colors are less favored by farmers for consumption, marketing and breeding chickens. In the same way, farmers in all three regions recognized two types of combs for the trait category of single (Netela) and doublex (Dimedem) comprised all comb types other than single (like: rose, pea and v-shape). Doublex was a favored comb type both for females and males suggesting that all of the farmers placed equally higher preference for any comb type other than single. No specific trait components were identified for the other trait categories like weight, conformations and breeding ability. According to report of Addisu *et al.* (2013) from north Wollo of

Amahara region, number of egg production/clutch (37.91%) and plumage colour (37.58%) were the major preferred trait of farmers. As indicated below in Table 2, different researchers reported different ranks for farmers' trait preferences of indigenous chickens.

Table 2: Farmers' preference traits and index values in Ethiopia

Traits preferred	Ranks(R)	Source
For selecting male		Addis (2014)
Color	R2	
Come type	R1	
Conformation	R4	
Weight	R5	
Breeding ability	R3	
For selecting females		
Color	R3	
Come type	R5	
Conformation	R1	
Weight	R4	
Breeding ability	R2	
For selecting male		Bekele <i>et al.</i> (2020)
Body weight	R1	
Plumage color	R2	
Comb type	R3	
Parental history	R4	
For selecting females		
Age at first egg	R2	
Plumage color	R3	
Brooding frequency	R1	
For selecting females		Kassa <i>et al.</i> (2020)
Egg production	R1	
Egg taste	R4	
Mothering ability	R3	
Disease resistance	R2	
Longevity	R4	
Feed efficiency	R4	
For selecting male		
Conformation	R1	
Body size	R3	
Disease resistance	R2	
Longevity	R4	

R1, R2 and R3=Rank 1, 2 and 3 respectively.

CONCLUSION

Breeding practices in the Ethiopia is uncontrolled mating because there is absence of planned breeding programme. Local chickens breeding objectives of the farmers in Ethiopia are linked to increase performances per animals through obtaining well performed chickens for meat, egg and religious roles, to insure their incomes and home consumptions. The most preferable traits are egg number, body conformation, body weight, plumage color, comb type, breeding ability and adaptive trait of chickens. From the traits preferred by the farmers, egg production appeared to be the most preferable trait because of the benefits of selling eggs, consumption and hatching for replacement stock. Farmers in Ethiopia prefer double comb type both for female and male chickens than any other comb type. Concerning trait of plumage colors, multi and red colors are the two important preferred traits used for selecting of chickens. Whereas, chickens having black, white, red brownish, white with red tips, black with white tips and white black red trips plumage colors are less favored by farmers for consumption, marketing and breeding chickens. Although farmers have their own criteria for traits preference to select chickens for breeding purposes:

- ❖ Special emphases on awareness creations of farmers need to be placed for productive traits rather than colors and comb types.
- ❖ For the farmers to focus more on such traits, training has to be given.
- ❖ The breeding practices in the country should be controlled mating.

REFERENCES

- Abdelqader, A., Wollny, C. and Gauly, M. (2007). Characterization of local chicken production system and potential under different level of management practice in Jordan. *Journal of Tropical Animal Health and Production*. 39:55–164.
- Addis, G. (2014). Farmers' trait preferences for their breeding objectives of local chicken ecotypes in Ethiopia. *Global Science Research Journals*. Vol. 2 (2), pp. 116-120.
- Addisu, H., Hailu, M. and Zewdu, W. (2013). Indigenous Chicken Production System and Breeding Practice in North Wollo, Amhara Region, Ethiopia. *Poult Fish WildlSci* 1:108.
- Bekele, B., Melesse. A., Banerjee, S., Esatu, W. and Dessie, T. (2020). Farmers' preferences towards breeding objective for indigenous chickens in different agro-ecologies of Ethiopia. *African Journal of Agricultural Research*: Vol. 16(12), pp. 1681-1690.
- Bogale, K. (2008). In situ characterization of local chicken eco-type for functional traits and production system in Fogera district, Amahara regional state. M.Sc. Thesis submitted to the department of animal science school of graduate studies, Haramaya University, 107p.

