Sri Balaji Societys The Balajian Journal of Management Research
2(2) 2025, 30-36
www.publishingindia.com/bjmr/
ISSN: 3049-317X(Online)

Role of Herbal and Natural Remedies in Reducing Antibiotic Use in Broiler Poultry Farming

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Abstract

Antibiotic overuse in broiler poultry farming has raised global concerns about antimicrobial resistance (AMR), food safety, and consumer health. This study explores the potential of herbal and natural remedies as sustainable alternatives to antibiotics in broiler farming. Through a comprehensive literature review, field observations, and interviews with poultry farmers using phytogenic feed additives, the study evaluates the efficacy of natural remedies in promoting growth, improving immunity, and reducing disease prevalence. Findings suggest that herbal products like neem, tulsi, garlic, turmeric, aloe vera, and probiotics significantly reduce the reliance on antibiotics, while maintaining or enhancing broiler performance. The paper concludes with recommendations for integrated herbal management practices for safer poultry production.

Keywords: Broiler Farming, Herbal Remedies, Antibiotic Alternatives, Antimicrobial Resistance, Natural Feed Additives, Poultry Health

Introduction

The broiler poultry industry has emerged as a critical contributor to global food security and nutritional adequacy, particularly in developing economies such as India, where rising incomes and population growth have accelerated demand for animal protein (Gadde et al., 2017). In response to the need for high-efficiency production, poultry farmers have traditionally depended on the widespread use of antibiotics to enhance feed conversion ratios, prevent infections, and improve growth rates.

However, this reliance on antibiotics has not been without consequences. Growing scientific and public concern centers on the escalation of antimicrobial resistance (AMR), an issue that threatens the efficacy of antibiotics in both veterinary and human medicine (Windisch et al., 2008). The persistence of antibiotic residues in meat and eggs has further raised alarms about food safety, environmental contamination, and consumer health. As a result, there is an urgent global push toward antibiotic-free poultry production practices that prioritize animal welfare, public health, and environmental sustainability.

In this context, herbal and phytogenic feed additives have garnered significant attention as viable alternatives to synthetic antibiotics. These natural compounds—extracted from medicinal plants such as *Azadirachta indica* (neem), *Allium sativum* (garlic), *Curcuma longa* (turmeric), *Ocimum sanctum* (tulsi), *Aloe vera*, and *Zingiber officinale* (ginger)—possess well-documented antimicrobial, immunomodulatory, antioxidant, and anti-inflammatory properties (Brenes & Roura, 2010). These properties suggest that herbal supplements can not only reduce disease prevalence and mortality but also improve gut health and enhance broiler performance.

This research seeks to examine the adoption and efficacy of herbal and natural remedies in reducing antibiotic dependency in broiler poultry farming. It evaluates the outcomes of using such alternatives on disease incidence, growth performance, mortality, and farmer perceptions in real-world farming conditions. Through this inquiry, the study aims to contribute to the growing body of knowledge advocating for safer and more sustainable poultry production methods.

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Objectives

- To compare the effectiveness of herbal and natural remedies versus conventional antibiotics in reducing disease incidence and improving health in broiler poultry farming.
- To assess the impact of herbal and natural remedies on growth performance, feed conversion ratio (FCR), and mortality rates in broiler farms.
- To evaluate the perception, acceptance, and adoption level of herbal and natural remedies among broiler poultry farmers compared to those using antibiotics.

Literature Review

Windisch et al. (2008) emphasized the potential of phytogenic feed additives such as oregano, thyme, and garlic, highlighting their antimicrobial and antioxidant properties. These compounds improve gut health and reduce reliance on synthetic antibiotics in poultry diets. Similarly, Gadde et al. (2017) reviewed alternatives to antibiotic growth promoters (AGPs), advocating for phytogenic compounds, prebiotics, and organic acids as sustainable solutions that maintain bird health and enhance performance.

Greathead (2003) explored plant extracts like garlic, neem, and ginger, observing positive effects on animal productivity and a decrease in bacterial load in broilers. This aligns with findings by Brenes and Roura (2010), who noted that essential oils from herbs serve as antimicrobials and digestive enhancers, thus functioning as effective substitutes for conventional antibiotics.

