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Original Research Article

Impact of Focus Farm Management on Growth Performance, Mortality, and Economic Efficiency in Commercial Broiler Production

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Abstract: *Commercial broiler production in Punjab, Pakistan, faces persistent constraints related to biosecurity gaps, suboptimal brooding and environment control, variable flock monitoring, and rising input costs, which collectively reduce growth performance and profitability. Integrated farm-management models may improve biological efficiency and economic returns under field conditions.* ***Objective:*** *To assess the influence of an integrated Focus Farm Management (FFM) system on production performance, flock health, energy efficiency, and economic outcomes in commercial broiler production in Punjab, Pakistan.* ***Methods:*** *A comparative field trial was conducted in Punjab, Pakistan, using 40,000 day-old broiler chicks allocated into two groups: Focus Farm Management (FFM; n=20,000) and conventional management control (n=20,000). The FFM model implemented structured brooding, stage-specific feeding, strict environmental control, enhanced biosecurity, and continuous monitoring of flock performance. Outcomes included mean daily weight gain, feed conversion ratio, mortality, medication cost per bird, energy consumption per bird (kWh/bird), flock uniformity, and cycle-level revenue impact. Group comparisons were performed for key performance indicators, with statistical significance considered at p<0.05.* ***Results:*** *Broilers managed under FFM achieved higher mean daily weight gain than controls (58.0 vs 54.0 g/day). Feed conversion improved under FFM (1.42) compared with conventional management (1.72). Mortality was lower in the FFM group (2.5%) than in the control group (6.5%), representing a 61.5% relative reduction. FFM also reduced medication cost per bird and improved energy efficiency (0.19 vs 0.24 kWh/bird), alongside better flock uniformity. Economic analysis indicated that reduced mortality and improved performance generated an additional PKR 592,800 per production cycle for a 20,000-bird flock.* ***Conclusion:*** *Focus Farm Management was associated with improved growth performance, feed efficiency, survival, and energy use, translating into meaningful economic gains in commercial broiler operations in Punjab, Pakistan. Wider adoption of integrated management practices may enhance productivity and profitability in comparable poultry farming settings.*

Keywords: Biosecurity, Broilers, Feed Conversion Ratio, Mortality, Pakistan

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Introduction

The poultry industry plays a central role in global food security by providing affordable, high-quality animal protein. Broiler meat production has expanded rapidly over the past three decades due to short production cycles, efficient feed utilisation, and a relatively lower environmental footprint compared with other livestock sectors (1,2). However, rising feed and energy costs, increasing disease pressure, concerns regarding antimicrobial stewardship, and growing demands for animal welfare continue to challenge the sustainability and profitability of broiler production systems, particularly in low- and middle-income countries (3).

Feed constitutes approximately 65–70% of total production costs in commercial broiler farming, and farm profitability is closely linked to feed conversion efficiency (4). Small changes in feed conversion ratio, mortality, or medication cost can substantially affect net returns at the farm level. Disease outbreaks, often exacerbated by inadequate biosecurity and suboptimal environmental control, remain a major cause of production losses and performance variability in commercial flocks (5). These challenges highlight the need for management systems that emphasise prevention, consistency, and data-driven decision-making rather than reactive interventions.

Early-life management is a key determinant of broiler growth, flock uniformity, and lifetime productivity. Inadequate brooding temperature, limited access to water and feed, and poor chick quality can result in irreversible growth retardation and increased flock heterogeneity (6). Improved early brooding practices have been shown to enhance growth performance and uniformity, thereby facilitating more efficient feeding, disease management, and marketing (7,8). Despite this evidence, early brooding management remains inconsistent in many commercial farms, particularly in settings with limited technical supervision.

Environmental control and housing conditions also strongly influence broiler health and productivity. Poor ventilation, excessive humidity, and high ammonia concentrations are associated with respiratory disease, reduced feed intake, increased mortality, and compromised welfare (9,10). Modern ventilation strategies not only improve bird comfort but may also reduce energy consumption per unit of output, contributing to both economic and environmental sustainability (11). Nevertheless, many farms still rely on manual adjustments and lack systematic monitoring of environmental parameters.

Preventive health management and biosecurity are essential components of sustainable broiler production. Vaccination programs, restricted farm access, sanitation protocols, and routine monitoring of mortality have been shown to reduce disease incidence, antimicrobial use, and production losses (12–14). In high-density poultry production areas, weak biosecurity substantially increases the risk of disease transmission.

