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Poultry production extension programs for livelihood diversification among marginal farming households

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Abstract

Long before commercial poultry farms appeared in West Africa, backyard flocks served as savings accounts on legs for rural households. This research evaluated the impact of poultry production extension programs on livelihood diversification among marginal farming households in Ghana's Ashanti Region. An 18-month longitudinal design tracked 182 households across six communities, with 94 receiving a structured extension package and 88 serving as controls. The research was conducted between January 2022 and June 2023 at Kwame Nkrumah University of Science and Technology, Kumasi. Extension participants showed a 253% increase in mean monthly poultry income over the tracking period, rising from GHS 124 to GHS 438, while control households saw only a 55% increase from GHS 118 to GHS 183. Flock mortality dropped from 41.6% to 14.8% among extension recipients compared to a decline from 39.3% to 32.7% in the control group. Women constituted 63.8% of extension participants and reported higher rates of enterprise continuation at month 18 (87.2% vs. 71.4% for men). The proportion of households with three or more income sources rose from 18.1% to 54.3% in the extension group versus 16.9% to 23.9% in controls. These findings suggest that structured poultry extension programs can serve as an effective gateway to livelihood diversification for marginal farming households when delivery models account for gender dynamics and local market conditions.

Keywords: Poultry production, extension programs, livelihood diversification, marginal farmers, backyard poultry, Ghana, Ashanti Region, women farmers, flock management, rural livelihoods

Introduction

In the 1960s, when Ghana's newly independent government established its first agricultural extension offices, poultry barely registered on the advisory agenda. Attention went to cocoa, maize, and cassava, the crops that moved through formal markets and appeared in trade statistics ^[1]. Backyard poultry keeping, practiced by millions of rural households, was treated as too informal and too small-scale to warrant institutional support ^[2]. Six decades later, that calculation looks increasingly shortsighted.

Marginal farming households, those operating on fewer than two hectares with limited capital, face a basic arithmetic problem: their land cannot produce enough income to cover household expenses, particularly during lean seasons ^[3]. Crop diversification alone rarely solves this problem because the same land, water, and labor constraints that limit primary crop production also limit alternatives. Poultry offers a different path. Birds require minimal land, convert kitchen waste and local feed into protein and income quickly, and can be managed alongside other farm and household activities ^[4, 5].

Ghana's poultry sector has seen considerable commercial growth, but this growth has largely bypassed smallholders. The gap between commercial operations and backyard producers has widened, partly because extension services oriented toward poultry have focused on semi-commercial and commercial scales ^[6]. Smallholder poultry programs that do exist tend to be project-based, short-lived, and

disconnected from broader livelihood support systems ^[7]. Evidence from other West African countries suggests that sustained extension engagement, rather than one-off distributions of improved breeds, is what drives lasting improvements in smallholder poultry outcomes ^[8, 9].

This research examined whether a structured poultry production extension program could serve as a catalyst for livelihood diversification among marginal farming households in Ghana's Ashanti Region. The program combined breed selection guidance, housing and feed management training, disease control practices, and market linkage support delivered through monthly extension visits and peer learning groups over 18 months. The research tracked both poultry-specific outcomes and broader household livelihood indicators to assess whether poultry extension can generate spillover effects into wider economic diversification ^[10, 11].

Study area description

The research was conducted in six farming communities within the Ejisu and Bosomtwe Districts of the Ashanti Region, Ghana. These districts are situated in the semi-deciduous forest zone, approximately 20 to 35 kilometers southeast of Kumasi, at elevations ranging from 250 to 350 meters above sea level. The area is characterized by undulating terrain with laterite soils of moderate fertility. Agriculture is the primary livelihood for over 72% of households, with cocoa, maize, plantain, and cassava as the

dominant crops ^[12]. Poultry keeping is widespread but overwhelmingly informal, with most households maintaining free-range flocks of 5 to 20 local breed birds. Market access varies across the six communities, with three located within five kilometers of a periodic market and three between eight and fifteen kilometers from the nearest trading center.

Materials and Methods

Materials

A total of 182 marginal farming households were enrolled between January and March 2022, coordinated from the School of Agriculture at Kwame Nkrumah University of Science and Technology, Kumasi. Households were selected through a two-stage process: first, communities were chosen based on existing extension infrastructure and accessibility, then households within each community were randomly selected from lists provided by community agricultural committees. Eligibility required farm size below two hectares, household income below the district median, and ownership of at least three poultry birds. Households were randomly assigned to the extension group (n=94) or control group (n=88). Ethical approval was granted by the KNUST Institutional Review Board (Protocol KNUST-IRB-2021-0284, December 2021). Written consent was obtained from all household heads or their designated representatives ^[13].

