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The Local Chicken (*Gallus gallus domesticus*) in Traditional Farming Systems: Between Indigenous Knowledge, Rural Resilience and Sustainable Productivity

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Abstract

In a global context marked by food security challenges, sustainability concerns, and the need for local adaptation, traditional poultry systems play a strategic role in the rural economies of Africa. These low-input systems rely heavily on orally transmitted local knowledge and are rooted in technical and cultural autonomy. This study aims to characterize traditional poultry practices, assess their impact on zootechnical productivity, and identify potential improvement levers through a combined approach integrating traditional wisdom and scientific innovation. The methodology is based on a comprehensive literature review of peer-reviewed articles from major academic databases including SCOPUS, Web of Science, Chemical Abstracts Services, Google Scholar, and African Journals Online. Findings reveal that traditional poultry systems are predominantly characterized by free-range management, feeding based on locally available resources, phytotherapeutic health care, and natural reproduction. These practices contribute to strong resilience and the preservation of local chicken strains, with women playing a central role in their transmission and implementation. However, zootechnical and productive performances remain limited: low annual egg production, slow growth rates, high juvenile mortality, rudimentary infrastructure, and the absence of formal genetic selection, vaccination, and veterinary services. As such, traditional poultry systems offer a foundational platform on which simple improvements (such as enriched feeding, sheltering, and basic vaccination) can be introduced without disrupting sociocultural norms. A well-balanced integration of empirical knowledge and validated technical innovations could help reconcile productivity with sustainability. Traditional poultry farming thus represents a resilient, culturally embedded, and economically viable production model. To enhance its impact, it is essential to document, preserve, and improve this knowledge through participatory and context-specific approaches. This area offers a strategic opportunity for policies that promote inclusive, sustainable, and equitable poultry value chains.

Keywords: Traditional poultry farming; Indigenous knowledge; Free-range systems; Rural resilience; Zootechnical performance

1. Introduction

The rearing of local chickens (*Gallus gallus domesticus*) represents a fundamental component of family farming systems in rural areas of Africa [1]. Well adapted to local ecological constraints, this form of village poultry farming relies on orally transmitted traditional knowledge, often managed by women, and is deeply embedded in the cultural, economic, and nutritional dynamics of rural communities [1,2,3]. Traditional systems are generally characterized by free-ranging birds, feeding based on locally available resources, phytotherapeutic veterinary care, and natural reproduction with no formal genetic management [4,5,6].

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Despite their low cost, environmental resilience, and socio-economic relevance, these poultry systems exhibit limited zootechnical performance [5,6,7]. Their productivity is further constrained by poor infrastructure, lack of prophylaxis, and limited access to veterinary services [8,9]. At the same time, the transmission of knowledge remains largely informal, which hinders its recognition and integration into technical improvement processes [10,11].

In light of contemporary challenges such as food security, the preservation of genetic biodiversity, and the sustainability of agricultural systems, it is imperative to document, analyze, and valorize the traditional knowledge associated with local chicken farming. Several authors advocate for a reasoned hybridization between local empirical practices and validated scientific innovations to improve performance without disrupting existing sociocultural balances [12,13,14].

In this context, the present study aims to characterize traditional local chicken farming systems in various African and Asian settings, assess their effects on poultry productivity, and identify improvement levers compatible with local dynamics. The ultimate goal is to contribute to an integrated reflection on sustainable, inclusive, and context-specific rural poultry development.

2. Traditional Knowledge on Local Poultry Farming

2.1. Common Practices Applied to Local Chickens

2.1.1. Production Systems

Village-based poultry production systems can be categorized into three main types based on their level of intensification, objectives, technical practices, and structural organization: extensive, semi-intensive, and customary or traditional systems.

