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Anticoccidial Potential of *Zingiber officinale* in Poultry:

Current Evidence, Biological Mechanisms, and Research Gaps

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Abstract

Avian coccidiosis, caused by host-specific species of *Eimeria*, damages the intestinal epithelium and can impair growth, feed efficiency, welfare, and flock profitability, increasing concern regarding anticoccidial resistance has encouraged investigation of phytogenic strategies, including *Zingiber officinale* (ginger). This critical narrative review evaluates direct evidence for ginger against avian coccidiosis, distinguishes poultry efficacy data from mechanistic evidence, and identifies priorities for translational research. PubMed/MEDLINE, Scopus, Web of Science Core Collection, and Google Scholar were searched using combinations of ginger/*Zingiber officinale* with coccidiosis, *Eimeria*, poultry, broiler, quail, pigeon, anticoccidial, oocyst, lesion score, oxidative stress, immune response, and phytogenic terms; literature coverage extended through 30 September 2026. Direct avian studies were extracted for species, challenge model, sample size, ginger preparation, dose, route, timing, comparator, endpoints, and reported statistical direction. Ginger administered as powder or aqueous/ethanolic preparations generally reduced oocyst output in several broiler models, although lesion-score and productive-performance effects were less consistent, and ginger essential oil was ineffective in one quail study. Recent evidence also indicates improvement in oxidative status and cecal morphology during experimental coccidiosis. Mechanistic studies support antioxidant, anti-inflammatory, and possible direct sporonenticidal actions, but most constituent-level evidence derives from non-avian or in-vitro models. The current literature is heterogeneous, incompletely standardized, and unsuitable for reliable quantitative pooling. Ginger should therefore be considered a promising experimental phytogenic adjunct rather than an established replacement for licensed anticoccidials. Future studies require chemically characterized preparations, dose-response designs, blinded parasitological and pathological endpoints, appropriate pen-level replication, and direct comparison with licensed anticoccidials.

1. Introduction

Coccidiosis in poultry

- Caused by host-specific *Eimeria* spp.
- Intestinal epithelial damage, malabsorption
- Reduced growth, feed efficiency, welfare
- Major economic losses

Control challenges

- Drug resistance
- Limitations of continuous chemoprophylaxis
- Need for complementary strategies

Why ginger?

- Contains bioactive phenolics and terpenoids
- Antioxidant, anti-inflammatory, immunomodulatory
- Potential to support intestinal health

2. Materials and Methods

Narrative review

Databases
PubMed, Scopus, Web of Science, Google Scholar

Search terms
ginger, Zingiber officinale, coccidiosis, *Eimeria,* poultry, broiler, quail, anticoccidial, oocyst, lesion score, oxidative stress, immune response

Time frame
Literature available up to 30 September 2026

Focus
Direct avian studies and mechanistic evidence
Extraction of species, dose, preparation, endpoints and statistical direction

3. Results and Discussion

3.1 Ginger preparations used in avian studies



Powder
(dietary inclusion)



Aqueous extract



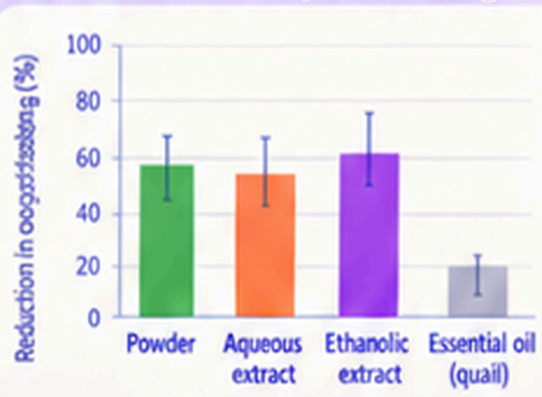
Ethanolic extract

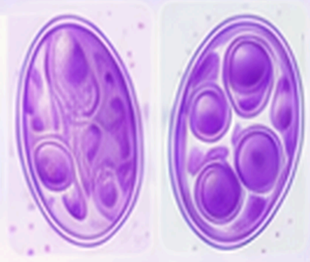


Essential oil

Preparation type	Main characteristics	Common doses (in poultry studies)	References (examples)
Powder	Dried rhizome, ground	0.5–2.0% in feed (5–20 g/kg)	[1,2,4,5]
Aqueous extract	Water extraction	100–500 mg/kg diet or water	[2,3,4]
Ethanolic extract	Ethanol extraction	50–400 mg/kg diet or water	[1,4,5]
Essential oil	Volatile fraction	100–300 mg/kg	[7]

3.2 Effects on oocyst shedding

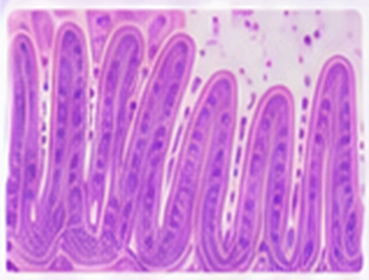




Eimeria spp. oocysts

Most avian studies reported significant reductions in oocyst shedding with ginger powder or extracts, whereas ginger essential oil was ineffective in one quail study.

3.3 Intestinal lesions and histopathology



Control (infected) Ginger-supplemented

Several studies indicated lower lesion scores and better preservation of intestinal villus architecture in ginger-treated groups, although results were not consistent across all experiments.

3.4 Oxidative status

MDA
Lower malondialdehyde levels

SOD CAT
Higher antioxidant enzyme activity

Ginger supplementation improved oxidative status during experimental coccidiosis, with lower MDA and increased SOD/CAT in some broiler studies.

3.5 Immune response



Some studies reported increased humoral and cellular immune parameters, including higher antibody levels and modulation of cytokine responses.

3.6 Productive performance



Effects on body weight gain, feed intake and feed conversion ratio were variable, with improvement reported in some studies and no significant effects in others.

3.7 Proposed mechanisms

- **Antioxidant activity** (scavenging of free radicals)
- **Anti-inflammatory effects** (inhibition of pro-inflammatory mediators)
- **Immune modulation** (enhanced humoral and cellular responses)
- **Barrier protection** (reduced intestinal damage, improved mucosal integrity)
- Possible direct sporonticidal action (in-vitro evidence)

3.8 Limitations and research gaps

- Few direct avian studies
- Heterogeneous preparations and doses
- Limited standardization of outcome measures
- Need for dose-response, molecular and field studies
- Direct comparison with licensed anticoccidials

4. Conclusions

Zingiber officinole shows promising complementary anticoccidial potential in poultry. The most consistent reported benefits include reduced oocyst shedding, amelioration of intestinal lesions, and improvement of oxidative and immune-related parameters. Nevertheless, current evidence is still limited and heterogeneous, and standardized preparations and well-designed trials are needed before routine application.