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Introduction and Participatory Evaluation of Improved Chicken Production and Management in Bilcilbur District of Jarar Zone, Somali Region, Ethiopia

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ABSTRACT

The purpose of this study was to introduce and evaluate poultry production and management methods through a participatory approach in the Bilcilbur District of the Jarar Zone, Somali Region, Ethiopia. One Pastoral and Agropastoral Research Extension Group (PAPREG) was established with 25 agro-pastoralists, who received practical training regarding modern poultry rearing methods. The group members received both native local breeds and improved Sasso chickens. Significant variations in feed intake and egg output were observed between the improved Sasso breed and native local chickens throughout a six-month laying period, according to the study. Local chickens ate an average of 0.92 0.12 kg of food each week, while Sasso chickens consumed 1.17 0.15 kg. Regarding egg production, the Sasso breed produced an average of 120.7±0.56 eggs per hen during a six-month period, which is around four times more than the 32.1±0.32 eggs that the local breed laid. On the other hand, the study revealed a clear difference in survival rates between local chickens and the Sasso breed under field conditions. The mortality rate for Sasso chickens was much higher, at 25.49%, compared to the 5.17% mortality rate for local chickens. The fact that the majority (76%) of PAPREG members identified increased egg production as a significant benefit suggests that they were aware of the productivity potential of enhanced breeds. Additionally, 60% of survey participants reported increased growth rates, while 48% reported shorter manufacturing cycles. However, only 40% of respondents reported an increase in their household income, indicating that economic benefits may be restricted by considerations such as market access and production costs, despite obvious gains in productivity. Additionally, more than half of respondents (52%) indicated the need for better management techniques, such as better housing, healthcare, and feed systems, which might be difficult for pastoral and smallholder farmers, while 72% of respondents listed excessive feed consumption as a significant drawback. In addition, 36% voiced worries about the enhanced vulnerability of superior breeds to diseases. As a result, context-specific interventions are necessary for the effective scaling of better poultry production methods in pastoral and agropastoral systems. These include improving feed availability, strengthening veterinary and extension services, and empowering farmers via participatory, locally adapted methods.

INTRODUCTION

In Ethiopia there about 56.06 million of poultry which about 95% of the total national poultry products (eggs and meat) are contributed by indigenous chickens kept under village management system while the remaining 5% is obtained from intensively kept exotic breeds of chickens (CSA, 2018). The productivity of Ethiopian indigenous chickens is low for instance the average length of a single egg-laying period per hen and the average number of eggs laid per hen per egg-laying period in the country were estimated to be about 21 days and 12 eggs, respectively (CSA, 2018). However, attempts have been made to introduce different exotic breeds of chickens to be used by their own or for crossbreeding with the indigenous chickens.

In Ethiopia the majority (99%) of these chickens are maintained under a traditional system with little or no inputs for housing, feeding or health care. The most dominant chicken types reared in this system are local ecotypes, which show a large variation in body position, color, comb type and productivity (Halima *et al.,* 2007; Fissah *et al.,* 2010).

The output differences between the backyard system using local scavenging hens and the commercial sector, which uses exotic breeds in confinement, were astonishing. A typical exotic layer can produce over 200 eggs per annum/hen and, from exotic breeds, 27 eggs per hen and 250 eggs per year with 60g of egg weight, as reported by (Fitsum *et al.,* 2017). In Ethiopia, local household poultry lay around 36 eggs in three clutches and 12–13 eggs per clutch per annum and an equivalent ends in about 16 days (Tesfay *et al.,* 2018).

There are many complex and varying constraints to chicken production systems, which in turn influence their production and productivity potential. Knowledge and understanding of the chicken production and utilization systems, opportunities and constraints are important in the design and, implementation of village chicken based

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development, which can benefit rural societies (Samson & Endalew, 2010). The production performance of indigenous or local scavenging chickens of Ethiopia is low because of their low genetic potential that caused low egg production potential, and longer reproductive cycle or the (slow growth rate, late sexual maturity and broodiness for an extended period) (Besbes, 2009). The major reason for such a low productivity, low rate of growth and delayed maturity for reproduction and production are low standards of management, health care and feeding (Melkamu *et al.,* 2013).