The extensive system is defined by its rudimentary management: chickens roam freely (free-range), with no proper housing, minimal or no zootechnical interventions (such as vaccination or controlled feeding), and overall low productivity. This system relies on local resources but remains highly vulnerable to diseases, predation, and climatic hazards. It is predominant in Burkina Faso, where it accounts for 60.78% of poultry farming practices [4]. In the Democratic Republic of Congo, it is even more widespread and unregulated: 94% of chickens are free-ranging, and 81% lack any shelter [5]. In Chad, this system also dominates in regions such as Guéra and Hadjer-Lamis/Lac, where up to 90% of chickens have no shelter, and where predation (25%) and traditional practices without improvements severely affect performance [7].

The semi-intensive system features minimal yet existing technical support, including partial housing, supplemental feeding, basic health monitoring, and occasionally some form of genetic selection. This model allows for better control of rearing conditions and significantly improved productivity and hatchability. It is present in the Sahelian zones of Burkina Faso, mainly led by women, and provides better performance than the extensive model [4]. In Côte d'Ivoire, the adoption of this system has resulted in a 112% increase in productivity and a marked improvement in hatchability rates [6]. In Nigeria, particularly in Borno State, the favorable agroecological conditions of the Sudanian savanna also yield better productivity and hatchability than the Sahelian zones [15]. In the Mayo-Kébbi Ouest region of Chad, simple interventions such as vaccination (76%) and organized selection have enhanced the resilience of poultry systems, aligning them with semi-intensive practices [7].

The customary or traditional system is strongly rooted in sociocultural contexts. It relies on indigenous knowledge, often with ritual or symbolic objectives, the use of local medicinal plants, and limited application of modern techniques. Although quantitatively less productive, this system shows notable resilience and strong social acceptance. In Burkina Faso, ritual-oriented poultry farming still exists in the Sudanian zone, with low productivity [4]. In Thailand, traditional poultry keeping combines ritual and commercial purposes and incorporates local medicinal plants such as *Tinospora crispa* and *Curcuma longa* [3,16]. Traditional practices such as nighttime confinement, neem use, and natural dietary supplements have shown relative efficacy in improving poultry health and productivity [13,17]. Comparative studies in Africa have confirmed that basic improvements—such as shelters, enriched diets, and chick separation—can lead to substantial performance gains [12,17,18]. In Ethiopia, productivity varies by agroecological zone (with an average of 56 eggs/year), and women play a key role in poultry management [19]. In Sri Lanka, integrating poultry into agricultural systems has improved egg quality [20]. In Madagascar, traditional knowledge has enabled hatchability rates exceeding 90% [21], while in Egypt, zootechnical performance varies significantly based on production scale and structural organization [22].

2.1.2. Feeding Practices

Feeding is primarily based on locally available resources, often derived from scavenging, household waste, and unprocessed cereals such as maize, millet, or sorghum [17,18,23,24]. Supplements such as insects, sesame seeds, or tuber crops are also consumed [3,7,25]. In Thailand, local chickens are commonly fed paddy rice, rice bran, and indigenous plants [16]. The use of commercial feed remains very limited [4].

2.1.3. Veterinary Care

Poultry healthcare is empirical and diverse, often combining modern veterinary products with traditional remedies based on medicinal plants or natural substances [13,26]. For instance, in Burkina Faso, 98.77% of poultry keepers use veterinary drugs [4], whereas in South Kivu, 77.5% rely on traditional treatments [5], and in Chad, 32.89% use substances such as salt, natron, roots, or sesame oil [7]. Commonly used plants include neem, garlic, chili pepper, *Capsicum* spp., and *Khaya senegalensis* [1,27,28].

2.1.4. Reproduction

Reproduction is natural and uncontrolled, characterized by maternal brooding and empirical selection of breeding stock based on traits such as hardiness, morphology, or plumage color [6,10,11,14]. The number of reproductive cycles per year varies with local conditions, ranging from 2.9 to 4 [5,19]. A consistent feature of the system is the absence of formal genetic control [21,29].