Patil et al. (2015) studied neem and turmeric supplementation in broilers, reporting enhanced weight gain, feed conversion efficiency, and disease resistance. Khan et al. (2012) confirmed that dietary inclusion of garlic and ginger powder led to better growth performance, improved feed conversion ratio (FCR), and reduced coliform bacteria in the gut.

Alcicek et al. (2004) evaluated a blend of thyme and anise essential oils, noting that their performance benefits were comparable to those of antibiotic-fed birds, with additional intestinal health advantages. Toghyani et al. (2010) observed that broilers fed basil and peppermint exhibited improved growth and reduced mortality, reinforcing the role of herbal additives as natural growth promoters.

Chowdhury et al. (2002) found that aloe vera extract enhanced immune response and growth in broilers, reducing susceptibility to E. coli and Salmonella, thus supporting its use as a natural antibiotic alternative. Mehala and Moorthy (2008) conducted a comparative study between synthetic antibiotics and herbal additives like turmeric and amla. Their results showed better immunity and comparable growth performance in the herbal group, suggesting a safe and effective substitution for antibiotics.

In a recent study, Sugiharto (2016) discussed the functional role of phytogenic feed additives, including their ability to improve nutrient digestibility, stimulate appetite, and reduce pathogenic load in the gastrointestinal tract of broilers. Additionally, Hashemi and Davoodi (2011) reviewed the role of medicinal herbs in poultry nutrition and found that their inclusion in diets improved performance and health through antimicrobial, antioxidative, and immunomodulatory effects.

Alagawany et al. (2015) reported that supplementing broiler diets with plant extracts such as fenugreek, black cumin, and cinnamon resulted in improved growth performance and reduced lipid peroxidation. Similarly, Cross et al. (2007) highlighted the antimicrobial effects of plant-derived compounds, attributing growth-promoting benefits to their influence on gut microbiota balance.

Overall, literature consistently supports the inclusion of herbal and natural remedies such as garlic, turmeric, ginger, neem, aloe vera, and essential oils in broiler diets. These compounds exhibit antimicrobial, anti-inflammatory, antioxidant, and immunomodulatory effects, making them promising alternatives to conventional antibiotics in poultry farming.

Hypothesis

Hypothesis 1: Disease Incidence

- H_{01} (Null Hypothesis): There is no significant difference in disease incidence between broilers treated with herbal and natural remedies and those treated with conventional antibiotics.

- H_{11} (Alternative Hypothesis): There is a significant difference in disease incidence between broilers treated with herbal and natural remedies and those treated with conventional antibiotics.

Hypothesis 2: Overall Health

- H_{02}: Herbal and natural remedies do not significantly improve the overall health of broilers compared to conventional antibiotics.
- H_{12}: Herbal and natural remedies significantly improve the overall health of broilers compared to conventional antibiotics.

Hypothesis 3: Growth Performance, FCR, and Mortality

- H_{03}: The use of herbal remedies has no significant effect on growth performance, feed conversion ratio (FCR), and mortality rates in broiler farms.
- H_{13}: The use of herbal remedies significantly improves growth performance, feed conversion ratio (FCR), and reduces mortality rates in broiler farms.

Research Methodology

This study follows an exploratory and descriptive research design to understand the role of herbal and natural remedies in reducing antibiotic use in broiler poultry farming.

The research was conducted in the Baramati region, focusing on selected broiler farms. A total of 60 poultry farmers participated in the study, with both type of farmers using herbal remedies and conventional antibiotics.

Data was collected through structured interviews with the farmers to gather information on their practices. Additionally, farm records were used to measure key performance indicators such as Feed Conversion Ratio (FCR), mortality rates, and overall growth performance of the broilers.

For data analysis, comparative statistical techniques were applied using SPSS software to evaluate differences between the two groups and assess the effectiveness of herbal remedies compared to antibiotics.

Data Analysis and Interpretation

Which Type of Remedy Do You Currently Use in Your Broiler Farming?

Table 1: Type of Remedy Used

Type of Remedy Used	*Respondents (Number of Farmers)*	*Percentage (%)*
Herbal and Natural Remedies	30	50.0%
Conventional Antibiotics	15	25.0%
Both	10	16.7%
Neither	5	8.3%
Total	60	100.0%

The results from the above Table 1 are half of the respondents (50%) reported exclusively using herbal and natural remedies, showing a strong preference for alternative, non-antibiotic approaches. Only 25% still rely solely on antibiotics, while 16.7% use a combination of both. This suggests increasing trust and adoption of herbal solutions in broiler farming practices.

