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Effectiveness of Targeted Educational Programs in Improving Duck-Management Knowledge Across Occupational and Educational Groups in Rural Indonesia

Eko Alif Bin Anto [1], Widjiati Widjiati [2, *], Dian Ayu Permatasari [3], Lilik Maslachah [4], Sri Pantja Madyawati [7], Muchammad Yunus [5], Mustofa Helmi Effendi [3], Rochmah Kurnijasanti [4], Budiarto MP [3], Oky Setyo Widodo [6] and Tantri Dyah Whidi Palupi [2]

[1] *Master Program of Reproductive Biology, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[2] *Department of Anatomy Division, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[3] *Department of Veterinary Public Health, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[4] *Department of Veterinary Basic Medicine, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[5] *Department of Veterinary Parasitology, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[6] *Department of Animal Husbandry, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*
[7] *Department of Veterinary Reproduction, Faculty of Veterinary Medicine, Universitas Airlangga, Surabaya, Indonesia.*

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Abstract

Duck farming plays a critical role in supporting food security, economic resilience, and rural livelihood development, especially in regions where agricultural diversification is a necessity. This study evaluated the effectiveness of a targeted educational program in improving technical knowledge of duck management among rural communities with diverse occupational and educational backgrounds. A quasi-experimental pre-test and post-test design was implemented in Palembon Village, Bojonegoro, Indonesia, involving 40 participants from both agricultural and non-agricultural sectors. Structured training modules covering disease control, feeding, and husbandry were delivered interactively. Knowledge gains were assessed using validated questionnaires and analyzed through non-parametric statistical tests. Results demonstrated a highly significant improvement in participants' technical understanding post-intervention ($p < 0.001$). Moreover, participants with non-agricultural occupations and low formal education achieved post-test scores comparable to their agricultural or higher-educated counterparts. These findings highlight the inclusivity and adaptability of the training approach, which emphasized practical relevance and community-based learning strategies. The convergence in learning outcomes suggests that effective instructional design can bridge knowledge gaps regardless of participants' prior experience or education. This study underscores the potential of targeted agricultural education as a scalable tool for rural capacity building and livestock productivity enhancement. The intervention aligns with Sustainable Development Goal (SDG) 4 on Quality Education and SDG 2 on Zero Hunger by promoting inclusive, lifelong learning and sustainable livestock practices for food security.

Keywords: Duck Farming; Agricultural Education; Rural Extension; Community-Based Training; Livestock Management; Quality Education and Zero Hunger

1 Introduction

Duck farming has been increasingly recognized as a strategic component of rural livelihoods, particularly in developing countries where agriculture remains a key source of food and income. Ducks offer several advantages over other poultry species, including adaptability to diverse environments, low production costs, and the ability to integrate into mixed crop–livestock systems. These features position duck farming as an important pathway to improve food security and strengthen household economic resilience in rural settings [1, 2].

* Corresponding author: Widjiati Widjiati

In Indonesia, smallholder duck farming contributes not only to household income but also to local food systems, particularly through egg and meat production. However, productivity in duck-based systems remains suboptimal due to limited access to technical knowledge, poor husbandry practices, and insufficient extension support [3]. Studies have shown that improving farmers' access to relevant training significantly enhances livestock performance and adoption of best practices [4, 5]. Educational programs tailored to the local context can promote sustainable production, biosecurity awareness, and efficient feeding, all of which are essential for resilient livestock systems [6].

Despite these benefits, the effectiveness of educational interventions may vary depending on participant characteristics such as occupation and education level. Individuals with farming experience are often assumed to have an advantage in adopting technical innovations, whereas those from non-agricultural backgrounds may face barriers in understanding and applying training content [7]. Similarly, low formal education is frequently associated with lower uptake of new practices, raising concerns about the inclusivity of conventional extension models [8]. These disparities present a challenge for program designers seeking to reach heterogeneous rural populations.

To address this issue, targeted educational programs have emerged as a promising strategy to bridge knowledge gaps across diverse socio-demographic groups. Such programs are designed to be inclusive, accessible, and contextually relevant. When effectively implemented, they have demonstrated the capacity to enhance knowledge acquisition regardless of participants' prior experience or formal education [9, 10].

This study investigates the effectiveness of a targeted educational program aimed at improving technical understanding of duck management among rural residents with varying occupational and educational backgrounds. By evaluating short-term knowledge outcomes before and after training, the study contributes to the growing body of evidence supporting inclusive approaches in agricultural education and aligns with global development priorities, particularly Sustainable Development Goal (SDG) 4 on quality education and SDG 2 on zero hunger.

