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PREVALENCE AND SPECIES DISTRIBUTION OF LICE (*PHTHIRAPTERA*) INFESTING DOMESTIC CHICKENS (*GALLUS GALLUS*) IN QUETTA, PAKISTAN

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Abstract

Poultry production contributes significantly to household food and nutrition security by supplying eggs and meat. However, parasites pose a major threat to the health of poultry and the safety of poultry products. This study aimed to determine the prevalence and species distribution of poultry lice infesting domestic chickens (Gallus gallus) in Quetta. A total of 335 chickens were examined across thirteen domestic areas in Quetta: 150 from household settings, 150 from poultry farms and 35 from various retail shops. Pretested questionnaires were used to collect data on chicken management practices and keeper demographics. Ectoparasites were collected by combing both the birds and their housing environments. Random sampling was employed to isolate lice from chickens in farms, shops, and households. Live lice were collected for species identification. Prevalence percent (P, %) was calculated using the formula: P (%) = (n ÷ N) × 100, where n is the number of infested birds and N is the total number examined (Herrera et al., 2023). Louse prevalence was higher in summer than in winter. Hens showed a higher infestation rate (81%) compared to cocks (57%). Prevalence was also higher in unclean environments than in hygienic areas. Six louse species were identified on Gallus gallus, with Menopon gallinae being the most prevalent and Lipeurus caponis the least. The overall infestation rate was 79% (81% in hens, 57% in cocks). High infestation levels warrant control measures, as lice damage feathers and cause skin allergies, irritation, and discomfort. Filthy environments significantly support louse survival and proliferation. This study highlights that poultry lice are a major concern in commercial poultry production in Quetta, and effective control strategies are urgently needed to improve poultry output.

Keywords: *Domestic chickens, Ectoparasite, Lice, Parasitic infestation, Phthiraptera*

INTRODUCTION

The poultry sector plays a fundamental socio-economic role in developing countries. Pakistan is an important contributor to the global poultry industry. Worldwide, eggs and meat both derived from poultry are considered the most essential food sources for humans. However, several agents threaten the health of poultry and the safety of poultry products, among which parasites are particularly significant (1). In Pakistan, lice are a common poultry pest. These insects are 1–6 mm long, wingless, pale yellow in color, with a compressed body structure and often an extended abdomen. Lice are permanent ectoparasites that reside on the host's body; they possess biting mouthparts and inhabit different body regions of the host (2).

Birds can be found in nearly every town and city around the globe (3). Famous regional chicken breeds include Aseel, Naked Neck, Rhode Island Red, Fayoumi, and Desi (4). Approximately 70% of parasitic lice species are found in most ecosystems. *Gallus gallus* (domestic chicken) is omnivorous, feeding on seeds, insects, and occasionally larger animals such as lizards and small worms. The domestic chicken has a lifespan of 10 to 16 years. In 2018, the global chicken population was recorded at 23.7 billion, up from over 19 billion in 2011. Chickens are widespread as domestic animals, and many are also kept as pets (5).

Most chickens suffer from lice infestations, which live on the skin, causing irritation, adversely affecting health, reducing egg production, and impairing growth. Like other animals, birds are susceptible to diseases transmitted by parasites. These disease-causing parasites live on the body, feathers, or air sacs of the birds. The economic productivity of chickens is also compromised by these ectoparasites, which suck blood and cause persistent irritation (6). Ectoparasites are among the most common and stable parasites of *Gallus gallus* and are permanent inhabitants of poultry farms. Compared to other bird species, the highest

number of chewing louse species is found on *Gallus gallus*. Eleven types of biting lice (bird lice) have been observed in local chickens, belonging to different genera, including *Cuclotogaster*, *Oxylipeurus*, *Goniocotes*, *Goniodes*, *Menopon*, *Menacanthus*, and *Lipeurus*. In 1978, Abu Yaman in Saudi Arabia recorded shaft louse, *Menacanthus*, *Argas persicus* (fowl ticks), and *Dermanyssus gallinae* on chickens (7).