What is Your Main Reason for Choosing Herbal and Natural Remedies or Antibiotics?

Table 2: Reason for Choosing Remedies

Reason for Choosing Remedies	*Respondents (Number of Farmers)*	*Percentage (%)*
Effectiveness in Disease Prevention	28	46.7%
Cost-effectiveness	15	25.0%
Availability	10	16.7%
Safety Concerns for Consumers	7	11.6%
Total	60	100.00%

From Table 2, it was observed that a majority (46.7%) of farmers prioritize effectiveness in disease prevention

as the main reason for choosing remedies, highlighting that herbal alternatives are not only seen as safe but also clinically effective. Safety and cost are also important, indicating a balanced evaluation by farmers.

How Often Do You Observe Disease Outbreaks in Broilers When Using Your Preferred Remedy?

Table 3: Frequency of Disease Outbreaks

Frequency of Disease Outbreaks	*Respondents (Number of Farmers)*	*Percentage (%)*
Never	25	41.7%
Rarely	18	30.0%
Occasionally	10	16.7%
Frequently	5	8.3%
Very Frequently	2	3.3%
Total	60	100.0%

As per the above Table 3, a total of 71.7% (Never + Rarely) of respondents experienced very few or no disease outbreaks when using their chosen remedies, primarily herbal based. This suggests a strong association between herbal use and improved flock health, reinforcing the earlier claim of effectiveness.

What is Your Level of Knowledge Regarding Herbal and Natural Remedies in Broiler Farming?

Table 4: Level of Knowledge

Level of Knowledge	*Respondents (Number of Farmers)*	*Percentage (%)*
Very knowledgeable	24	40.00%
Somewhat knowledgeable	20	33.3%
Neutral	8	15.3%
Little knowledge	6	10.00%
No knowledge	2	3.0%
Total	60	100.00%

Above Table 4 shows, a large proportion (73.3%) of respondents reported being either very or somewhat knowledgeable about herbal remedies. This indicates a growing awareness and educational outreach about natural alternatives, which likely contributes to their increasing adoption in poultry management.

Hypothesis Testing

Table 5: Hypothesis Testing

Q. No.	*Questions & Respondents Opinion*	*5*	*4*	*3*	*2*	*1*	*Mean*	*t-Statistic*	*p-Value*
5	Herbal and natural remedies are as effective as conventional antibiotics in reducing disease incidence in broiler poultry.	22	10	7	5	6	3.74	3.21	0.0021 (Significant)
6	Broilers treated with herbal and natural remedies show better overall health compared to those treated with antibiotics.	19	11	8	7	5	3.64	2.85	0.0065 (Significant)
7	The use of herbal remedies improves growth performance, feed conversion ratio (FCR) and reduces mortality in broiler farms	20	10	7	6	5	3.71	3.05	0.0038 (Significant)

Hypothesis 1: Disease Incidence

The p-value is 0.0021, which is less than the significance level of 0.05. Therefore, the null hypothesis (H_{01}) is rejected. It is concluded that there is a significant difference in disease incidence, indicating the effectiveness of herbal and natural remedies.

Hypothesis 2: Overall Health

The p-value is 0.0065, which is less than the significant level of 0.05. Therefore, the null hypothesis (H_{02}) is rejected. It is concluded that herbal and natural remedies significantly improve the overall health of broilers.

Hypothesis 3: Growth Performance, FCR, and Mortality

The p-value is 0.0038, which is less than the significance level of 0.05. Therefore, the null hypothesis (H_{03}) is rejected. It is concluded that the use of herbal remedies has a significant positive effect on growth performance, feed conversion ratio (FCR), and mortality in broiler farming.

Findings

This study examined how herbal and natural remedies help reduce antibiotic use in broiler poultry farming. Key findings from 60 farmer responses are as follows:

- *Use of Remedies:* Half of the farmers (50%) used only herbal remedies. About 25% used only antibiotics, while 16.7% used both. This shows a growing shift toward herbal methods.
- *Reason for Use:* Most farmers (46.7%) chose herbal remedies to prevent disease. Others used them because they were cheaper (25%) or easier to get (16.7%).
- *Health Benefits:* Around 71.7% of farmers said they rarely or never faced disease outbreaks when using herbal remedies, showing good preventive results.
- *Farmer Knowledge:* A large number (73.3%) said they were knowledgeable about herbal remedies. This suggests farmers are well aware of how to use them.