- Brannang, E. and Person, S. (1990). Ethiopian animal husbandry and Breeding in the tropics and sub- tropics. Humboldt University of Berlin, Germany. Uppsala, Sweden, 127pp.
- Chencha, C. and Hailemikael, N. (2016). Performances, Breeding Practices and Trait Preferences of Local Chicken Ecotypes in Southern Zone of Tigray, Northern Ethiopia. *Asian Journal of Poultry Science*, 10: 158-164.
- Dana, N., L.H. Van der, W., Dessie, T. and J.A.M. van Arendonk, (2010). Production objectives and trait preferences of village poultry producers of Ethiopia: Implications for designing breeding schemes utilizing indigenous chicken genetic resources. *Trop. Anim. Health Prod.*, 42: 1519-1529.
- Emebet, M., Horpal, S., Tesefaye, S. and Anna, MJ. (2014). Phenotypic Characterization of Indigenous Chicken Populations in South West and South Part of Ethiopia. *British Journal of poultry Sciences*, 3(1): 15:19.
- Fisseha, M., Abera, M. and Tadelles, D. (2010). Assessment of village chicken production system and evaluation of the productive and reproductive performance local chicken ecotype in Bure district, North West Ethiopia. *African Journal of Agricultural Research* Vol. 5(13): pp. 1739-1748.
- Halima, H. (2007). Phenotypic and Genetic Characterization of Indigenous Chicken Populations in Northwest Ethiopia. PhD Thesis; University of the Free State, Bloemfontein, South Africa, p. 186.
- Jens Christian, R., Anders, P., Charlotte, V., Ainslie, MC. and Lone, F. (2004). Keeping village poultry A technical manual for small scale poultry production. Copenhagen, Denmark, 34pp.
- Kassa, B., Tadesse Y., Esatu W. and Dessie, T. (2020). Village Chicken Breeding Objectives and Trait Preferences of Chicken Producers' in Western Amhara, Ethiopia. *Journal of Biology, Agriculture and Healthcare* Vol.10: 18-26.
- Markos, S., Belay, B. and Dessie, T. (2016). Village chicken breeding practices, objectives and farmers' trait preferences in western zone of Tigray, Northern Ethiopia. *Journal of Agricultural Research and Development* Vol. 6(1). pp. 001-011.
- Meseret, M. (2010). Characterization of Village Chicken Production and Marketing System. M.Sc. Thesis Submitted to the Department of Animal Science, Jimma University, College of Agriculture and Veterinary Medicine, School of Graduate Studies, 110pp.
- Muchadeyi, F., Wollny, A., Eding H., Weigend, S., Makuza, M. and Simianer, H. (2009). Variation in village chicken production systems among agro-ecological zones of Zimbabwe. *Tropical Animal Health and Production*. 39: 453-461.
- Nigussie, D. (2011). Breeding programs for indigenous chicken in Ethiopia, Analysis of diversity in production systems and chicken populations. PhD .Thesis

- submitted in fulfillment of the requirements for the degree of doctor at Wageningen University Netherlands, 148pp.
- Salam, K. (2005). Improvement of village chicken production in a mixed (chicken ram) farming system in Burkina Faso. Ph.D. Thesis. Wageningen Institute of Animal Sciences, Animal Nutrition Group, Wageningen University, the Netherlands, 125pp.
- Solkner, J., Grausgruber, H., Okeyo, AM., Ruckebauer, P. and Wurzinger, M. (2008) Breeding objectives and relative importance of traits in plant and animal breeding: a comparative review. *Euphytica*. ;161:273–282.
- Solomon, D. (2007). Suitability of hay-box brooding technology to rural household poultry production system. *Lives. Res. Rural Dev.*, 19 (1).
- Solomon, D. (2008): Ethiopia: Poultry sector country review. FAO, Rome, Italy.
- Tadelle, D (1996): Studies on village poultry production systems in the central highlands of Ethiopia. M Sc. Thesis, Department of Animal Nutrition and Management of Swedish University of Agricultural Sciences, Uppsala, Sweden.
- Tadelle, D., Alemu, Y. and Peters, K. (2003). Village chicken production systems in Ethiopia: Use patterns and performance valuation and chicken products and socio-economic functions of chicken. *Livestock Research for Rural Development* (15)1.
- Teklewold, H., Dadi, L., Yami, A., and Dana, N., (2006). Determinants of adoption of poultry technology: a double hurdle approach, *Livestock Research for Rural Development*, 18(3).
- Zewdu, W. (2004). Indigenous cattle genetic resources, their husbandry practices and breeding objectives in Northwestern Ethiopia M.Sc. Thesis. Alemaya University, Alemaya, Ethiopia.