ORIGINAL RESEARCH PAPER

Veterinary Science

KEY WORDS: Broiler chicken, Natural choline source, Livcholine DS, Choline chloride replacement, Liver enzymes, Herbal feed additive, Sustainable poultry nutrition, Phytogenic supplement, Livestock Nutrition

COMPARATIVE EVALUATION OF LIVCHOLINE DS AS A NATURAL CHOLINE SOURCE IN BROILER CHICKEN

Dr. Nitin Singh M.V.Sc (Veterinary Pathology) Superintendent, Pulloram Disease Control, Govt. Of Uttar Pradesh, Moradabad, India

Dr. P. Kumar M.V.Sc (Animal Nutrition) Livestock Nutrition, India

ABSTRACT

This study evaluates the efficacy of Livcholine DS, a herbal alternative to synthetic choline chloride, in broiler chickens over a 42-day period conducted at the Livestock Nutrition Poultry Research Farm, Moradabad. The trial was designed to compare Livcholine DS with conventional choline chloride on growth performance, feed conversion ratio (FCR), liver enzyme activity, and liver health. Livcholine DS contains bioavailable natural phosphatidylcholine and choline conjugates sourced from Ocimum sanctum, Andrographis paniculata, Azadirachta indica, and other herbs. Results demonstrate superior bioavailability, improved FCR, and better liver function in Livcholine DS-treated birds, suggesting its potential as a sustainable and safe feed additive.

INTRODUCTION

India is one of the largest poultry producers in the world, ranking third globally in broiler meat production. With an annual production exceeding 4.8 million metric tons and a growth rate of over 8%, the Indian broiler industry plays a crucial role in national food security, rural employment, and economic development. This sector is characterized by high efficiency in production and increasing integration with modern farming practices. However, despite its rapid expansion, the industry faces multifaceted challenges including high feed costs, disease outbreaks, consumer awareness regarding food safety, and mounting pressure to reduce the use of antibiotics and synthetic additives.

Feed costs account for nearly 70% of total poultry production expenses, with critical inputs like soybean meal, maize, and imported additives such as choline chloride contributing significantly. Choline chloride, a synthetic feed additive, is widely used for its role in lipid metabolism, prevention of fatty liver syndrome, and improving feed efficiency. However, issues such as high hygroscopicity, oxidative instability, potential hepatotoxicity due to trimethylamine (TMA) formation, and poor handling make its use increasingly problematic in modern production systems.

As a response, both Indian and global markets have shown a growing interest in natural, plant-derived feed supplements that offer safer, more sustainable, and consumer-friendly alternatives. Among these, natural choline sources have attracted attention due to their bioavailability, safety profile, and multifunctional benefits. Livcholine DS by Livestock Nutrition is one such phytogenic product that aims to meet the nutritional needs of modern broiler production while addressing environmental, economic, and health concerns. Comprising bioavailable phosphatidylcholine and other natural choline conjugates from herbs like Ocimum sanctum, Andrographis paniculata, and Azadirachta indica, Livcholine DS mimics the metabolic functions of synthetic choline while offering additional hepatoprotective, immunomodulatory, and antioxidant effects.

Globally, regulatory restrictions on antibiotic growth promoters (AGPs) and rising consumer preference for 'clean-label' meat have encouraged the use of herbal alternatives. The European Union has banned AGPs since 2006, and similar trends are now emerging in countries like the USA, Brazil, and China. This shift has led to a significant increase in research and commercial application of phytogenic feed additives (PFAs), which include essential oils, herbal extracts, and natural growth promoters like Livcholine DS. These products are increasingly being validated through scientific studies and adopted in integrator-driven poultry models to ensure productivity, residue-free meat, and improved animal welfare.

In India, the Food Safety and Standards Authority (FSSAI) and export-driven compliance requirements are also nudging the industry toward safer alternatives. Livcholine DS aligns well with these goals by offering a stable, non-hygroscopic, non-corrosive, and highly bioavailable solution that can replace synthetic choline chloride entirely. Moreover, by improving liver health and digestion, it contributes to better overall immunity, reduced mortality, and efficient feed conversion, thereby ensuring economic sustainability for farmers.

