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Comparative Evaluation of Natu Choline DS and Choline Chloride on Growth, Liver Function, and Economic Parameters in Commercial Swine under Indian Conditions

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Abstract
This study assessed the efficacy of Natu Choline DS, a natural herbal choline replacer, in enhancing growth, liver health, and cost-efficiency in commercial pigs. Thirty-six weaned crossbred piglets were randomly assigned to three dietary treatments: control (no choline), choline chloride (60%) at 1 kg/ton, and Natu Choline DS at 150 g/ton feed. The trial lasted 90 days. Parameters recorded included body weight, feed conversion ratio (FCR), liver enzymes, backfat thickness, faecal consistency, skin and hair coat quality, and feed cost per kg gain. Results showed that Natu Choline DS significantly improved ADG, liver enzyme profiles, faecal quality, and skin coat condition. Additionally, it reduced feed cost per kg weight gain. The study supports the use of Natu Choline DS as a viable, cost-effective, and holistic alternative to synthetic choline chloride in Indian pig production.
Key Words: Natu Choline DS, Swine, Natural Choline

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I. Introduction

Swine farming in India is gradually transitioning from backyard systems to semi-intensive and commercial setups, driven by increasing pork demand and rising incomes. To sustain growth and improve profitability, optimal nutritional strategies are imperative. Choline is essential for lipid metabolism, liver function, and methyl group donation, and is typically supplemented using synthetic choline chloride.

However, synthetic choline chloride is known to be hygroscopic, chemically unstable in premixes, and may negatively interact with vitamins and minerals. With growing interest in natural and residue-free feed additives, herbal alternatives are being explored for safety and multifunctionality.

Natu Choline DS, a standardized herbal formulation, contains bioactive plant extracts that naturally supply choline equivalents and hepatoprotective compounds. This study investigates its efficacy as a replacement for synthetic choline chloride in commercial pigs, with a focus on performance, health biomarkers, economic return, and animal welfare indices such as faecal consistency and coat quality.

II. Materials and Methods

Thirty-six crossbred commercial piglets (avg. 10.1 ± 0.4 kg BW) were randomly allocated into 3 groups (n=12 per group):

- T1 (Control): Basal diet with no choline supplement
- T2 (Choline Chloride): Basal diet + 1 kg/MT of choline chloride 60%
- T3 (Natu Choline DS): Basal diet + 150 g/MT of Natu Choline DS

The trial duration was 90 days. All pigs were housed under standard management with ad libitum access to feed and water.

All groups were fed an isocaloric and isonitrogenous corn-soy-based diet formulated to NRC (2012) standards. The only variation was the choline source.

Parameters recorded included growth performance, liver function markers (ALT, AST), lipid profile, backfat thickness, liver and bile weight as % body weight, faecal consistency score (1–5), skin and hair coat score (1–5), and economic cost per kg gain. Data were analyzed using one-way ANOVA followed by Tukey's HSD test.

Diet Composition (Basal Diet, % as-fed basis)

Ingredient	Inclusion (%)
Corn	60.00
Soybean Meal (48%)	25.00
Wheat Bran	8.00
Fish Meal	3.00
Vegetable Oil	1.50
Dicalcium Phosphate	1.20
Limestone	0.80
Salt	0.30
Vitamin–Mineral Premix	0.20
DL-Methionine	0.10
L-Lysine HCl	0.05

Choline supplementation per treatment:
- T1 (Control): No additional choline source.
- T2 (Choline Chloride 60%): 1 kg/MT feed.
- T3 (Natu Choline DS): 150 g/MT feed.

Comprehensive Results Comparison

Parameter	Control	Choline Chloride	Natu Choline DS
Final Weight (kg)	61.3 ± 1.5	65.4 ± 1.2	68.6 ± 1.1
Average Daily Gain (g/day)	568 ± 17	614 ± 14	651 ± 12
FCR	2.87 ± 0.07	2.68 ± 0.05	2.52 ± 0.04
Feed Cost / kg Gain (INR)	82.6 ± 2.1	79.2 ± 1.9	74.5 ± 1.5
ALT (U/L)	56.3 ± 2.8	50.1 ± 2.3	44.6 ± 2.1
AST (U/L)	82.7 ± 3.5	74.2 ± 3.1	66.8 ± 2.9
Cholesterol (mg/dL)	172 ± 6	162 ± 5	151 ± 4
Triglycerides (mg/dL)	109 ± 5	100 ± 4	91 ± 3
Backfat Thickness (mm)	18.2 ± 1.3	17.0 ± 1.1	16.4 ± 1.0
Fecal Score (1–5)	2.8 ± 0.4	3.7 ± 0.3	4.3 ± 0.2
Coat Score (1–5)	2.6 ± 0.5	3.8 ± 0.4	4.4 ± 0.3

Additional Health Parameters

Blood Biochemistry and Stress Indicators

Parameter	Control	Choline Chloride	Natu Choline DS
Hemoglobin (g/dL)	10.2 ± 0.3	10.8 ± 0.2	11.4 ± 0.2
RBC Count (10^6/µL)	5.1 ± 0.2	5.4 ± 0.2	5.7 ± 0.1
WBC Count (10^3/µL)	12.3 ± 1.1	11.7 ± 1.0	10.9 ± 0.8
Cortisol (ng/mL)	38.2 ± 2.5	34.1 ± 2.2	29.6 ± 1.8
H/L Ratio	0.81 ± 0.05	0.69 ± 0.04	0.58 ± 0.03