  Hypothesis Testing
- *Disease Reduction:* Herbal remedies reduced disease significantly ($p = 0.0021$).
- *Bird Health:* Health of birds improved ($p = 0.0065$).
- *Growth & FCR:* Growth performance, feed conversion ratio (FCR), and mortality improved ($p = 0.0038$).

Discussion

The results clearly support the use of herbal remedies as effective alternatives to antibiotics in broiler farming.

The high number of farmers using herbs shows a positive trend toward natural farming methods. This supports earlier studies (Windisch et al., 2008; Gadde et al., 2017) that noted a global shift in this direction.

Most farmers chose herbs for their disease-fighting ability, as also seen in research by Patil et al. (2015) and Chowdhury et al. (2002).

The low rate of disease outbreaks and better bird health agrees with findings from Khan et al. (2012) and Brenes and Roura (2010), who said herbs improve gut health and reduce harmful bacteria.

Farmers in this study were also quite aware of herbal remedies, which help in their successful adoption. Hashemi and Davoodi (2011) also highlighted the role of farmer knowledge in herbal use.

The statistical tests confirmed that herbal remedies help in reducing disease, improving health, and boosting performance — like results from studies by Alcicek et al. (2004) and Toghyani et al. (2010).

Overall, the study confirms that herbal remedies are a practical, affordable, and effective alternative to antibiotics in poultry farming.

Limitations

- *Sample Size:* The study was limited to 60 poultry farmers from the Baramati region, which may not represent all farming contexts in India or other countries.
- *Geographic Focus:* Regional factors such as climate, feed availability, and farming practices may affect the generalizability of results.
- *Subjective Responses:* Some data relied on self-reported measures and perceptions, which could introduce bias.
- *Short-Term Analysis:* The study did not track long-term effects of herbal remedy usage on productivity and resistance patterns.

Implications

- *Academic Use:* This study adds useful information to research on safe and natural poultry farming. It supports earlier studies that showed herbs like garlic, turmeric, and neem help improve bird health

and reduce the need for antibiotics. The results can be used by researchers, students, and teachers in poultry science, animal nutrition, and agriculture.

- *Practical Use:* For farmers, this study shows that herbal remedies are a good and safe option. They help reduce diseases, improve growth, and meet the rising demand for chemical-free chicken. Government and farm support groups can use this research to give training, make policies, and help more farmers use herbal remedies in daily poultry work.

Conclusion

The study concludes that herbal and natural remedies are effective and practical alternatives to antibiotics in broiler poultry farming. They have been shown to improve bird health, reduce disease outbreaks, enhance feed efficiency, and lower mortality rates. The growing use of herbal products also aligns with consumer demand for organic and residue-free poultry products, contributing to both food safety and environmental sustainability.

Furthermore, the findings indicate that farmers are increasingly aware and willing to adopt herbal practices, provided they are affordable and accessible. With adequate training, supportive policies, and awareness programs, herbal remedies can become a key part of sustainable poultry farming systems in India and globally.

Future Scope

Future research can focus on:

- Developing standardized herbal formulations with consistent dosages and proven effects.
- Long-term comparative studies between herbal and antibiotic treatments across different poultry breeds and climatic zones.
- Exploring economic impacts, such as cost-benefit analysis of herbal remedy use.
- Investigating consumer perception and market demand for antibiotic-free poultry products.
- Assessing the environmental benefits of reduced antibiotic residues in soil and water due to herbal use.
- Such studies will further strengthen the scientific basis for integrating herbal remedies into mainstream poultry management practices.

Acknowledgements

The author sincerely acknowledges the valuable cooperation of all the poultry farmers from the Baramati region who participated in this study and shared their insights and experiences. Special thanks to field experts and veterinary professionals who provided practical guidance and helped validate the findings of the study.

Funding Disclosure

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors. The study was self-funded by the researcher as part of academic research work.

Conflict of Interest

The author declares that there is no conflict of interest regarding the publication of this paper. The study was conducted independently and without any commercial or financial relationships that could be construed as a potential conflict.

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