Many poultry farmers prefer using pesticides rather than liquid sprays when lice or mites affect chickens. Nowadays, machinery has been developed for pesticide application, and large-scale industrialized poultry production systems have been established by major industries worldwide (8). To ensure good poultry production, it is essential to keep the environment free from dirt and infection, remove garbage, maintain clean farms, and apply appropriate pesticides (9).

MATERIALS AND METHODS

SAMPLE COLLECTION

A total of 150 domestic chickens (*Gallus gallus*) were sampled. Random sampling was employed, and chickens were examined randomly across poultry farms, retail shops, and household settings to isolate lice from their bodies. Live lice were collected to identify different species affecting the health and welfare of *Gallus gallus* over several months. Using forceps, the lice were carefully removed and placed into separate small bottles containing 30% ethyl alcohol solution. After all samples were collected, they were transported to the Department of Zoology laboratory for counting, classification, identification, and slide preparation. The lice were observed under a stereo microscope; slides were labeled, and the collected lice were subsequently classified.

RESEARCH TOOLS AND TECHNIQUES

Combs, forceps, bottles, Petri dishes, and black paper were used to isolate lice. Lice were collected by combing the feathers over black paper. Forceps were used to carefully pick lice away from the head and wing areas. Species identification was performed using a stereo microscope. All collected lice were preserved in 30% alcohol for further analysis. Data management was carried out using Microsoft Word, and statistical analysis was performed using GenStat statistical software. Microsoft Excel was used for data entry.

SAMPLING PROCEDURE

A head comb was used to examine the entire body of *Gallus gallus* (including feathers, neck, legs, and wings) for the presence of lice. The body of each chicken was brushed thoroughly with the comb. Any lice found were transferred into small bottles containing 30% alcohol and subsequently taken to the Department of Zoology, Sardar Bahadur Khan University (SBKU), for examination.

STATISTICAL ANALYSIS

Prevalence percent (P, %) was calculated using the formula: $P\ (\%) = (n \div N) \times 100$, where n is the number of infested birds and N is the total number of birds examined (Herrera et al., 2023). All lice were identified microscopically in the laboratory using taxonomic keys and descriptions from Wall and Shearer (2001) and Yevstafieva (2015).

RESULTS

For the current study, 11 domestic areas were selected and 150 *Gallus gallus* chickens were sampled from each area. This work is valuable from biological, economical, ecological, and physiological perspectives. Field visits were conducted in different months of the year (March to September). Area A was visited in March 2024. The recorded temperature was 14°C and the humidity level was 72%. The infestation rate was higher in hens compared to roosters (cocks). Among the examined chickens, 79% were infested with lice, while 21% remained uninfested. Overall infestation prevalence was lower in March, possibly due to cold weather or the non-breeding season, whereas infestation rates were higher in July and August,

associated with hot weather conditions. Table I presents the number of *Gallus gallus* which were examine during the survey of Quetta district in 2024. The *Gallus gallus* which are found in high number in Quetta District were Aseel and Austrolops.

Table I. Types of *Gallus gallus* examine during survey of Quetta district in 2024

S. No.	Name of different *Gallus gallus*	Number of *Gallus gallus*	Percentage of *Gallus gallus*
1	Aseel	51	34%
2	Lohman brown	21	14%
3	ISA brown	12	8%
4	Buckeye	2	1%
5	Rooster (Buff orpington)	16	11%
6	Rhode island red	5	3%
7	Plymouth rock	6	4%
8	Easter egger	1	1%
9	Austrolorp	24	16%
10	Golden Misri	12	8%
	Total	150	

In the present study, the infestation rate among domestic chickens (*Gallus gallus domesticus*) was high, while the non-infested proportion was low. During the cold months of 2024, lice infestation was observed to be low, whereas in the warm months, the infestation rate steadily increased. Overall, the infested percentage was 79%, and the non-infested percentage was significantly lower at 21%. Furthermore, the infestation rate was higher in hens than in cocks or roosters (Fig. 1).

