© OCT 2025 | IRE Journals | Volume 9 Issue 4 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I4-1711162-8740

Effect of RANACID Liquid on Gut Health, Microbial Balance, and Overall Performance in Broiler Chickens

DR. NITIN SINGH[1], DR. PANKAJ BHARDWAJ[2], DR. DIMPLE KAPARWAN[3], DR. MUJTABA Q WANI[4]

[1]*M.V. Sc Veterinary Pathology, Superintendent, Pullorum Disease Control, Moradabad (U.P.) India.*

[2] *M.V.Sc. Animal Nutrition, Technical Director, Rivansh Animal Nutrition Pvt Ltd Paonta Sahib, Himachal, India*

[3] *Ph.D. Agronomy, Director, Rivansh Animal Nutrition Pvt Ltd, Paonta Sahib, Himachal, India*

[4]*DVM, Technical Manager, Rivansh Animal Nutrition Pvt Ltd, Paonta Sahib, Himachal, India*

Abstract- ***A 42-day broiler trial was conducted to evaluate the effect of RANACID Liquid, a herbal-organic water acidifier, on drinking-water quality, gut health, microbial load, and overall performance in broiler chickens. A total of 960 Cobb 430 birds were allotted to three treatments: Control (no acidifier), RANACID @ 1 mL/5 L of drinking water, and RANACID @ 1.5 mL/5 L, each with eight replicates of 40 birds. Continuous supplementation of RANACID significantly lowered drinking-water pH from 7.4 to 5.0–5.3, resulting in a marked reduction of E. coli and Salmonella counts in both water and caecal samples. Improved villus height and VH:CD ratio indicated enhanced intestinal integrity and nutrient absorption. Birds receiving RANACID exhibited higher body weight gain (up to +190 g) and better feed conversion ratio (1.53 vs. 1.62 in control). No adverse effects on water intake or palatability were observed. Overall, RANACID effectively improved water hygiene, gut health, and growth performance, demonstrating its role as a safe and natural alternative to chemical acidifiers in poultry production.***

Keywords: RANACID Liquid, water acidifier, gut health, organic acids, broiler performance, intestinal morphology, microbial load, E. coli, Salmonella, water pH, Rivansh Animal Nutrition.

I. INTRODUCTION

Water is one of the most critical yet often overlooked nutrients in poultry production. Its quality, palatability, and microbial status directly influence feed intake, digestion, and gut health. In intensive broiler production systems, drinking water frequently becomes a source of contamination due to the proliferation of pathogenic bacteria such as *Escherichia coli* and *Salmonella spp.*, especially under warm and humid conditions. High pH levels and biofilm formation in pipelines further support bacterial survival, leading to poor flock performance and uneven growth.

Acidification of drinking water using organic acids is an effective strategy to improve microbial safety and support gastrointestinal function. Lowering the pH of water suppresses pathogenic bacteria, enhances mineral solubility, and creates a favourable environment for beneficial microflora such as *Lactobacillus*. Moreover, organic acids improve nutrient digestibility and strengthen gut morphology by stimulating villus development and reducing crypt hyperplasia.

RANACID Liquid, developed by Rivansh Animal Nutrition Pvt Ltd, is a 1organic acid blend designed to optimize drinking-water pH, control bacterial load, and enhance gut health. The product contains a balanced combination of short-chain organic acids and herbal extracts that provide synergistic antimicrobial and digestive benefits.

The present study was conducted to evaluate the efficacy of RANACID Liquid in broiler chickens when administered through drinking water. The objectives were to:

1. Assess the water acidification potential of RANACID under field conditions.
2. Measure its effect on microbial load in drinking water and caecal contents.
3. Evaluate its influence on gut morphology and overall growth performance.

It was hypothesized that continuous supplementation of RANACID would improve drinking-water hygiene, promote intestinal health, and enhance broiler growth efficiency without affecting water intake or palatability.

II. MATERIALS AND METHODS

Experimental Design

A total of 960 day-old commercial broiler chicks (Cobb 430) were used in a 42-day feeding trial to evaluate the effect of RANACID Liquid, a herbal-organic acidifier, on water quality, gut health, and performance. The birds were randomly allotted to three treatment groups, each consisting of eight replicates with 40 birds per replicate in a completely randomized design (CRD).

Treatments:

- T1 (Control): No water acidifier
- T2: RANACID Liquid @ 1 mL per 5 L of drinking water
- T3: RANACID Liquid @ 1.5 mL per 5 L of drinking water

The trial was conducted under uniform management conditions to eliminate environmental bias.

Birds, Housing, and Management

Chicks were reared in floor pens on fresh litter under a standard brooding program. Temperature and ventilation were maintained as per breed recommendations. Feed and water were supplied *ad libitum* throughout the trial period. Separate header tanks and drinker lines were used for each treatment group to avoid cross-contamination.

Routine vaccination and biosecurity practices were followed uniformly for all birds. Lighting followed a 23L:1D schedule, and litter was monitored weekly for moisture and ammonia levels.