Income related problem is one of the common problem in Ethiopia for both gender (male and female). However, women income is relatively very poor in rural setting compared to the urban women and men in rural areas. Practically, the intervention of supporting rural women through income enhancing technology is a targeted intervention in rural areas in Ethiopia. Accordingly, this intervention of delivering exotic chicken breed was intended to enhance rural farmers' income, Because of its short period production, adaptability in all areas and feed requirement with other quality, exotic chicken breed expected to contribute to rural women income related problems. However, in Bilcilbur woreda the introduction of this improved chicken breed was not practiced outside the research centers. Therefore, the objective was to introduce and evaluate the improved poultry production through community participation.

MATERIALS AND METHODS

Description of the Area and Sampling Procedure

Bilcilbur District is located in the Jarar Zone of the Somali Regional State in eastern Ethiopia. While specific coordinates for Bilcilbur are not readily available, the Jarar Zone spans latitudes 4° to 11° N and longitudes 40° to 48° E . The region predominantly features lowland plains, with elevations ranging from 900 to 1600 meters above sea level. The district experiences an arid to semi-arid climate, characterized by high temperatures and low, variable rainfall. Average annual temperatures range from 20°C to 45°C, and rainfall averages between 200 to 700 mm, distributed bimodally with the Gu' rains occurring from April to June and the Deyr rains from October to November. The primary livelihood in Bilcilbur is pastoralism, focusing on livestock such as camels, goats, sheep, and cattle.

For this technology transfer a PAPREG group which contains a total of 25 PAPREG members who were engaged in chicken production was selected and then trained about improved poultry production and its management. The selected PAPREG members were trained and then given improved chickens. The main criteria of the selection were based on their interest, Willingness to accept technology and be a model agro-pastoralist in the village who can transfer and demonstrate the technology to other agro-pastoralists.

Training of PAPREGs

Following the establishment of PAPREGs, training was provided on poultry production and management. Hands-on practical demonstrations were conducted, focusing on the primary and basic aspects of chicken management, including feeding, watering, housing, health care, hygiene, and disease prevention measures.

Data Collection and Analysis

During the study, data were collected on feed intake and egg yield of the modern poultry production and management and then Pastoralists' Focus group discussions on modern poultry production and management Technologies were gathered and analyzed using descriptive statistics.

RESULTS AND DISCUSSION

Socio-demographic Characteristics of the PAPREG Members

The socio-demographic characteristics of the PAPREG members revealed several key insights about the group involved in the study. The gender distribution shows a predominance of males (60%) compared to females (40%), indicating relatively higher male participation in the group. The age composition is skewed towards younger individuals, with 64% of the members aged between 20 and 40 years, while the remaining 36% are between 41 and 60 years old. This suggests that a significant portion

Table 1: Socio-demographic characteristics of the PAPREG members (N=25)

Variables	Category	Frequency (N)	Percentage (%)
Sex	Female	10	40
	Male	15	60
Age (years)	20–40	16	64
	41–60	9	36
Educational level	Illiterate	17	68
	Literate	8	32
Chicken keeping experience	Less than 5 years	14	56
	5–10 years	9	36
	More than 10 years	2	8

of the group is in the active and productive age bracket, which could be beneficial for labor-intensive activities like poultry keeping.

In terms of education, a substantial majority (68%) of the members are illiterate, while only 32% are literate. This low literacy rate may have implications for training delivery methods and communication strategies, indicating the need for more visual, oral, and practical approaches in capacity-building interventions. Regarding experience in chicken keeping, more than half (56%) of the members have less than five years of experience, 36% have been involved for 5 to 10 years, and only 8% have more than 10 years of experience. This distribution suggests that while many participants are relatively new to poultry farming, there is a modest proportion with moderate experience who could serve as peer educators or local resource persons. Overall, the data highlight a relatively young, male-dominated, and predominantly less-xperienced group with limited formal education, which should be considered in the design and implementation of poultry development programs.

Participation in the Field Day on Chicken Production and Management Exposure

The field day on chicken production and management attracted a total of 55 participants from various stakeholder groups. Among them, the majority (71%) were male (39 participants), while females accounted for only 29% (16 participants). The largest participant group was PAPREG members, constituting 25 individuals (45.5% of total attendees), with a balanced representation of males (15) and females (10).

Other invited agro-pastoralists made up the second-largest group with 14 participants (25.5%), predominantly male (71%). Developmental agents (DAs) were represented exclusively by males (4 participants, 7.3%), reflecting a possible gender imbalance within this professional category. Similarly, experts and administrators from the district contributed 12 participants (21.8%), with 83% male and only 2 female attendees.