2 Material and methods

2.1 Study Design and Participants

This study was conducted to assess the effectiveness of a targeted educational program in improving duck-management knowledge among rural populations with different occupational and educational backgrounds. A quasi-experimental pre-test/post-test design was employed, which is frequently used in evaluating knowledge change resulting from educational interventions in rural communities [1].

The intervention took place over two days, from 26 to 28 January 2026, in Palembon Village, Kanor District, Bojonegoro Regency, Indonesia. The site was selected based on its active involvement in small-scale duck farming and the presence of heterogeneous socio-economic characteristics among its residents. A total of 40 adult participants voluntarily enrolled in the training, comprising individuals from both agricultural (n = 30) and non-agricultural (n = 10) sectors.

2.1.1 Demographic Characteristics

Participants represented a wide age range (20–67 years) with a mean of 49.2 years, indicating the relevance of duck farming across multiple generations. Occupational diversity included full-time farm laborers, self-employed individuals, private workers, and homemakers. Educational backgrounds ranged from no formal education to completion of secondary school. This demographic composition allowed for comparative analysis of training outcomes across subgroups, consistent with the objective of assessing the inclusivity of the educational intervention [2].

2.2 Intervention and Data Collection

The educational program was designed to address core areas of duck management, including feeding practices, disease control, and husbandry. Instruction was delivered through interactive lectures, group discussions, and contextualized examples to ensure accessibility across varying education levels. The training incorporated participatory approaches aligned with adult learning theory, which emphasizes relevance and practical application for effective knowledge retention [3].

Pre-test and post-test assessments were administered using a structured questionnaire developed based on validated materials from prior livestock training programs [4]. Each test consisted of objective questions measuring participants' technical knowledge in duck management. The same instrument was used before and after the intervention to evaluate changes in understanding directly attributable to the training.

2.2.1 Demographic Characteristics

Due to the small sample size and the non-normal distribution of scores, non-parametric statistical methods were applied. The Wilcoxon signed-rank test was used to compare pre-test and post-test scores within the same group, while the Mann–Whitney U test was applied to compare post-test scores between occupational and education-based subgroups [5]. This analytical approach ensured robust evaluation of differences without assuming normality, which is appropriate for community-based intervention studies with limited sample sizes [6].

3 Results and discussion

This section presents and discusses the outcomes of the targeted educational program in improving duck-management knowledge among rural participants. The results are organized into thematic subsections to clearly describe knowledge improvement patterns and to examine differences across occupational and educational backgrounds. The findings are interpreted in relation to existing literature on agricultural education and rural extension.

3.1 Socio-Demographic Characteristics of Respondents

A total of 40 respondents participated in the targeted educational program, representing a heterogeneous rural population. Participants ranged in age from 20 to 67 years, with a mean age of 49.2 years, indicating that engagement in duck farming activities spans multiple generations. With respect to occupational background, the majority of respondents (75%) were employed in the agricultural sector, primarily as farm laborers, while the remaining 25% were engaged in non-agricultural activities such as self-employment, private-sector work, and household-based roles.

Educational attainment among respondents was relatively balanced. Approximately 52.5% of participants had low levels of formal education (no schooling or primary school), whereas 47.5% had completed secondary education. This demographic composition reflects the diverse socio-economic structure typical of rural communities and provides an appropriate basis for evaluating the inclusiveness of the educational intervention.

Table 1 Socio-demographic profile of respondents (n = 40)

Characteristics	Category	Frequency (n)	Percentage (%)
Occupation	Agricultural sector (farm laborers/independent farmers)	30	75,0
	Non-agricultural sector (self-employed, homemakers, private employees, etc.)	10	25,0
Education	Low (no formal education/primary school graduates)	21	52,5
	Secondary (junior high school/senior high school/vocational school)	19	47,5
Age	Mean: 49.2 years (Range: 20–67 years)	-	-

Table footnote: Data are presented as frequency and percentage unless otherwise stated.

3.2 Improvement of Duck-Management Knowledge after Educational Intervention

Overall, the targeted educational program resulted in a substantial improvement in participants' technical understanding of duck management. Comparison of pre-test and post-test scores demonstrated a marked increase in knowledge following the intervention. Statistical analysis using the Wilcoxon signed-rank test revealed that this increase was highly significant ($p < 0.001$), indicating that the program was effective in enhancing short-term knowledge outcomes.