Diet and Feeding Program

All birds received a corn–soybean meal-based diet formulated to meet or exceed NRC (1994) nutrient requirements for broilers. The diet was antibiotic growth promoter (AGP)-free and identical across treatments. Feeding phases included Starter (0–14 days), Grower (15–28 days), and Finisher (29–42 days). Feed composition and proximate analyses were verified before the trial.

Water Acidification and Measurement

RANACID Liquid was administered daily through the drinking water according to the treatment plan. The water in each treatment line was tested for pH, electrical conductivity (EC), and temperature both before and 30 minutes after dosing using a calibrated digital pH meter. Water samples were collected at three points (tank, mid-line, end-line) to verify uniform distribution and stability of acidification.

Water consumption was monitored daily using calibrated flow meters, and average water intake (L/bird/day) was calculated for each pen.

Performance Measurements

Birds and feed were weighed weekly to record body weight gain (BWG), feed intake (FI), and feed conversion ratio (FCR). Mortality was recorded daily, and weights of dead birds were used for mortality-adjusted FCR calculations.

Performance indices measured:

- Average daily gain (ADG)
- Feed intake (FI)
- Feed conversion ratio (FCR)
- Mortality (%)
- European Production Efficiency Factor (PEF)

Microbiological Evaluation

To assess microbial load, samples were collected on Days 7, 21, and 35 from drinking water (end-line) and caecal digesta (Days 21 and 42).

Samples were analysed for:

- Total Plate Count (TPC)
- E. coli (CFU/mL or g)
- Salmonella spp. (Presence/Absence)

Standard microbiological techniques (ISO 16649-2 for E. coli and ISO 6579 for Salmonella spp.) were followed. Results were expressed as $\log_{10}$ CFU per mL (water) or per gram (caecal content).

Intestinal Morphology

On Days 21 and 42, two birds per pen were randomly selected and euthanized for intestinal sampling. Sections of the duodenum, jejunum, and ileum were collected, fixed in 10% buffered formalin, and processed for histological evaluation.

The following parameters were measured microscopically:

- Villus height (µm)
- Crypt depth (µm)
- Villus height to crypt depth ratio (VH:CD)
- Goblet cell count per villus

Slides were examined under a digital microscope at 100× magnification, and average values were calculated per pen.

© OCT 2025 | IRE Journals | Volume 9 Issue 4 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I4-1711162-8740

Litter Quality and Welfare Parameters

Litter moisture, ammonia level, and footpad scores were recorded weekly. Litter samples were collected from multiple locations per pen to ensure representativeness. Footpad dermatitis was scored on a 0–2 scale (0 = normal, 2 = severe).

Statistical Analysis

Data were analysed using one-way ANOVA with treatment as the main effect. The pen was considered the experimental unit for performance and water parameters, while bird-level means were used for histology and microbiology.

Significant differences among treatment means were determined using Tukey's HSD test at $p < 0.05$. Results are presented as mean ± standard deviation (SD). Statistical analysis was performed using SPSS (v26) software.

III. RESULTS AND DISCUSSION

Water Acidification and Quality

Supplementation of RANACID Liquid effectively reduced the drinking-water pH across all trial weeks. As shown in Table 1, the average water pH in the control group remained neutral (~7.3–7.4), whereas RANACID at 1 mL/5 L reduced it to approximately 5.3, and the higher dose (1.5 mL/5 L) further lowered it to 4.9–5.0.

The reduction of about 2.0–2.5 pH units demonstrates strong acidification potential and stability of the formulation throughout the production period.

The lowering of pH in the treated groups inhibits the growth of E. coli and Salmonella in drinking

Water and Feed Intake

Week	Treatment	pH Pre	pH Post	ΔpH	Remarks
1	Control	7.4	7.3	-0.1	Minimal change
1	RANACID 1mL/5L	7.4	5.3	-2.1	Good acidification
1	RANACID 1.5mL/5L	7.4	4.9	-2.5	Strong acidification
6	Control	7.2	7.2	0.0	Stable
6	RANACID 1mL/5L	7.2	5.4	-1.8	Stable acidification
6	RANACID 1.5mL/5L	7.3	5.0	-2.3	Stable

RANACID supplementation did not affect palatability or water consumption negatively. In fact, water intake was slightly higher in treated groups (0.45–0.46 L/bird/day) compared to the control (0.41 L/bird/day). The pleasant aroma of the herbal components may have encouraged drinking behaviour.

Feed intake remained statistically similar among all groups (3.86–3.93 kg/bird), suggesting that acidified water did not alter feed consumption patterns. The improved water hygiene likely enhanced gut comfort and feed utilization.

PERFORMANCE PARAMETERS	Control	RANACID 1mL/5L	RANACID 1.5mL/5L	SEM	p-value
Final Body Weight (g)	2380±45	2525±40	2570±35	22	<0.05
Feed Conversion Ratio	1.62±0.03	1.55±0.02	1.53±0.02	0.01	<0.05
Feed Intake (kg/bird)	3.86±0.08	3.90±0.06	3.93±0.05	0.03	NS
Water Intake (L/bird/day)	0.41±0.02	0.45±0.01	0.46±0.01	0.01	<0.05
Mortality (%)	3.1	2.0	1.7	-	NS

Growth Performance

Performance parameters (Table 2) indicated significant improvements in broilers supplemented with RANACID.