In Pakistan, commercial broiler production, particularly in Punjab, faces persistent challenges in feed efficiency, disease control, and production consistency (15). While individual management interventions such as feeding strategies or vaccination schedules have been studied, the combined impact of a coordinated, data-driven management system under field conditions has received limited empirical evaluation. Evidence suggests that the integrated application of management practices yields greater cumulative benefits than isolated interventions (4,16).

Focus Farm Management (FFM) is a structured management approach that emphasises standardised operating procedures, continuous monitoring, preventive health care, optimised nutrition, environmental control, and trained personnel. However, quantitative evaluations of its combined effects on growth performance, feed efficiency, mortality, energy utilisation, and economic outcomes in commercial broiler operations remain scarce. Therefore, the present study aimed to assess the effectiveness of Focus Farm Management on biological performance, resource use efficiency, and economic returns in commercial broiler production systems in Punjab, Pakistan.

Methodology

This comparative field study was conducted in a commercial broiler production setting in Punjab, Pakistan, under routine farm conditions. A total of 40,000 day-old broiler chicks of comparable genetic stock were enrolled and followed over a complete production cycle. Birds were allocated to two parallel groups of equal size: 20,000 birds managed under a structured Focus Farm Management (FFM) system and 20,000 birds reared using conventional farm practices commonly employed in the region. Both groups were raised simultaneously under similar climatic conditions and marketed at comparable ages to minimise confounding from environmental or temporal variation.

In the FFM group, standardised early-life management protocols were implemented. Broiler houses were pre-heated 24 hours prior to chick placement to achieve optimal thermal conditions. Day-old chicks with a mean body weight of approximately 40 g and high initial uniformity were selected. Brooding temperature was maintained at approximately 32°C during the first week and gradually reduced by 2–3°C per week, depending on bird age and observed comfort. Immediate access to clean drinking water supplemented with glucose and vitamins was provided at placement, and dry litter was maintained at a depth of approximately 3–4 inches. Crop fill was assessed 12 hours post-placement as an indicator of early feeding success.

Nutritional management in the FFM group followed a phase-feeding strategy, consisting of pre-starter (0–10 days), starter (11–24 days), and finisher diets (from day 25 until marketing), formulated to meet age-specific nutrient requirements. Feed physical form and pellet size were adjusted according to bird age, and feeder height and distribution were routinely optimised to minimise wastage. Drinking water was provided ad libitum via nipple drinkers at approximately one per ten birds, with periodic monitoring of water quality parameters, including pH and microbial contamination.

Environmental management in the FFM houses was guided by age-specific ventilation targets, with humidity maintained within an acceptable range and ammonia concentration kept below 20 ppm. Seasonal adjustments, including the use of cooling systems during warmer periods and insulation during colder periods, were employed to stabilise the house's internal environment. Stocking density was controlled to approximately 30 kg live weight per square meter, and litter quality was maintained through routine stirring and prompt removal of wet patches to reduce moisture accumulation.

A comprehensive preventive health and biosecurity program was implemented in the FFM group, including adherence to routine vaccination schedules against major poultry diseases, restricted farm access, disinfection protocols for personnel and equipment, and the use of an all-in/all-out production system. Farm staff involved in FFM operations received structured training in bird observation, hygiene practices, environmental monitoring, and record keeping. Daily monitoring of feed intake, water consumption, mortality, body weight sampling, and flock uniformity was conducted to allow early identification of deviations from expected performance.

Birds in the control group were reared under conventional management practices representative of typical commercial operations in the region, without standardised performance monitoring, structured environmental optimisation, or enhanced biosecurity and staff training protocols.

Data on growth rate, feed conversion ratio, cumulative mortality, medication cost per bird, energy consumption per bird, and flock uniformity were recorded throughout the production cycle for both groups. Economic outcomes were estimated using prevailing market prices to calculate differences in marketable live weight and revenue between the two management systems.

Statistical analysis was performed using SPSS software (version 26.0). Continuous variables were summarised as means with standard deviations, and categorical variables as frequencies and percentages. Between-group comparisons were conducted using independent-samples t-tests for continuous outcomes, with $p < 0.05$ as the criterion for statistical significance.

Results

A total of 40,000 broiler chicks were evaluated over one production cycle, with 20,000 birds managed under Focus Farm Management (FFM) and 20,000 birds reared under conventional practices in comparable commercial farm conditions in Punjab, Pakistan. Broilers in the FFM group achieved a significantly higher mean daily weight gain than the control group (58.0 ± 2.4 vs 54.0 ± 2.1 g/day; $p < 0.05$), indicating superior growth performance under structured management (Table 1). The difference in growth performance between the two systems is illustrated in Figure 1.