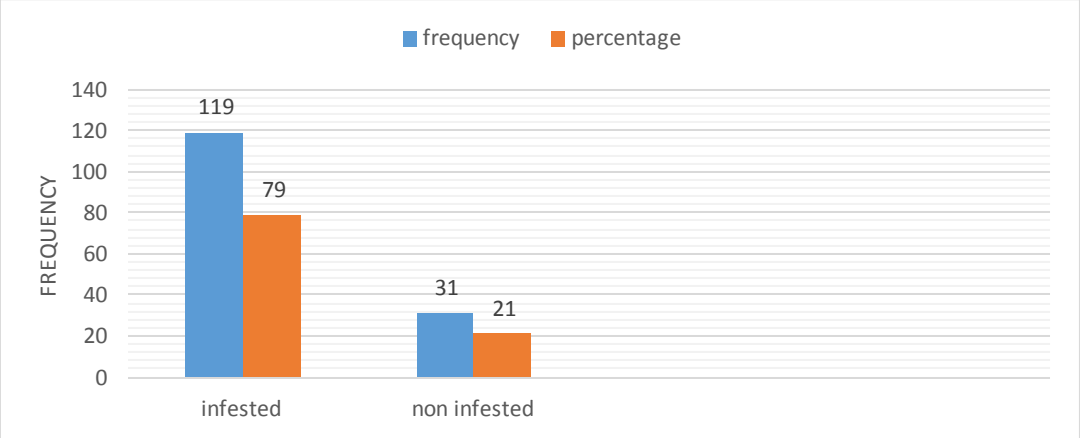

Fig. 1. Graphic presentation of prevalence of lice in *Gallus gallus* in year 2024 showing the total frequency and percentage of the infested and non infested *Gallus gallus*

It was observed that the prevalence of infestation was higher in hens than in cocks or roosters. A total of 150 Gallus gallus were examined, of which 94 were hens and 56 were cocks or roosters. The infestation rate was 81% in hens and 57% in cocks or roosters (Fig. 2).

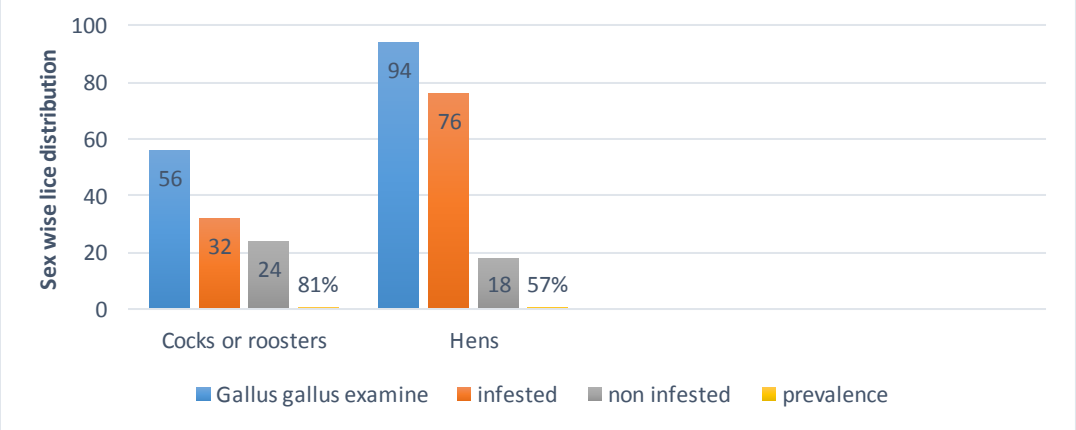

Fig. 2. Sex wise lice distribution in *Gallus gallus*

The distribution of lice in hens across different months of the year 2024 (from March to August) shows the effect of temperature on prevalence. Infestation rates were higher during warm or hot months compared to cold months (Table II).