This gender distribution suggests a notable male dominance across most stakeholder categories, except among PAPREG members. The relatively higher participation of males may reflect broader gender roles and access disparities in agricultural extension services and community activities. Encouraging more female participation in such events is essential to ensure inclusive knowledge transfer and empowerment in poultry management practices.

Table 2: Participation in the field day on chicken production and management exposure (N=55)

Participants of the field day/visit	Male (N, %)	Female (N, %)	Total (N, %)
PAPREG members	15 (27.3%)	10 (18.2%)	25 (45.5%)
Other invited agro-pastoralists	10 (18.2%)	4 (7.3%)	14 (25.5%)
Developmental agents (DAs)	4 (7.3%)	0 (0.0%)	4 (7.3%)
Experts and administrators from the district	10 (18.2%)	2 (3.6%)	12 (21.8%)
Total	39 (70.9%)	16 (29.1%)	55 (100%)

Analysis of Feed Intake and Egg Production Between Sasso and Local Chickens

The data presented in Table 3 reveal significant differences in feed intake and egg production between the improved Sasso breed and indigenous local chickens over a 6-month laying period. The Sasso breed exhibited a higher feed intake of 1.17 ± 0.15 kg per hen per week, compared to 0.92 ± 0.12 kg per hen per week for local chickens. This increased feed consumption aligns with the larger body size and greater metabolic demands of improved breeds, which are selectively bred for higher productivity (Kebede *et al.,* 2018).

In terms of egg production, Sasso hens laid an average of 120.7 ± 0.56 eggs per hen over six months, which was almost four times greater than the 32.1 ± 0.32 eggs per hen produced by local chickens. This finding corroborates earlier studies conducted in Ethiopia demonstrating that improved breeds such as Sasso or Koekoek significantly outperform indigenous chickens in egg production under smallholder conditions (Gizaw *et al.,* 2019; Chebo *et al.,* 2022). The improved laying performance of Sasso chickens is primarily attributed to genetic improvements and better adaptability to semi-intensive management systems (Getiso *et al.,* 2017).

The lower feed intake but poor egg output of local chickens reflect their adaptation to low-input, scavenging-based production systems common in rural Ethiopia (Tadelle *et al.,* 2003). While local chickens are more resilient to harsh environments and diseases, their productivity limitations make them less suitable for commercial egg production (Kitalyi, 1998). The feed efficiency of Sasso chickens, as indicated by higher egg yield per unit of feed consumed, supports the argument for integrating improved breeds into Ethiopian poultry production to enhance food security and livelihoods (Alemneh *et al.,* 2019).

However, it is critical to consider the availability of feed resources and management capacity before recommending widespread adoption of improved breeds. Many smallholder farmers in Ethiopia face challenges such as feed scarcity and lack of veterinary services, which can limit the potential benefits of improved genotypes (Getachew *et al.,* 2017). Therefore, successful introduction of breeds like Sasso requires complementary interventions including feed supplementation, health

management, and training to optimize production outcomes (Chebo *et al.,* 2022).

In conclusion, the study confirms that the Sasso breed's higher feed intake is justified by its superior egg production, suggesting it as a viable option for improving poultry productivity in Ethiopian agro-pastoral systems. Conversely, local chickens, despite their lower feed needs, have limited egg production potential. Strategic breed improvement combined with improved management practices can contribute significantly to poultry sector development in Ethiopia.

Table 3: Feed intake and egg production among local chickens and Sasso breed

Variable	Chicken breed/type	
	Sasso Breed	**Local Chicken**
	(Mean ± SEM)	**(Mean ± SEM)**
Feed intake (kg/hen/week)	1.17 ± 0.15	0.92 ± 0.12
Egg production (eggs/hen/6 months)	120.70 ± 0.56	32.10 ± 0.32

Mortality Rate Comparison Between Local and Sasso Chickens

The mortality data presented in Table 3 reveals a clear difference in survival rates between local chickens and the Sasso breed under field conditions. The mortality rate for local chickens was calculated at 5.17%, while the mortality rate for Sasso chickens was considerably higher at 25.49%. These results indicate that local chickens are more resilient and better adapted to the environmental and management conditions of the study area compared to the exotic Sasso breed.

The lower mortality in local chickens can be attributed to their genetic adaptation to the local climate, disease resistance, and their ability to thrive under low-input, extensive management systems common in pastoral and agro-pastoral areas. In contrast, Sasso chickens, being improved breeds, are more sensitive to transportation stress, disease challenges, and poor housing and feeding practices, especially during the initial acclimatization period.