Gut Health (Intestinal Villi Morphology)

Parameter	Control	Choline Chloride	Natu Choline DS
Villus Height (µm)	475 ± 25	510 ± 20	548 ± 18
Crypt Depth (µm)	182 ± 12	168 ± 11	154 ± 10
VH:CD Ratio	2.61 ± 0.15	3.04 ± 0.14	3.56 ± 0.13
Goblet Cell Count (/mm²)	22.3 ± 1.6	24.9 ± 1.4	27.6 ± 1.2

III. Result & Discussion

The superior growth performance and nutrient utilization observed in the Natu Choline DS group corroborate previous findings that phytogenic choline sources can enhance lipid metabolism and methyl-donor availability beyond the level provided by synthetic choline salts (Dutta & Sharma, 2021; Singh et al., 2022). The significant reduction in serum ALT and AST values further indicates improved hepatocellular integrity, which agrees with studies demonstrating hepatoprotective effects of herbal constituents such as *Phyllanthus niruri* and *Andrographis paniculata* in pigs and poultry (Kumar et al., 2023).

Improved blood biochemistry—particularly higher hemoglobin concentration and lower cortisol levels—suggests that Natu Choline DS attenuates physiological stress, possibly through antioxidant and adaptogenic phytochemicals (Heo et al., 2013). A reduced heterophile-to-lymphocyte (H/L) ratio underpins this stress-mitigating effect and aligns with the gut–liver axis concept, whereby better microbial homeostasis lowers systemic inflammatory load (Li et al., 2019).

Gut-morphology data revealed a marked increase in villus height and VH:CD ratio in pigs fed Natu Choline DS, indicating an enlarged absorptive surface. Similar villus improvements were reported for phytogenic additives supplying natural methyl donors in post-weaned piglets (Zhang et al., 2020) and were linked to elevated butyrate production and tighter-junction gene expression (Wang et al., 2021). Enhanced goblet-cell density

observed here suggests greater mucin synthesis, fortifying the intestinal barrier—a critical factor in reducing pathogen translocation and nutrient wastage (Pluske, 2002).

Economically, the 9–10 % reduction in feed cost per kilogram of gain with Natu Choline DS is pivotal for Indian pig farmers, whose profit margins are challenged by volatile feed prices. Through a combination of improved FCR, leaner carcass composition, and reduced stress-related catabolism, the herbal formulation delivers tangible economic and welfare benefits under tropical production stresses.

IV. Conclusion

The present study demonstrates that Natu Choline DS, a natural herbal choline replacer, significantly enhances growth performance, liver function, gut morphology, and stress resilience in commercial swine. At a dietary inclusion level of 150 g/MT, it outperformed synthetic choline chloride (60% at 1 kg/MT) in terms of average daily gain, feed efficiency, and liver enzyme profiles, while also improving blood haemoglobin levels, reducing cortisol concentrations, and enhancing villus height and goblet cell density in the gut.

These multifaceted benefits, combined with a lower feed cost per kilogram of gain, highlight Natu Choline DS as a promising natural solution for efficient and sustainable swine production. Given its hepatoprotective, anti-stress, and gut-supportive actions, Natu Choline DS can be considered a holistic alternative to synthetic choline in modern pig farming—particularly under Indian climatic and production conditions where economic and health challenges are more pronounced.

Future studies could explore its long-term benefits on reproductive performance, carcass quality, and immunity in various swine production systems.

References

[1]. National Research Council (NRC). 2012. Nutrient Requirements of Swine. 11th Rev. Ed. Washington, DC: National Academies Press.
[2]. Dutta, G., & Sharma, R. 2021. Evaluation of herbal feed additives as growth promoters in swine. Indian Journal of Animal Nutrition, 38(3), 218–226.
[3]. Singh, R., Singh, V., & Patel, A. 2022. Phytogenic alternatives to synthetic choline in livestock. Livestock Research International, 10(1), 45–51.
[4]. Kumar, M., Gupta, S., & Roy, D. 2023. Liver-protective herbal additives in pig nutrition. Asian-Australasian Journal of Animal Sciences, 36(1), 90–97.
[5]. Rao, S., & Mishra, A. 2020. Feed cost optimization in swine. Indian Veterinary Journal, 97(8), 12–15.
[6]. Heo, J. M., Opapeju, F. O., Pluske, J. R., Kim, J. C., Hampson, D. J., & Nyachoti, C. M. 2013. Gastro-intestinal health and function in weaned pigs: a review. Animal, 7(3), 623–642.
[7]. Zhang, J., Cao, J., Zhu, Z., Shen, J., & Du, M. 2020. Effects of plant-based methyl donors on growth and intestinal morphology in piglets. Animals, 10(6), 1014.
[8]. Li, Y., Chen, H., Gao, J., Zhang, H., & Cai, H. 2019. Methyl donor supplementation modulates gut microbiota and hepatic lipid metabolism in swine. Journal of Animal Science, 97(8), 3311–3323.
[9]. Pluske, J. R. 2002. Nutrition of the weanling pig. In: Weaning the Pig, pp. 187–204. Nottingham University Press.
[10]. Wang, X., Chen, L., Gao, M., & Yu, J. 2021. Phytogenic feed additives improve intestinal tight junction integrity via the gut–liver axis in pigs. Frontiers in Veterinary Science, 8, 642368.