2.2. Traditional Knowledge and Oral Transmission of Indigenous Poultry Practices

In traditional local chicken production systems, zootechnical, health-related, and management knowledge is primarily transmitted orally, across generations, and outside formal training structures [3,4,30,31]. Rooted in observation, community experience, and cultural practices, this knowledge ensures the continuity of rural poultry systems in both Africa and Asia [32,33].

In Burkina Faso, more than 86% of poultry keepers have received no formal training in poultry farming and rely on empirical practices for feeding, healthcare, and reproduction [4]. In Chad, 32% of farmers use traditional treatments such as salt, ash, or natron, derived from collective memory [7]. In the Democratic Republic of Congo, 77.5% rely on traditional medicine, and vaccination remains marginal[5]. Similar trends are observed in Algeria, where 87% of farmers avoid vaccination in favor of empirical practices [9]. In Côte d'Ivoire, the selection of breeding stock is based on subjective and rarely formalized criteria [6].

Rural women play a central role in preserving and transmitting this knowledge. They are responsible for managing reproduction, brooding, and poultry healthcare in several African contexts [11,34], and in India, particularly with indigenous breeds such as Aseel [2]. Women also contribute to disease recognition and the administration of empirical treatments [35].

Traditional practices include egg candling, the use of night baskets [36], and phytotherapeutic treatments. In Thailand, for example, farmers use *Tinospora crispa* and *Curcuma longa* to enhance poultry health [3,16]. These practices, often imbued with ritual significance, reflect a strong cultural anchoring [3].

However, despite their richness and adaptability, local knowledge remains largely underrecognized by science and is at risk of disappearing due to a lack of systematic documentation [37,38]. Valuing this knowledge requires bridging endogenous expertise with participatory scientific approaches [39,40].

Hybrid innovations are nevertheless emerging. In Senegal, in the regions of Bambey and Thiès, the use of artisanal incubators complements natural brooding, illustrating a gradual integration of local innovations [13,41]. Similar dynamics are observed in the Cascades region in Burkina Faso [42], Machakos in Kenya [43], Kisangani in the DRC [44], Nasarawa in Nigeria [32], and Maradi in Niger [24]. These extensive systems, rooted in community autonomy, exhibit rich ecological and sociocultural diversity. Their improvement requires formal recognition of local knowledge and a sustainable, context-specific, and inclusive development approach [3,38].

3. Productivity and Constraints in Local Chicken Farming

3.1. Productivity Indicators of Local Chickens

3.1.1. Egg Production

Productivity of local chickens in traditional farming systems remains generally low, due to a combination of factors including rudimentary husbandry conditions, limited genetic selection, and restricted access to veterinary care. Annual egg production varies widely depending on the context. In Burkina Faso, the average is 45.88 eggs per year with a hatchability rate of 75% [4], whereas in Côte d'Ivoire, traditional systems yield 56 eggs per hen annually compared to 87 in semi-intensive systems [6]. In Kolda (Senegal), improved systems enable an annual egg production of up to 75 eggs [10]. Other studies confirm this variability, with outputs ranging from 35 to 130 eggs per year depending on practices and environmental conditions [1,12,22,45].

3.1.2. Growth

The growth performance of local chickens is characterized by an average daily gain (ADG) typically below 15 g/day [24], with adult weight usually reached between 5 and 7 months of age [46]. In South Kivu (DRC), adult birds weigh between 1.0 and 1.5 kg [5], while in Ethiopia, the average is around 1.1 kg [19]. In Algeria, weights range from 550 g to 1.65 kg depending on sex and region [9]. Generally, the eggs produced weigh between 30 and 50 g [35,47].

3.1.3. Mortality

Mortality (particularly among chicks) remains a major constraint in traditional poultry production systems. It reaches alarming levels: 56% in Chad [7], 76.6% in South Kivu [5], and up to 60% in several other documented settings [21,48,49]. The primary causes include infectious diseases (notably Newcastle disease), predation, and exposure to harsh weather conditions [42,50]. In Kolda, improved care practices have helped reduce mortality to 15% [10], and similar outcomes have been reported in Côte d'Ivoire following targeted interventions [6].