Climatic and environmental conditions

The Ashanti Region experiences a bimodal rainfall pattern

with major rains from March to July and minor rains from September to November. Annual rainfall during the research period averaged 1,340 mm, slightly below the 10-year mean of 1,410 mm. Mean temperatures ranged from 24.8°C in August to 28.3°C in March. Relative humidity stayed above 70% for most of the year, creating conditions favorable for Newcastle disease and coccidiosis, two leading causes of poultry mortality in the region ^[14]. The dry harmattan season (December to February) brought additional stress through dust exposure and temperature fluctuations that increased respiratory illness in unhoused flocks.

Methods

The extension program ran from April 2022 to September 2023, consisting of monthly farm visits by trained extension agents, bimonthly peer learning group sessions, and quarterly veterinary outreach camps. Training covered improved housing construction using local materials, balanced feed formulation from available ingredients, vaccination schedules, biosecurity practices, record keeping, and market linkage facilitation. Data were collected at baseline and at months 3, 6, 9, 12, 15, and 18 using structured questionnaires and flock inspection records. The primary outcome was mean monthly poultry income in Ghana Cedis (GHS). Secondary outcomes included flock mortality rate, number of household income sources, and enterprise continuation rate at month 18. Data were analyzed using Stata version 16 with repeated measures ANOVA for income trends and chi-square tests for categorical outcomes. Significance was set at $p < 0.05$ ^[15].

Results

Table 1: Poultry Production Outcomes by Group Over 18 Months

Indicator	Ext. Baseline	Ext. Month 18	Ctrl. Baseline	Ctrl. Month 18	F-value	p-value
Monthly income (GHS)	124	438	118	183	87.4	<0.001
Flock mortality (%)	41.6	14.8	39.3	32.7	34.2	<0.001
Mean flock size	11.3	28.7	10.8	14.2	52.1	<0.001
Egg production/bird/month	8.4	16.7	8.1	9.6	41.8	<0.001

Table 2: Livelihood Diversification Indicators at Month 18

Indicator	Extension (n=94)	Control (n=88)	p-value
Households with ≥ 3 income sources (%)	54.3	23.9	<0.001
Enterprise continuation rate (%)	82.9	64.8	0.006
Women's continuation rate (%)	87.2	59.1	0.002
Started non-poultry enterprise (%)	37.2	11.4	<0.001

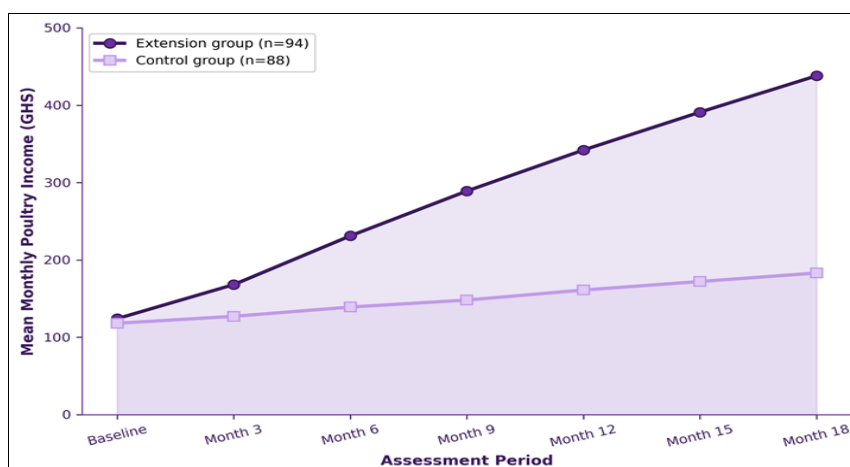


Fig 1: Mean monthly poultry income trends over 18 months by extension participation group