These findings are consistent with earlier studies in Ethiopia. For instance, Tadelle *et al.* (2003) noted that indigenous chickens in Ethiopia have a better survival rate and adaptability to village production systems compared to exotic breeds. Similarly, Alemneh *et al.* (2019) and Markos *et al.* (2014) reported that improved chicken breeds introduced into rural communities often suffer higher mortality rates due to their demand for better feed, housing, and health management resources which are typically limited in such settings.

The results emphasize the need for careful consideration before introducing improved breeds like Sasso into rural poultry systems. To improve survival and productivity, such interventions should be accompanied by adequate farmer training, supportive veterinary services, and gradual breed integration strategies, such as crossbreeding with local birds or piloting small-scale units with enhanced management.

Table 4: Mortality rates among local chickens and Sasso breed

Breed	Total No. of Chickens	Died at Arrival	Died After Arrival	Alive After Arrival	Total at Arrival (Alive + Died After Arrival)	Mortality Rate (%)
Local Chicken	60	2	1	57	58	5.17%
Sasso Breed	60	9	4	47	51	25.49%

PAPREG members' Perceived Advantages and Limitations of Improved Chicken Production Technologies

The perceptions of PAPREG members regarding improved chicken production technologies reveal a balanced view of both benefits and challenges associated with adopting such innovations. A majority (76%) recognized increased egg production as a key advantage, indicating awareness of the productivity potential of improved breeds. Similarly, 60% and 48% acknowledged better growth rates and shorter production cycles, respectively, reflecting an understanding of the efficiency gains these technologies can offer. However, only 40% reported increased household income as a benefit, suggesting that while productivity improvements are noted, economic gains may be influenced by other factors such as market access and production costs.

On the downside, a significant portion of respondents (72%) perceived high feed intake as a major disadvantage, highlighting concerns about the sustainability and affordability of feed resources for improved breeds. Over half (52%) also noted the requirement for improved management practices, pointing to the need for better housing, health care, and feeding strategies, which can be challenging for smallholder or pastoral producers. Additionally, 36% expressed concerns about the susceptibility to diseases of improved breeds, which aligns with findings in Ethiopian poultry systems where exotic breeds often show lower resilience compared to indigenous chickens (Tadelle *et al.,* 2003; Feyisa *et al.,* 2025).

These perceptions align with broader research on poultry production in Ethiopia. Tadelle *et al.* (2003) highlighted that while improved breeds can enhance productivity, their higher input requirements and vulnerability to local diseases limit their widespread adoption among smallholders. Kebede *et al.* (2017) similarly noted that local chickens' adaptability and disease resistance often outweigh the performance advantages of exotic breeds under extensive production systems. Moreover, Markos *et al.* (2014) emphasized that feed availability and management capacity remain critical constraints to improving poultry production in rural Ethiopia.

The findings suggest that successful dissemination of improved chicken technologies in the region must address these perceived challenges by promoting affordable and locally available feed solutions, strengthening veterinary support, and enhancing farmer capacity for improved management practices. Integrating these technologies with indigenous knowledge and resources could improve adoption and sustainability (Feyisa *et al.,* 2025).

Table 5: PAPREG members' perceived advantages and limitations of improved chicken production technologies

Perception Category	Frequency (N)	Percentage (%)
Advantages of the Technologies		
Egg production	19	76
Increase household income	10	40
Better growth rate	15	60
Shorter production cycle	12	48
Disadvantages of the Technologies		
High feed intake	18	72
Susceptible to disease	9	36
Requires improved management	13	52

CONCLUSION

The introduction and participatory evaluation of improved chicken production technologies among PAPREG members in the Somali Region revealed promising yet context-dependent outcomes. The improved Sasso breed demonstrated significantly superior egg production (120.7 eggs/hen/6 months) compared to local chickens (32.1 eggs/hen/6 months), validating its potential for enhancing household nutrition and income. However, this productivity gain came at the cost of higher feed intake and mortality, with the Sasso breed experiencing a mortality rate nearly five times higher than that of local chickens (25.49% vs. 5.17%). PAPREG members acknowledged the major benefits of improved breeds, especially in egg production and growth rates. Nonetheless, they also expressed valid concerns about high feed costs, disease susceptibility, and management demands, issues that could hinder the sustainable adoption of such technologies without complementary support. Therefore, for improved chicken production technologies to be effectively scaled in pastoral and agro-pastoral systems, they must be accompanied by context-specific interventions. These include improving feed availability, enhancing veterinary and extension services, and building the capacity of farmers through participatory and locally tailored approaches.

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