Table II. Distribution of lice in hens in different months of 2024

Hens	March	April	May	June	July	August	Mean (Ẋ)	Standard Deviation (St. Dev)	Standard error of the mean
Total number of hens	15	17	15	17	15	15	15.67	1.033	±0.422
Infested hens	11	12	10	13	15	15	12.67	2.0659	±0.843
Non infested hens	4	5	5	4	0	0	3.00	2.366	±0.966

*All numbers show, Standard error of the mean (±SEM), Standard deviation (St. Dev) and mean (Ẋ)

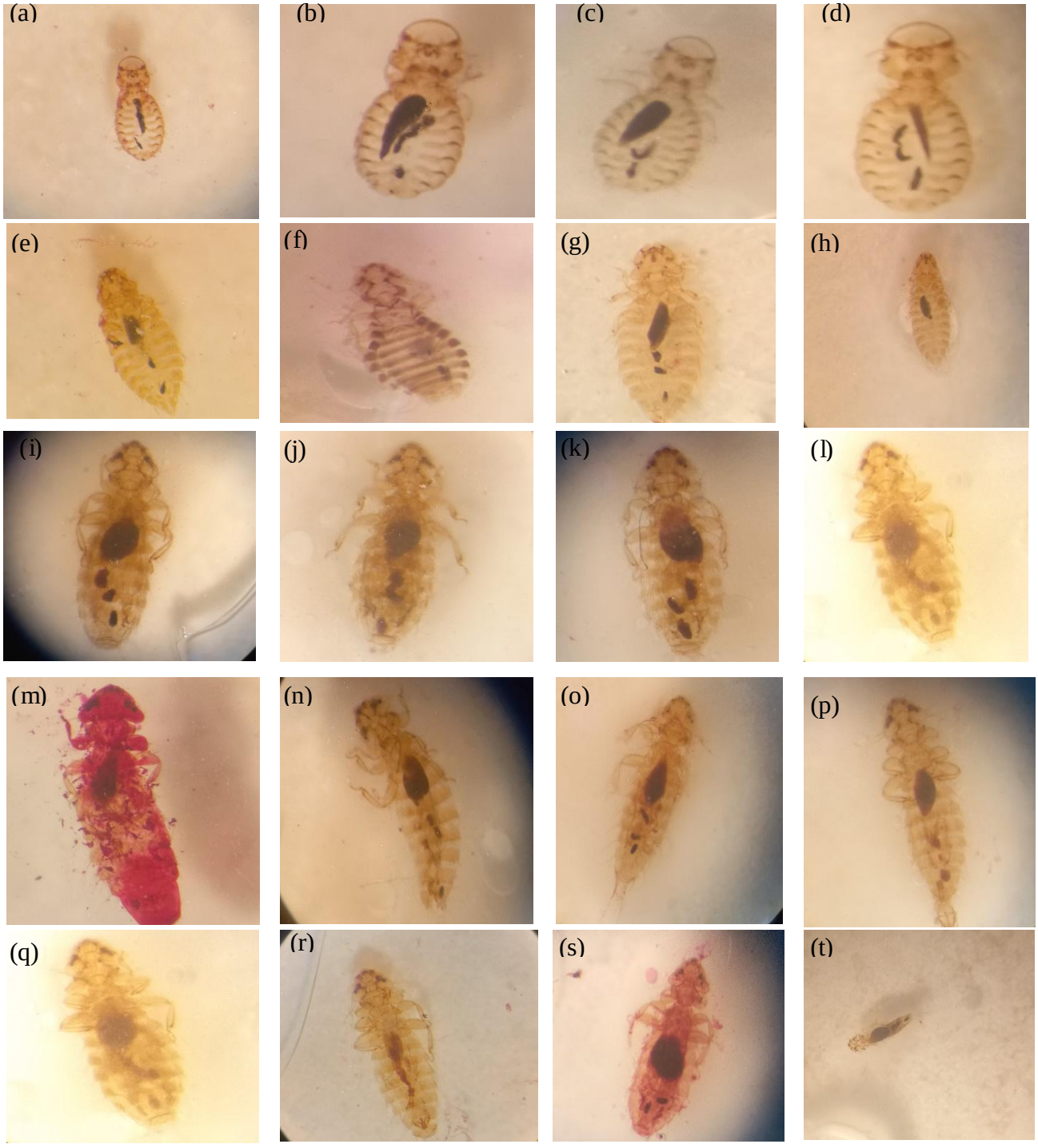

Fig. 4. Different types of lice species found in current study 2024, (a-d) *Goniocotes gallinae*, (e-h) *Menopon gallinae*, (i-l) *Menacanthus stramineus*, (m-p) *Cuclotogaster heterographus;* (q-s) *Menacanthus cornutus;* (t) *Lipeurus caponis*