The observed improvement aligns with previous findings showing that short-term, structured agricultural training programs can produce rapid gains in technical knowledge when content is delivered through participatory and contextually relevant approaches [11, 12]. By emphasizing disease management, feeding practices, and general husbandry, the program addressed core knowledge gaps commonly reported in smallholder poultry systems.

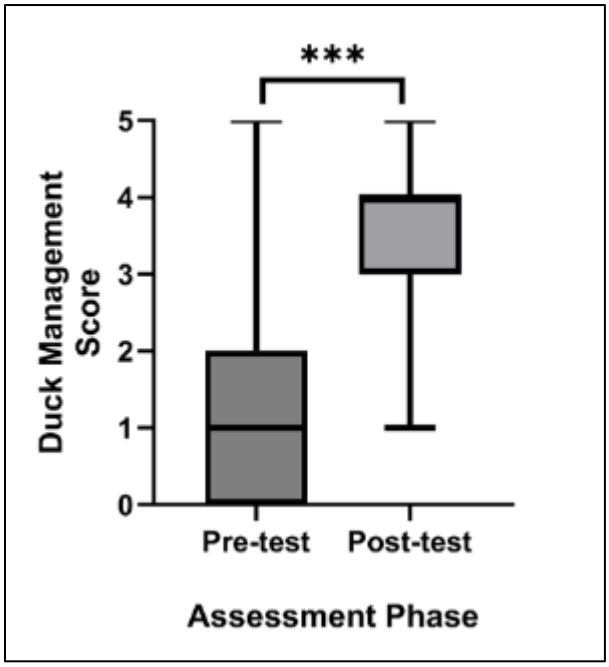


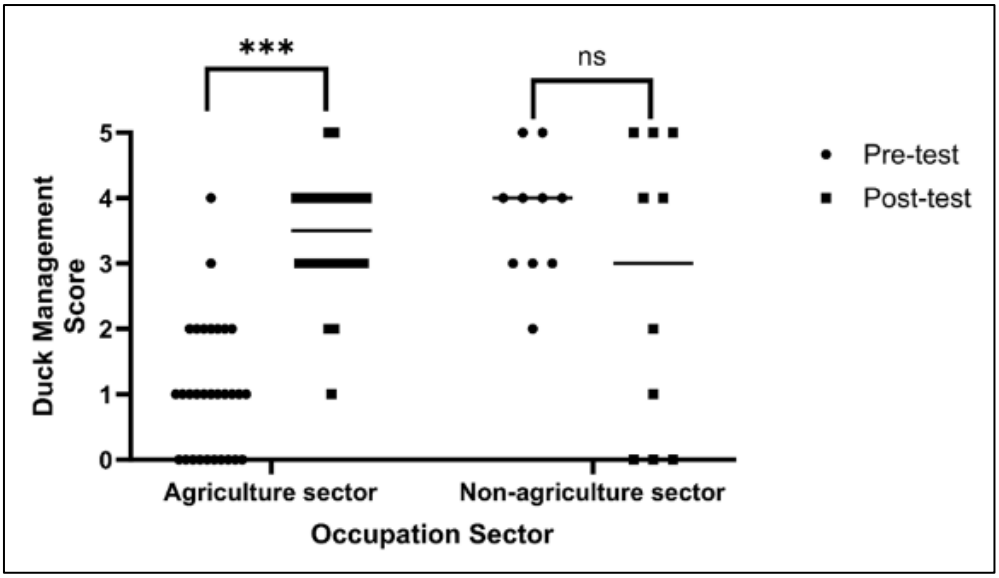
Figure 1 Comparison of duck-management knowledge scores before and after the educational intervention. Data are presented as mean ± SD (n = 40). Wilcoxon signed-rank test: $p < 0.001$.

3.3 Comparative Analysis Based on Occupational Background

Differences in knowledge acquisition were further examined between participants from agricultural and non-agricultural occupational backgrounds. At baseline, respondents working in the agricultural sector demonstrated slightly higher pre-test scores, reflecting their prior exposure to farming activities and practical husbandry experience. This pattern is consistent with earlier studies reporting that farming experience contributes to higher initial knowledge levels in agricultural training contexts [13].

Despite these baseline differences, both occupational groups exhibited substantial improvements following the intervention. Post-test analysis showed no statistically significant difference in knowledge scores between agricultural and non-agricultural participants ($p > 0.05$), as determined by the Mann–Whitney U test. This finding indicates that the targeted educational program was equally effective across occupational groups.