Feed efficiency was significantly improved in the FFM group, with a lower feed conversion ratio compared with controls (1.42 ± 0.06 vs 1.72 ± 0.08; $p < 0.05$), reflecting more efficient feed utilisation under FFM (Table 1). This difference in feed conversion is depicted in Figure 2.

Cumulative mortality was substantially lower among broilers managed under FFM than under conventional management (2.5% vs 6.5%; $p < 0.01$), reflecting a marked improvement in survivability associated with enhanced biosecurity and health management (Table 1). The comparative mortality pattern between the two groups is shown in Figure 3.

Broilers in the FFM group incurred lower medication costs per bird (PKR 12 ± 3 vs PKR 20 ± 4; $p < 0.05$), alongside lower energy consumption per bird (0.19 ± 0.02 vs 0.24 ± 0.03 kWh; $p < 0.05$), indicating both health-related and operational efficiency benefits of the structured management approach (Table 1).

Flock uniformity in marketing was superior under FFM, with a lower body weight coefficient of variation compared with the control group (9.5 ± 1.1% vs 12.5 ± 1.4%; $p < 0.05$), reflecting more consistent growth across the flock (Table 1). The reduction in mortality led to approximately 800 additional birds being marketed per cycle in the FFM group, resulting in an estimated additional revenue of PKR 592,800 per production cycle.

Table 1. Comparison of Production Performance, Health, and Efficiency Indicators between Focus Farm Management and Control Groups

Parameter	Focus Farm Management (Mean ± SD)	Control Group (Mean ± SD)	Relative Improvement (%)
Growth rate (g/day)	58.0 ± 2.4	54.0 ± 2.1	+7.4
Feed conversion ratio (FCR)	1.42 ± 0.06	1.72 ± 0.08	+17.4
Mortality rate (%)	2.5	6.5	+61.5
Medication cost (PKR/bird)	12 ± 3	20 ± 4	+40.0
Energy consumption (kWh/bird)	0.19 ± 0.02	0.24 ± 0.03	+20.8
Flock uniformity (CV%)	9.5 ± 1.1	12.5 ± 1.4	+24.0

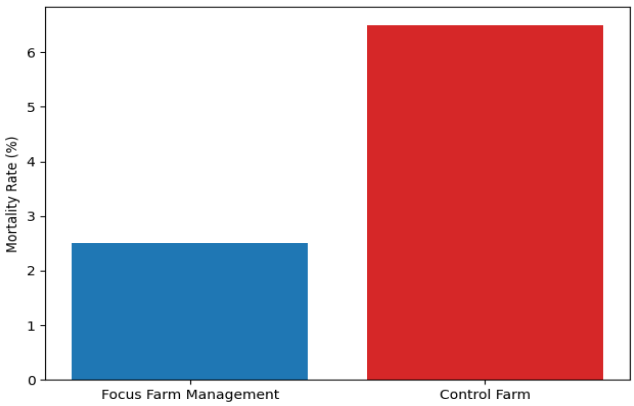

Figure 1. Mean daily growth rate (g/day) of broilers reared under Focus on Farm Management and conventional management systems

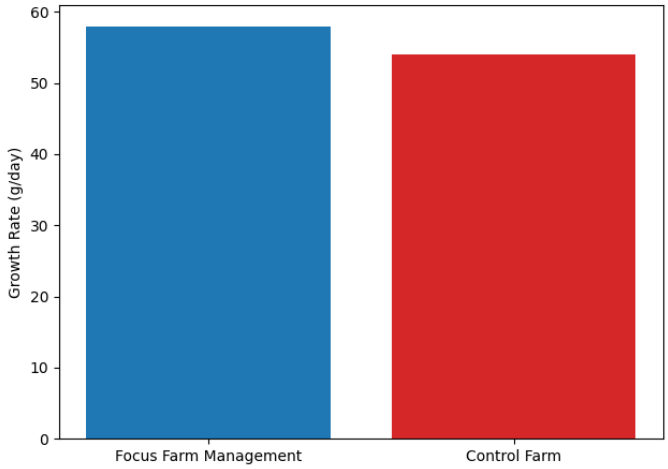

Figure 2. Feed conversion ratio (FCR) of broilers under Focus Farm Management and conventional management systems.