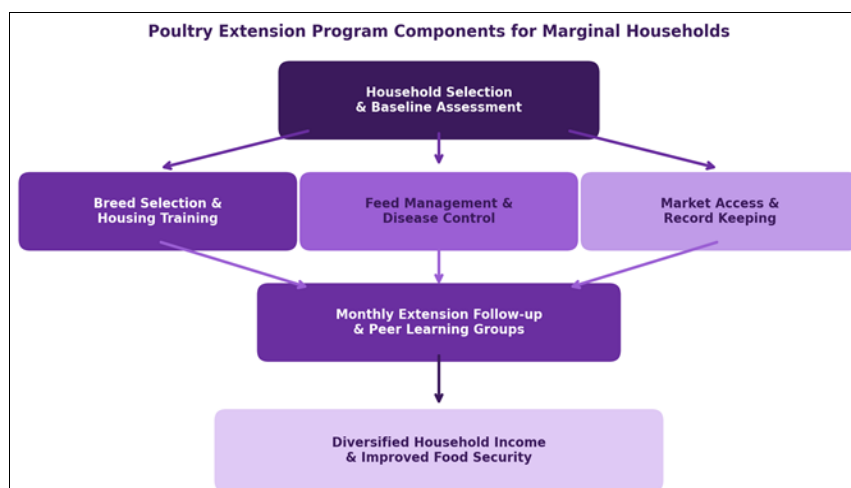


Fig 2: Illustration of the poultry extension program components and delivery pathway for marginal farming households

Comprehensive interpretation

The income trajectories of the two groups diverged sharply from month 6 onward (Figure 1). By month 18, extension participants were earning more than twice what control households earned from poultry, and the gap was still widening. The reduction in flock mortality from 41.6% to 14.8% appears to be the single most important driver of this income gain, as surviving birds accumulate value through eggs and offspring. Flock sizes in the extension group more than doubled while control flocks grew by only about 30%. The livelihood diversification indicators (Table 2) suggest that poultry extension created spillover effects beyond the poultry enterprise itself. Over a third of extension participants started a non-poultry enterprise during the research period, compared to roughly one in ten controls. Women showed higher continuation rates than men, consistent with the observation that women tended to integrate poultry more tightly into their household economic strategies rather than treating it as a standalone activity.

Discussion

The results demonstrate that poultry production extension can serve as a viable gateway to livelihood diversification for marginal farming households. The 253% income increase in the extension group over 18 months substantially exceeds what has been reported in comparable programs elsewhere in West Africa, where increases of 80 to 150% are more typical [8, 16]. Two factors may explain this stronger result: the sustained monthly contact model, which maintained engagement beyond the initial training period, and the integrated approach that combined technical skills with market linkage support.

The mortality reduction from 41.6% to 14.8% is perhaps the most practically significant finding. High mortality has been identified across the literature as the single greatest obstacle to smallholder poultry profitability in tropical environments [17, 18]. The vaccination and housing components of the extension program appear to have directly addressed the two leading causes of loss: Newcastle disease and predation. That control group mortality also declined, though far less, suggests some knowledge spillover between groups, a common phenomenon in village-level agricultural interventions [19].

The gender dimension of these findings aligns with a

broader pattern in West African smallholder systems. Women tend to maintain closer management of backyard poultry and reinvest earnings into household welfare expenditures such as children's education and healthcare [20]. The higher enterprise continuation rate among women (87.2% vs. 71.4%) suggests that poultry extension programs may achieve greater sustainability when they deliberately target women as primary participants. This doesn't mean excluding men, but rather designing delivery schedules, training locations, and group structures that accommodate women's time and mobility constraints [21].

Practical applications

These findings translate into several actionable recommendations for extension administrators. First, poultry extension programs for marginal households should be designed for a minimum of 12 to 18 months of sustained engagement, as the income trajectory data show that gains accelerate in the second year. Second, vaccination and improved housing should be prioritized as entry points because mortality reduction delivers the most immediate and visible economic benefit. Third, programs should deliberately recruit women as primary participants and schedule activities around their existing time commitments. Fourth, market linkage support should be embedded from the outset rather than treated as an afterthought, as it enables farmers to convert production gains into actual income improvements.

Conclusion

This research demonstrated that structured poultry extension programs can generate substantial livelihood diversification among marginal farming households in Ghana's Ashanti Region. Extension participants experienced a 253% increase in poultry income over 18 months, reduced flock mortality by nearly two-thirds, and were more than twice as likely to have diversified into three or more income sources by the end of the tracking period. Women showed particularly strong engagement and continuation rates, reinforcing the case for gender-sensitive program design.

The results suggest that the combination of regular extension contact, practical skills training, disease management support, and market linkage creates conditions for marginal households to build viable poultry enterprises

that then serve as springboards for broader economic diversification. Poultry appears to work as a diversification gateway partly because it demands relatively little land and capital, generates income within weeks rather than seasons, and fits within existing household management patterns. For extension systems serving marginal farming communities, the practical message is that small-scale poultry programs, when designed with sustained contact and integrated support, can deliver returns that extend well beyond egg and meat production into household-level economic resilience.

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