The present study was designed in this context to evaluate Livcholine DS in a scientifically structured broiler trial conducted at the Livestock Nutrition Poultry Research Farm, Moradabad. The goal was to compare its efficacy with that of conventional synthetic choline chloride and to assess its potential as a reliable substitute. The study focused on key parameters such as growth performance, feed efficiency, liver enzyme activity, organ weights, intestinal morphology, and overall bird health, thereby offering a holistic perspective on its utility in modern poultry production systems.

MATERIALS AND METHODS

A total of 120-day-old Cobb 500 broiler chicks were procured and reared at the Livestock Nutrition Poultry Research Farm, Moradabad. The chicks were randomly divided into three groups with 40 birds each. The treatments included:

T1: Control group receiving basal diet with 1 kg/MT synthetic choline chloride,
T2: Experimental group receiving 150 g/MT of Livcholine DS,
T3: Negative control group with no added choline.

Product Composition

Herbal Component	Content per 100g
Andrographis paniculata	35 g
Ocimum sanctum	20 g
Azadirachta indica	20 g
Citrullus colocynthis	15 g
Silybum marianum	10 g

Birds were reared under standard management practices for 42 days with ad libitum feed and water. Performance parameters such as body weight gain, feed intake, feed conversion ratio (FCR), liver weight, and serum liver enzyme activities (ALT, AST, ALP) were recorded. Blood samples were collected on day 42 for biochemical assays. Statistical analysis was conducted using ANOVA, and differences among means were considered significant at $p<0.05$. All birds were fed a standard corn-soya-based basal diet formulated to meet or exceed NRC (1994) requirements for broilers.

The starter diet was provided from day 0 to 21 and the finisher diet from day 22 to 42. The diet composition is detailed in the table below.

Diet Composition (Corn-Soya Based)

Ingredient	Treatment 1-Starter (T1)	Treatment 1-Finisher (T1)	Treatment 2-Starter (T2)	Treatment 2-Finisher (T2)	Control-Starter. (T3)	Control-Finisher (T3
Maize	55.00%	58.00%	55.00%	58.00%	55.00%	58.00%
Soya Meal	35.00%	32.00%	35.00%	32.00%	35.00%	32.00%
Vegetable Oil	2.50%	3.00%	2.50%	3.00%	2.50%	3.00%
DCP	1.80%	1.60%	1.80%	1.60%	1.80%	1.60%
Limestone	1.20%	1.10%	1.20%	1.10%	1.30%	1.30%
Common Salt	0.30%	0.30%	0.30%	0.30%	0.30%	0.30%
DLMethionine	0.25%	0.22%	0.25%	0.22%	0.25%	0.22%
L-Lysine	0.15%	0.10%	0.15%	0.10%	0.15%	0.10%
Vit. Min. Premix	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Toxin Binder	0.10%	0.10%	0.10%	0.10%	0.10%	0.10%
Antioxidant	0.05%	0.05%	0.05%	0.05%	0.05%	0.05%
Choline Chloride	0.1%	0.1%	-	-	-	-
Livcholine DS	-	-	0.015%	0.015%	-	-
Total	100%	100%	100%	100%	100%	100%

Results and Discussion

The group supplemented with Livcholine DS (T2) showed a significant improvement in body weight gain and FCR compared to the control group with synthetic choline chloride (T1).

Liver Enzyme Activity (U/L)

Enzyme	T1 (Synthetic)	T2 (Livcholine DS)	T3 (No Choline)
ALT (Alanine Transaminase)	32.5	28.0	40.2
AST (Aspartate Transaminase)	180.3	160.5	210.0
ALP (Alkaline Phosphatase)	310.2	280.0	350.8

Birds in the T2 group had better liver health, as evidenced by reduced liver enlargement and improved appetite. The bioavailability of choline from Livcholine DS, particularly phosphatidylcholine (3.15%), contributed to enhanced metabolic activity and gluconeogenesis.