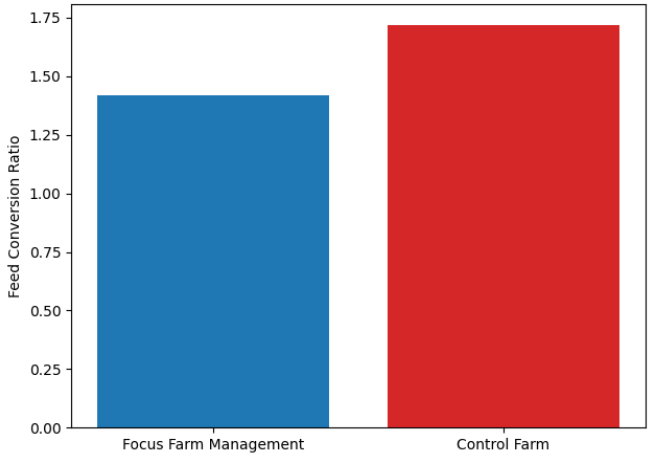

Figure 3. Mortality rate (%) of broilers reared under Focus Farm Management and conventional management systems.

Discussion

The present study demonstrates that implementing a structured, data-driven farm management program resulted in significant improvements in broiler growth performance, feed efficiency, survivability, medication costs, energy efficiency, and flock uniformity under commercial field conditions. These findings are consistent with previous research indicating that systematic improvements in early brooding, nutrition, environmental management, and biosecurity lead to measurable gains in biological performance and farm-level profitability (7, 16).

The improvements in growth rate and flock uniformity observed in the Focus Farm Management group are likely attributable to optimised early-life management practices. Standardised brooding temperature, immediate access to water and feed, and high chick uniformity have been shown to enhance early feed intake and reduce growth variability, thereby improving cumulative performance (17, 7). Controlled post-hatch thermal regimes have also been associated with better welfare and growth patterns in commercial broilers, supporting the higher mean daily weight gain observed in the present study (7). Evidence from Pakistan further supports the relevance of proper brooding practices in improving production performance under local farming conditions (17).

The substantial improvement in feed conversion ratio observed under Focus Farm Management aligns with the existing literature, which indicates that phase-specific feeding strategies enhance nutrient utilisation and feed efficiency (18). Improved feed efficiency directly reduces production costs, as feed is the largest cost component in broiler farming (4). Similar improvements in feed efficiency have been associated with optimised feeding programs and management practices in other commercial production systems (19).

Environmental control, including ventilation, humidity regulation, and ammonia management, likely contributed to the observed reductions in mortality and energy consumption. Previous studies have demonstrated that appropriate ventilation regimes reduce respiratory disease, improve welfare, and enhance production efficiency while lowering energy use per unit of output (10, 11). Improved house climate control has also been associated with lower disease incidence and improved flock performance (9).

The marked reduction in mortality in the Focus Farm Management group is consistent with evidence highlighting the importance of comprehensive biosecurity and preventive health programs. Restricted access, sanitation protocols, and adherence to vaccination schedules have been shown to significantly reduce early mortality and antimicrobial use in commercial broiler production (12–14). Reduced mortality represents one of the most economically impactful outcomes of improved management, as even small improvements in survivability translate into substantial gains in marketable birds and farm revenue (19, 20).

The reduction in medication costs observed in the present study is also consistent with reports indicating that preventive, biosecurity-focused management approaches decrease disease burden and reliance on therapeutic interventions (14). This not only reduces production costs but also aligns with global efforts to promote antimicrobial stewardship in animal agriculture.

Despite the positive outcomes observed, several limitations should be acknowledged. The study compared two large commercial flocks during a single production cycle, and future studies incorporating multiple cycles and replicated farm units would strengthen causal inference and generalizability (16). Additionally, while the integrated management package yielded clear benefits, the independent contributions of individual components, such as nutrition, ventilation, and biosecurity, could not be isolated. Nevertheless, the cumulative improvements observed support the concept that coordinated, multi-component management strategies offer greater benefits than isolated interventions.

Overall, the findings suggest that Focus Farm Management offers a practical, economically viable approach to improving broiler performance and sustainability in commercial poultry systems, particularly in resource-constrained settings such as Pakistan.

Conclusion

This study suggests that implementation of a structured Focus Farm Management approach may be associated with meaningful improvements in growth performance, feed efficiency, survivability, energy use, flock uniformity, and economic returns in commercial broiler production under field conditions in Punjab, Pakistan. The observed gains appear consistent with the combined effects of standardised early-life management, phase-feeding, environmental control, and strengthened biosecurity. While the findings support the practical value of coordinated, data-driven management in resource-constrained commercial settings, multi-cycle and multi-site evaluations would help to clarify the durability and generalizability of these effects.

Declarations

Data Availability statement

All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate

Approved by the department concerned. (IRBEC-HSBAG/23-25)

Consent for publication

Approved

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The authors declared no conflict of interest.

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