The convergence of post-test scores suggests that well-designed instructional strategies can compensate for differences in prior experience. Similar outcomes have been reported in studies demonstrating that inclusive, practice-oriented training enables non-agricultural participants to achieve learning outcomes comparable to those of experienced farmers [14]. These results highlight the importance of pedagogical design in ensuring equitable knowledge acquisition.



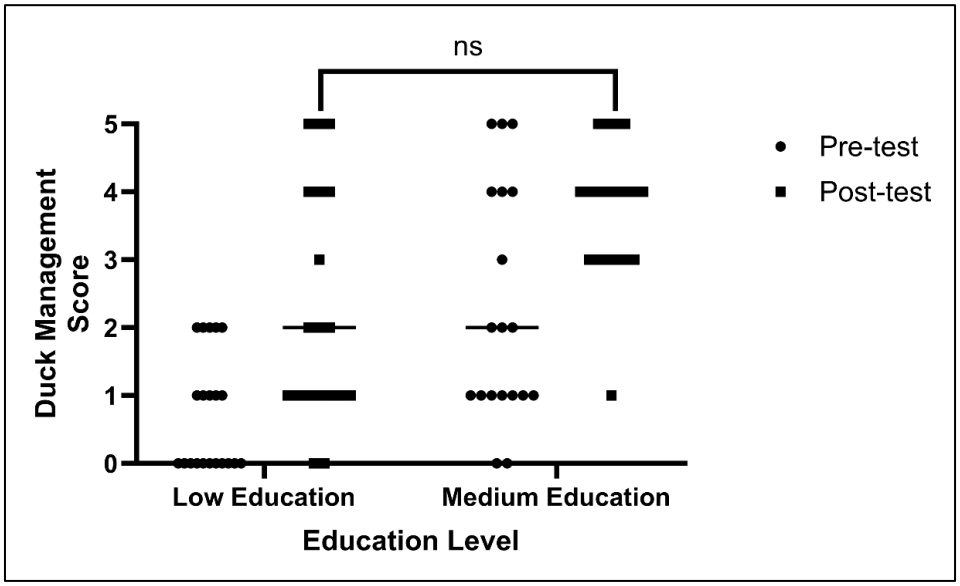
No significant difference was observed in post-test scores ($p > 0.05$).

Figure 2 Comparison of duck-management knowledge scores between agricultural and non-agricultural participants.

3.4 Comparative Analysis Based on Educational Level

The influence of formal education level on learning outcomes was assessed by comparing respondents with low and medium educational backgrounds. Participants with medium education levels showed slightly higher pre-test scores, consistent with evidence that formal schooling enhances baseline cognitive and information-processing skills [15]. However, post-test results revealed no significant difference in knowledge scores between education groups ($p > 0.05$).

These findings suggest that the targeted educational program effectively mitigated disparities associated with educational background. Participatory teaching methods, simplified explanations, and contextualized examples likely contributed to this outcome, as reported in previous extension studies involving low-literacy populations [16]. The results reinforce the view that educational level does not necessarily limit learning effectiveness when training is appropriately designed.



Respondents with low and medium education achieved comparable post-test scores ($p > 0.05$).

Figure 3 Effect of educational background on duck-management knowledge acquisition

3.5 Implications for Rural Extension and Sustainable Development

The absence of significant differences in post-intervention knowledge across occupational and educational groups underscores the inclusiveness of the targeted educational approach. By enabling diverse participants to achieve similar learning outcomes, the program supports broader rural development objectives, particularly SDG 4 (Quality Education) and SDG 2 (Zero Hunger). Inclusive agricultural education can strengthen human capital, enhance livestock productivity, and contribute to resilient rural livelihoods.

4 Conclusion

This study demonstrates that the targeted educational program was effective in significantly improving duck-management knowledge among rural community members with diverse occupational and educational backgrounds. Substantial gains in technical understanding were observed across all participant groups, and no significant differences were found in post-intervention knowledge scores between agricultural and non-agricultural participants or between low and medium education levels. These findings indicate that learning effectiveness was primarily influenced by instructional design rather than by prior farming experience or formal education. The use of context-specific, participatory, and practically oriented training methods enabled inclusive knowledge acquisition and reduced typical disparities associated with socio-demographic differences. The convergence of learning outcomes highlights the capacity of well-structured educational interventions to enhance technical competence in smallholder livestock systems. From a broader perspective, this study provides empirical evidence that inclusive agricultural education can serve as a practical tool for strengthening rural livelihoods, supporting food security, and advancing human capital development in line with Sustainable Development Goals 2 (Zero Hunger) and 4 (Quality Education). Future research should focus on assessing long-term knowledge retention, behavioral change, and productivity impacts to further support the scalability and sustainability of targeted educational programs in rural livestock development.