DISCUSSION

This study represents the first investigation into the prevalence, density, and intensity of lice infesting domestic chickens (*Gallus gallus domesticus*) raised in the semi-cold regions of Pakistan, specifically Quetta, Balochistan. The overall prevalence of ectoparasites recorded in backyard chickens was 79.3%, which is higher than the 68.7% (10), but comparable to findings from other developing countries where free-range systems dominate (5). The high prevalence observed in this study underscores the significant ectoparasite burden in locally managed poultry and highlights the need for effective control interventions.

Six species of chewing lice were identified in the present study. The most prevalent species was *Menopon gallinae* (30%), followed by *Menacanthus stramineus* (23%), *Goniocotes gallinae* (20%), *Menacanthus cornutus* (16%), *Cuclotogaster heterographus* (9%) and *Lipeurus caponis* (2%). This species distribution is broadly consistent with previous reports from Africa and Asia (2-5). A recent comprehensive review of chewing lice in sub-Saharan Africa reported that *M. stramineus* and *M. gallinae* are the most common and widely distributed species, with prevalence ranging from 1.28% to 100% depending on geographic location and management practices (11). Similarly, a study from northeast Algeria identified *M. gallinae* as the most frequent ectoparasite (82.84%) in free-range backyard chickens (2).

However, our findings differ somewhat from those of Eissa *et al.,* 2025, who reported *M. stramineus* (52.9%) as the dominant species, followed by *M. gallinae* (23.5%) and *L. caponis* (15.7%). These discrepancies may be attributed to regional climatic differences, host breed variations, and management practices. Notably, the low prevalence of *L. caponis* (2%) in our study contrasts with the 17.91% reported by Edosomwan (2018), suggesting possible ecological or host-related factors influencing species distribution.

The prevalence of lice was significantly higher in hens (81%) compared to cocks (57%). This finding aligns with previous reports where female birds exhibited higher infestation rates (91.7%) than males (90.3%) (12) and with Eissa *et al.,* 2025, who reported 75.7% infestation in hens versus 24.3% in cocks. Several factors may explain this disparity. During the breeding season, cocks frequently mate with multiple hens, potentially transferring parasites during copulation. Additionally, hormonal changes in laying hens, particularly during incubation, may produce olfactory cues that attract ectoparasites. Immunosuppression associated with the physiological demands of egg production may also increase susceptibility to infestation.

Environmental conditions play a critical role in louse population dynamics. In the present study, infestation rates were lower in March (cold weather) and higher in July and August (hot weather). This seasonal pattern is consistent with the biology of chewing lice, which have faster life cycles and higher reproductive rates under warm, humid conditions. A recent study on birds in arid regions (Utah, USA) compared to humid regions (Bahamas) found that louse prevalence, abundance, and richness were considerably lower in arid environments, suggesting that low humidity directly constrains louse populations independent of host availability (3-6). These findings have important implications for understanding how climate change may reshape parasite communities. Birds in arid regions may experience reduced louse diversity over time, while those in more humid regions may face increased parasite pressure requiring greater investment in anti-parasite defenses (13).

Quetta's semi-arid, temperate climate, with mild summers and cold winters, creates seasonal windows favorable for louse proliferation. The higher infestation rates observed during warmer months (July–August) in our study are consistent with reports from Togo, where temperatures >28°C and humidity >47% were identified as key environmental drivers of ectoparasite proliferation (10). Proper litter management and regular bedding changes have been shown to significantly decrease parasite loads and reduce reinfection risk (14).