3.1.4. Chick Survival

Chick survival rate is a critical performance indicator. It is often below 30% in systems lacking adequate shelter and care [4,8], but can be significantly improved through measures such as vaccination, nutritional supplementation, and provision of shelters [6,10]. Nevertheless, even with these practices, the average number of chicks raised to adulthood remains modest, ranging from 21 to 27 per hen per year [15].

3.2. Specific Constraints in Local Chicken Production

Health-related constraints represent the primary barrier to the productivity of local chickens in traditional farming systems. Newcastle Disease (ND) is consistently identified as the most devastating pathology, causing up to 70% mortality during outbreaks [4,5,8,49]. Despite this major threat, vaccination coverage remains extremely low: only 4.5% of farmers vaccinate in South Kivu [5], 13% in Chad [7], while in Thailand the rate reaches 42%, reflecting greater awareness [3].

Local poultry flocks are also highly susceptible to other infectious and parasitic diseases such as fowlpox, coccidiosis, avian cholera, Gumboro disease, and both internal and external parasitosis [26,32,33,50,51]. The lack of veterinary services, balanced feeding regimes, and adequate health infrastructure increases the vulnerability of poultry stocks in most rural settings [9,10,31].

Predation is another significant structural constraint, particularly for young birds. Chicks are often exposed to attacks from raptors, cats, dogs, snakes, and other predators, especially when they sleep outdoors or without proper supervision [5,7,21,34]. Losses due to predation can account for 15 to 20% in some rural areas [4,44].

Climatic hazards such as heavy rainfall or extreme heat further exacerbate the situation, particularly in farms lacking proper shelters or protective systems. The limited training and awareness among farmers regarding disease prevention and risk management is a major limiting factor [9,10,52]. These combined factors highlight the urgent need to incorporate appropriate and accessible health strategies into local poultry development policies.

4. Effects of Traditional Practices on Productivity

4.1. Comparison with Modern Poultry Farming: Structural, Zootechnical, and Health-Based Differences

The comparison between traditional and modern systems of local chicken farming highlights a pronounced dichotomy between the technical-economic performance of intensive models and the resilience, autonomy, and socio-cultural embeddedness of traditional systems. Modern poultry farming (characterized by sophisticated infrastructure, balanced nutrition, and rigorous veterinary monitoring) can achieve very high production levels, reaching up to 250 eggs per year, or even 320 eggs/year in some commercial lines like ISA Brown [4,47]. In contrast, traditional systems, such as those in Burkina Faso, rarely exceed 41.33 eggs/year [4]. In Côte d'Ivoire, semi-intensive systems have led to a 112% increase in laying rate and a 390% rise in viable chicks, demonstrating the major impact of structured intensification [6].

In the Democratic Republic of Congo, the limitations of traditional systems are particularly evident: 81.11% of farms lack shelters, post-hatch mortality reaches 42.57%, and traditional medicine is the primary health strategy in 77.5% of cases [5]. Similarly, in Ethiopia, despite a relatively higher productivity (56 eggs/year), performance remains below commercial standards due to the absence of genetic selection, prolonged laying cycles, and natural brooding [2,6,19].

Nutritionally, traditional systems rely on unregulated practices such as scavenging and the use of household waste, resulting in frequent nutritional deficiencies [7,37]. Conversely, modern systems employ balanced compound feeds tailored to poultry's physiological needs [4,38]. Infrastructure in traditional settings is often rudimentary [9,36], and vaccination coverage is nearly non-existent [4,7], compromising flock health and productivity.

Nonetheless, traditional poultry systems offer significant advantages. They are minimally dependent on external inputs, economically viable for smallholders, and highly adapted to local ecological and cultural realities [2,37]. In Thailand, such systems are integrated into ritual and symbolic practices, enhancing their social sustainability [3,16]. In contrast, while modern systems achieve superior performance in growth, egg production, and mortality reduction [53,54], they entail high investment costs and remain largely inaccessible in resource-limited rural areas [46,55]. Thus, despite their technical superiority, modern systems face diffusion barriers, whereas traditional models offer a more sustainable and autonomous approach, particularly relevant in low-resource rural contexts [1,14,51,56].