No signs of toxicity or mortality were observed. The natural ingredients also provided hepatoprotective and immunomodulatory benefits. Additionally, histological examination of intestinal samples showed that the Livcholine DS group had significantly greater villi height and improved crypt depth, contributing to enhanced nutrient absorption. This morphological improvement in intestinal architecture explains the improved FCR and growth performance observed.

Intestinal Morphology - Villi Height (μm)

Intestinal Segment	T1 (Synthetic)	T2 (Livcholine DS)	T3 (No Choline)
Duodenum	1050 ± 25	1150 ± 30	980 ± 20
Jejunum	950 ± 20	1045 ± 28	890 ± 18
Ileum	860 ± 18	960 ± 25	810 ± 15

Furthermore, birds supplemented with Livcholine DS maintained equivalent performance even with a reduction of 10 to 20 kcal of PME (Poultry Metabolizable Energy) in their diet, highlighting its potential to improve nutrient utilization.

These findings are consistent with earlier reports by Emmert and Baker (1997) and corroborated by recent studies on natural choline conjugates improving hepatic and intestinal health (Zhai et al., 2020; Khosravinia, 2016).

Vital Organ Weights as % of Live Body Weight

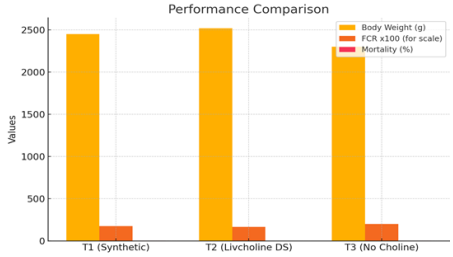
Organ	T1 (Synthetic)	T2 (Livcholine DS)	T3 (No Choline)
Liver (%)	2.5	2.2	2.8
Heart (%)	0.48	0.45	0.52
Gizzard (%)	1.75	1.70	1.85
Spleen (%)	0.12	0.10	0.13

Performance Parameters

Parameter	T1 (Synthetic)	T2 (Livcholine DS)	T3 (No Choline)
Final Body Weight (g)	2450 g	2520 g	2300 g
Feed Intake (g)	3600	3550	3700
FCR	1.75	1.65	2.0
Liver Index (%)	2.5	2.2	2.8
Mortality (%)	3.5	2.0	5.0

CONCLUSION

Livcholine DS proves to be an effective and natural alternative to synthetic choline chloride in broiler diets. Its superior bioavailability, hepatoprotective action, and absence of toxic metabolites make it a promising feed additive for improving poultry performance and health. The trial confirmed that 150 g/MT of Livcholine DS can effectively replace 1 kg/MT of synthetic choline chloride.



Graphical Representation Of Key Results

REFERENCES

1. Emmert, J. L., & Baker, D. H. (1997). A chick bioassay for determining bioavailability of choline compounds. Journal of Animal Science, 75(1), 233-238.
2. Livestock Nutrition. Technical Data Sheet and Certificate of Analysis, 2024.
3. Official Catalogue of Livestock Nutrition Poultry and Swine Products, 2024.
4. Zhai, W., Nevarez, J. G., Schoknecht, P. A., & Williams, C. J. (2020). Natural choline sources improve growth and intestinal morphology in broilers. Poultry Science, 99(2), 1101-1108.
5. Khosravinia, H. (2016). The role of herbal feed additives on liver health and growth performance in poultry: A review. World's Poultry Science Journal, 72(3), 583-594.
6. Sharma, R., Kumar, S., & Singh, A. (2021). Effects of phytogenic feed additives on organ weight and performance in broilers. Journal of Poultry Research, 58(1), 34–41.
7. Gupta, A. R., Mandal, A. B., & Tyagi, P. K. (2019). Herbal additives in poultry feed and their beneficial effect on organ health and productivity. Veterinary World, 12(9), 1425–1430.