Lice infestation imposes substantial welfare and economic costs on poultry production. Ectoparasites cause persistent irritation, skin allergies, feather damage, anemia, and stress, leading to reduced feed conversion efficiency, decreased egg production, and impaired growth. A recent study on laying hens infested with *M. cornutus* demonstrated that untreated control groups experienced a 9.94% decrease in egg production compared to treated groups, with significant differences in feed conversion and egg mass parameters (7). Treatment with a 1% fluralaner solution effectively eliminated infestation within

seven days and prevented reinfestation for up to 120 days, highlighting the availability of modern, effective control options (7).

In backyard and free-range systems, where biosecurity measures are often limited, the economic impact of ectoparasites may be even more pronounced. Resource-limited farmers may lack access to effective acaricides or knowledge of proper application methods. The MSD Veterinary Manual emphasizes that while several insecticides are available for louse control, products approved for dogs and cats (e.g., fipronil, selamectin) are strictly forbidden for use in food animals, including backyard poultry -4. Farmers should consult approved product labels and resources such as the Food Animal Residue Avoidance Databank (FARAD) to ensure safe and effective treatment (4).

The prevalence rates observed in our study fall within the range reported globally. In sub-Saharan Africa, chewing louse prevalence varies widely from 1.28% in Ethiopian chickens to 100% in Zimbabwean flocks (5). In Nigeria, *M. stramineus* prevalence ranged from 1.5% to 100%, while *M. gallinae* prevalence ranged from 4.5% to 83.3% (5). In northeast Algeria, *M. gallinae* was the most frequent ectoparasite (82.84%), followed by *Goniodes dissimilis* (15.97%) and *M. stramineus* (13.60%) (2). In Pakistan, a study from District Faisalabad reported an overall ectoparasite prevalence of 55%, including *Argas persicus* (25%) and *Lipeurus caponis* (35%). The higher prevalence in our study (79.3%) may reflect differences in climate, host genetics, management practices, or sampling methodology (1).

CONCLUSION

This study confirms that chewing lice are a major ectoparasitic problem affecting backyard chickens in Quetta, Balochistan. Filthy and poorly managed environments harbor significantly higher louse populations due to the accumulation of organic debris that provides shelter and microclimatic conditions favorable for parasite survival and reproduction. Lice infestation causes substantial harm to chickens, including feather damage, skin allergies, chronic irritation, and discomfort, ultimately reducing growth rates and egg production. Infestation rates are higher in warm weather compared to cold weather, as warmer temperatures accelerate louse life cycles and increase reproductive output.

Effective control requires an integrated approach combining improved hygiene, regular monitoring, and targeted treatment. Poultry keepers should implement routine cleaning of coops, proper litter management, and regular inspection of birds for ectoparasites (9). Where infestations are detected, registered poultry dusts (e.g., those containing permethrin or other approved acaricides) should be applied thoroughly to the base of feathers around the vent, under the wings, and along the back. In severe cases, newer systemic treatments such as fluralaner administered in drinking water have demonstrated high efficacy and prolonged protection (7).

Further research is urgently needed to survey ectoparasite diversity and prevalence across other cities and ecological zones of Balochistan, including urban, rural, and commercial poultry production systems; evaluate the efficacy of locally available acaricides and alternative control strategies (e.g., phytotherapy, diatomaceous earth) under field conditions; assess the economic impact of louse infestations on egg production, growth performance, and feed efficiency in the local context; and investigate the potential role of wild birds as reservoirs and vectors of poultry ectoparasites. Addressing these knowledge gaps will inform evidence-based control programs that improve poultry health, welfare, and productivity, thereby enhancing household food security and income generation in resource-limited communities.

Conflict of interests:

The authors declare that they have no competing interests.

Authors' contribution:

Kb Conducted research; NR Supervised and conceived the research; ZB & AI Conceived and designed the experiments; ZB, AI & GM Contributed to experiments and data analysis; K, NR, ZB, AI & GM Contributed to manuscript preparation.

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