4.1.1. Strengths of Traditional Approaches

Traditional poultry farming systems, prevalent in rural regions, offer several structural advantages that explain their persistence and relevance in resource-limited environments. Their primary strength lies in their low production cost, enabled by the use of locally available inputs: household scraps, locally grown grains, insects, and free-range foraging, thus avoiding expensive industrial feed [7,16]. Veterinary care is also based on accessible resources such as ash, natron, or medicinal plant extracts, significantly reducing animal health costs [3,5]. These low-cost, autonomous local practices are a key factor in the viability of poultry farming in remote regions [1,30].

A second strength is the hardiness of indigenous breeds, known for their adaptability to challenging environmental and health conditions. These breeds exhibit resilience to endemic diseases like Newcastle and fowlpox, and tolerate fluctuations in feed and temperature, as reported in Chad, Cameroon, and the DRC [2,5,7,27,38]. This adaptive capacity makes traditional systems particularly well-suited to agroecological stress.

Moreover, traditional systems promote the technical and economic autonomy of producers. Reproduction is managed locally, selection is based on empirical performance and physical traits, and knowledge is transmitted orally, often intergenerationally, reinforcing community sovereignty and indigenous knowledge systems [10,33,36]. This dynamic also supports genetic diversity conservation, as the absence of genetic standardization allows for the preservation of numerous local lines adapted to specific ecological niches, contributing to the resilience of avian biodiversity [11,45].

Traditional poultry farming also plays a crucial socio-cultural and economic role. Often managed by women, it empowers them economically and nutritionally, and plays a part in rituals, festivals, and symbolic practices [3,10,16,43,56]. As such, it contributes significantly to household food security and the social cohesion of rural communities [34].

In summary, traditional poultry farming remains an ecologically resilient, economically accessible, and culturally rooted model, based on the sustainable use of local resources, the valorization of community knowledge, and the preservation of biodiversity [26,35,41].

5. Conclusion

The analysis of traditional local chicken farming systems reveals a wealth of empirical practices deeply rooted in the agroecological and socio-cultural contexts of rural areas in Africa. Grounded in farmer autonomy, the use of local resources, and the intergenerational transmission of knowledge, these systems demonstrate remarkable resilience to economic, environmental, and health-related challenges. Their contribution to food security, women's empowerment, and the conservation of poultry genetic diversity makes them a strategic pillar of rural development.

However, these practices also present significant structural limitations that hinder zootechnical efficiency. The main constraints include low body weight and egg productivity, high juvenile mortality, minimal health coverage, and inadequate infrastructure. These shortcomings are partly due to the absence of genetic selection, a lack of formalized knowledge systems, and limited access to animal health services and technical training.

In light of current challenges surrounding sustainability, food security, and local resource valorization, a well-balanced strategy integrating traditional knowledge with validated innovations is increasingly necessary. Such an approach could enhance productive performance while preserving the socio-cultural fabric of rural communities. Targeted actions—such as improving nutrition, providing appropriate housing, promoting basic prophylaxis, and offering continuous training to farmers—could yield substantial benefits without disrupting local equilibrium.

The study of traditional poultry farming practices constitutes a strategic field for developing alternative, sustainable, and context-specific models. It calls for greater institutional recognition, participatory scientific support, and valorization of endogenous knowledge, within a co-construction framework. This synergy between tradition and science represents a promising pathway toward achieving productive, equitable, and sustainable local poultry farming.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest to be disclosed.

Author contribution

MOUSSA HASSAN Ousseini conducted the literature review and provided the first draft of this work; BRAH Nouri carried out a first revision of the manuscript; OUMAROU HALADOU Issoufou performed a second revision of the work.

Data availability

The data supporting this study's findings are available upon reasonable request to the corresponding author.

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