Compliance with ethical standards

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Disclosure of Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this manuscript. No financial, institutional, or personal relationships exist that could have influenced the work reported in this paper. The authors also declare no competing interests with any products or institutions mentioned in the study.

Statement of Ethical Approval

The present research work does not contain any studies performed on animals or human subjects by any of the authors. The intervention involved community-based education and did not require biomedical procedures, thereby falling outside the scope of formal institutional ethical approval.

Statement of Informed Consent

Informed consent was obtained from all individual participants included in the study. Participants were briefed on the purpose, voluntary nature, and use of anonymized data from the pre-test and post-test assessments for academic and publication purposes.

References

[1] Makarabbi MC, Baral S, Naik N, Swain RK. Measuring impact of farmer education programs using pre- and post-intervention knowledge assessment: A methodological review. Int J Agric Ext. 2025;13(1):45–52.

[2] Nampanya S, Suon S, Rast L, Windsor P. Improvement in smallholder farmer knowledge of cattle production, health and biosecurity in southern Cambodia between 2008 and 2010. Transbound Emerg Dis. 2011;59(2):117–27.

[3] Guo M, Jia X, Huang J, Kumar K, Burger N. Farmer field school and farmer knowledge acquisition in rice production: Experimental evaluation in China. Agric Ecosyst Environ. 2015;209:100–7.

[4] Rijal J, Regmi R, Ghimire R, Puri K, Gyawaly S, Poudel S. Farmers' knowledge on pesticide safety and pest management practices: A case study of vegetable growers in Chitwan, Nepal. Agriculture. 2018;8(1):16.

[5] Chan MK, Mburathi G, Onyango K. Analyzing intervention impact in small sample rural contexts: Use of Mann–Whitney and Wilcoxon approaches. Afr J Rural Dev. 2018;5(3):88–96.

[6] Husniah H. Community-based agricultural training improves knowledge of poultry farmers in Indonesia. J Vet Educ Dev. 2025;6(2):99–105.

[7] Ruisi P, Wang Y. Experience vs. exposure: Prior occupational background and its impact on training outcomes. J Agric Learn Behav. 2024;8(1):55–63.

[8] Ragetlie R, Najjar D, Oueslati D. "Dear brother farmer": Gender-responsive digital extension in Tunisia during the COVID-19 pandemic. Sustainability. 2022;14(7):4162.

[9] Billah M, Rahman M, Mahimairaja S, Lal A, Naidu R. Role of agricultural extension and rural advisory services in strengthening climate-smart agricultural systems: A systematic review. J Sustain Agric Environ. 2025;4(3):34–46.

[10] Munyaneza C, Bizimana F, Mukumbo F, Gatesi S, Sibomana E, Munyampuhwe S, Dutuze MF. Knowledge, attitudes, practices (KAP), and risk factors toward zoonotic diseases among smallholder livestock farmers in Rwanda. Front Public Health. 2025;13:1012310.

[11] Atanaw D, Asresie A, Worku M. Determinants of livestock management knowledge and practice among smallholder farmers. Agriculture. 2023;13(2):412.

[12] Bai Y, Kao C, Chen S. Learning effectiveness of novice farmers in agricultural training programs. J Agric Educ Ext. 2019;25(4):327–41.

[13] Khadda H, Singh D, Jain SK. Evaluation of farmer field schools on livestock management: Differential responses based on experience. Indian J Anim Sci. 2021;91(3):219–25.

[14] Degefu T, Bekele A, Mekonnen T. Agricultural training and learning outcomes among non-farming rural households. J Rural Stud. 2024;102:103–12.

[15] Indrarosa I, Nugroho B, Purwanto E. Educational background and knowledge gain in livestock extension programs: Evidence from Indonesia. Asian J Agric Rural Dev. 2024;14(1):77–85.

[16] Pratiwi A, Suzuki A. Effects of farmers' social networks on knowledge acquisition: Lessons from agricultural training in rural Indonesia. J Econ Struct. 2017;6(1):6.