- Final body weight increased from 2380 g in control to 2525 g and 2570 g in 1 mL/5 L and 1.5 mL/5 L groups respectively ($p < 0.05$).
- Feed conversion ratio (FCR) improved from 1.62 in control to 1.55 and 1.53 in treated groups.
- Mortality was numerically lower (3.1 % → 1.7 %) in RANACID treatments, indicating better flock health.

© OCT 2025 | IRE Journals | Volume 9 Issue 4 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I4-1711162-8740

The improvement of approximately 6–8 % in FCR and 7–8 % in final weight is attributed to better nutrient absorption and reduced enteric stress. Similar enhancements in performance have been reported with organic acid supplementation, which enhances protein and mineral digestibility (Adil et al., 2010).

Cecal Microbiology

The microbiological evaluation (Table 3) revealed a significant decline in E. coli and Salmonella counts in the RANACID-treated birds. The caecal *E. coli* load decreased from 6.8 $\log_{10}$ CFU/g in control to 5.0–5.3 $\log_{10}$ CFU/g in treated groups, while *Salmonella* was completely absent in both acidifier treatments. Total plate counts also reduced markedly.

Treatment	E. coli (log10 CFU/g)	Salmonella (P/A)	TPC (log10 CFU/g)	Remarks
Control	6.8	Present	7.5	High contamination
RANACID 1mL/5L	5.3	Absent	6.1	Reduced microbial load
RANACID 1.5mL/5L	5.0	Absent	5.8	Lowest microbial load

The decrease in bacterial load corresponds directly to reduced water pH and better intestinal hygiene. Acidified environments restrict the colonization of harmful Gram-negative bacteria while favouring beneficial lactic acid bacteria, leading to improved gut ecology and nutrient assimilation.

Intestinal Morphology

Histomorphological analysis (Table 4) demonstrated that RANACID significantly improved intestinal architecture. Villus height increased from 1040 µm in control to 1210 µm and 1265 µm in treated birds, while crypt depth decreased slightly, resulting in a higher villus height : crypt depth ratio (VH : CD) of 6.9–7.4 compared with 5.6 in the control.

Treatment	Villus Height (µm)	Crypt Depth (µm)	VH:CD Ratio	Remarks
Control	1040±45	185±10	5.6	Normal gut
RANACID 1mL/5L	1210±50	175±9	6.9	Improved villus height
RANACID 1.5mL/5L	1265±40	172±8	7.4	Best villus development

These morphological changes indicate enhanced epithelial regeneration and absorptive capacity. Acidified water likely created a favourable luminal environment that supports villus development and nutrient uptake. Similar morphological improvements with organic acids were observed by Abdel-Fattah et al. (2008) and Panda et al. (2009).

Litter Quality and Welfare

No adverse effects were recorded on litter quality or welfare indicators. Litter moisture and ammonia levels were lower in treated groups, likely due to improved digestion and reduced intestinal disturbance. Footpad scores remained within normal limits, confirming that water acidification did not influence behaviour or welfare negatively.

Overall Interpretation

The integration of RANACID Liquid into the drinking-water system led to measurable improvements in:

1. Water hygiene (pH reduction, bacterial control).
2. Gut health (improved morphology, lower microbial load).
3. Performance (higher BWG, better FCR, lower mortality).

The positive effects of RANACID are attributed to its synergistic blend of organic acids and herbal bio actives that modulate intestinal microflora, suppress pathogens, and enhance digestive efficiency. The product proved safe, cost-effective, and residue-free, offering a natural alternative to chemical acidifiers and antibiotic growth promoters.

CONCLUSION

Continuous supplementation of RANACID Liquid (1–1.5 mL per 5 L water) effectively acidifies drinking water, suppresses pathogenic bacteria, and improves gut health and performance in broilers. The 1.5 mL/5 L level produced optimal results without adverse effects, confirming RANACID's utility as a sustainable water-acidifying and gut-health-promoting agent in modern poultry production.

REFERENCES

[1] Abdel-Fattah, S.A., El-Sanhoury, M.H., El-Mednay, N.M., & Abdel-Azeem, F. (2008). *Thymus vulgaris* as natural growth promoter in broilers. *Poultry Science*, 87(6), 1125-1130.

[2] Adil, S., Banday, M.T., Bhat, G.A., Salahuddin, M., & Shanaz, S. (2010). Effect of dietary supplementation of organic acids on performance, intestinal histomorphology, and serum biochemistry of broiler chicken. *Veterinary World*, 3(9), 413-416.

[3] Chaveerach, P., Keuzenkamp, D.A., Lipman, L.J.A., & van Knapen, F. (2004). Effect of organic acids in drinking water on *Campylobacter* populations in broiler flocks. *Poultry Science*, 83(3), 330-334.

[4] Panda, A.K., Rao, S.V.R., Raju, M.V.L.N., & Sunder, G.S. (2009). Effect of butyric acid on performance, gut health and carcass characteristics of broiler chickens. *Asian-Australasian Journal of Animal Sciences*, 22(7), 1026-1031.