NATURAL PROBIOTIC ALTERNATIVES FOR SUSTAINABLE BROILER PRODUCTION

A.-D. Răşinar[1], S. Pătruică[1], F.D. Simiz[2], M.-D. Luncan[1], E. Simiz[1*]

[1]University of Life Sciences "King Mihai I" from Timişoara,
Faculty of Bioengineering of Animal Resources, Calea Aradului no.119, Romania
[2]University of Life Sciences "King Mihai I" from Timişoara,
Faculty of Veterinary Medicine, Calea Aradului no.119, Romania

Abstract

The present study aims to investigate the influence of administering natural probiotics (kefir, whey, and yogurt) on growth performance, feed intake, and health status in Ross 308 broiler chickens reared under a semi-intensive system. The experiment was conducted over six weeks on four groups of broilers, all receiving the same standard feed, with the only difference being the type of drinking water provided: plain water for the control group and water supplemented with different probiotics for the experimental groups. Monitoring of body weight, feed intake, feed conversion ratio, and health status highlighted the positive effects of probiotics, particularly yogurt and kefir, on growth performance and feed conversion efficiency, without negatively affecting the birds' health or survival rate. The results emphasize the value of natural lactic probiotics as an economical, safe, and sustainable solution that can enhance productivity and reduce dependence on synthetic growth promoters in broiler chicken production.

Key words: *natural probiotics, broiler chickens, semi-intensive rearing, growth performance, feed conversion ratio*

INTRODUCTION

In recent decades, intensive poultry meat production has become one of the most dynamic branches of the agri-food industry, playing an essential role in ensuring global food security. However, economic pressures and efficiency demands have, over time, led to the widespread use of synthetic growth promoters and antibiotics [1] in animal feed a practice increasingly challenged from the standpoint of public health and food safety. In the context of European regulations restricting the use of antibiotics [2] as growth promoters [3], interest in natural and sustainable alternatives has grown significantly [4].

Among the alternative strategies, natural probiotics, live cultures of beneficial microorganisms [5] that improve the balance of intestinal microflora, have attracted particular attention [6,7]. Numerous studies [8,9] have demonstrated their potential to support productive performance, strengthen immunity, and reduce the risk of digestive diseases in broiler chickens. However, results regarding the effectiveness of different probiotic sources are sometimes divergent [6,10,11]: some studies highlight significant effects on feed conversion and weight gain, while others report minor or strain, dose, or environment dependent variations.

From this perspective, natural sources of probiotics such as kefir, whey, and yogurt represent a promising research direction. These fermented dairy products contain complex consortia of lactic acid bacteria and yeasts that can contribute to maintaining intestinal microbiota balance,

* Corresponding author: elizasimiz@usvt.ro
The manuscript was received: 20.10.2025
Accepted for publication: 17.11.2025

stimulating immunity, and improving nutrient digestibility [12,13]. Moreover, their use aligns with the principles of sustainable agriculture by reducing dependence on synthetic additives and promoting the valorization of dairy by products.

Based on these considerations, the present study aims to evaluate the effects of natural probiotic administration (kefir, whey, and yogurt) on growth performance, feed intake, and health status in Ross 308 broiler chickens reared under semi-intensive conditions. The working hypothesis is that natural probiotics can improve feed conversion efficiency and growth parameters without compromising animal health, providing a safe and economical alternative to synthetic growth promoters.

The results obtained contribute to strengthening the scientific foundation for the use of natural probiotics in poultry farming and highlight their potential as sustainable solutions for efficient and responsible poultry meat production.

MATERIAL AND METHOD

The experiment was conducted in a private household located in Comloșu Mare commune, Timiș County, between May 6 and June 18, 2025. The housing facility used was arranged in a farm annex adapted for semi-intensive broiler rearing, with a capacity of 50–100 birds. The chickens were floor-reared on permanent straw litter, with manual feeding and watering, and the space was divided into four separate pens (Figure 1), corresponding to the experimental variants. The microclimate conditions (ventilation, natural lighting, humidity, and temperature) were maintained within the recommended limits for the Ross 308 hybrid.

The biological material consisted of 40 broiler chickens from the commercial hybrid Ross 308, produced by the Aviagen Group. The Ross 308 hybrid is known for its rapid growth rate, high feed conversion efficiency, and good carcass yield, being one of the most widely used broiler hybrids worldwide.

The chickens were randomly distributed into four experimental variants (V1–V4), with 10 birds per variant, following the principle of uniformity in initial body weight.

Fig.1 Compartmentalization of the housing space

All broilers were fed the same standard compound feed, administered in meal form, corresponding to the growth phases:

- Phase I (starter): days 1–14
- Phase II (grower): days 15–42

The only experimental variable was the type of natural probiotic administered through the drinking water, according to the experimental design (Table 1).

The probiotics were administered according to the protocol presented in Table 2, by partially replacing the drinking water with predetermined volumes of freshly prepared natural probiotic products, produced under hygienic conditions.

Table 1. Experimental design

Variant	Type of feed	Type of drinking water	Probiotic administration
V1 (Control)	Standard	Drinking water	Without probiotic
V2	Standard	Water with kefir	With probiotic
V3	Standard	Water with whey	With probiotic
V4	Standard	Water with yogurt	With probiotic

Table 2. Probiotic administration protocol

Day of administration	Probiotic amount (ml/L of water)
Day 1	Not administered
Day 2	2,5 ml
Days 3–4	5 ml
Days 5-10	8 ml
Days 11-14	5 ml
Day 15 and onward	Not administered

Probiotic products used:

- Kefir: a fermented dairy product obtained by fermenting milk with kefir grains (*Lactobacillus spp.*, *Lactococcus spp.*, *Saccharomyces spp.*, *Kluyveromyces spp.*); it has beneficial effects on digestion and the balance of intestinal microflora.
- Whey: a by-product of cheese manufacturing, rich in whey proteins, lactose, and minerals; it supports rehydration and digestion.
- Yogurt: a fermented dairy product containing *Lactobacillus bulgaricus* and *Streptococcus thermophilus*; it contributes to the stabilization of intestinal microbiota and the stimulation of immunity.

The main bioproductive indicators monitored were:

- Body weight (g): determined weekly by individual weighing;
- Average daily gain (g/day): calculated from weight differences;
- Compound feed intake (g/chick/week): determined by daily weighing of the feed offered and the unconsumed residues;
- Feed conversion ratio (FCR): ratio between total feed intake and total weight gain (kg feed/kg gain);
- Mortality (%): monitored daily;
- Health status: evaluated by daily clinical observations (appetite, activity, plumage, consistency of droppings).

Experimental data were compiled and statistically analyzed using the SPSS 26.0 software (IBM Corp., Armonk, NY, USA). The following statistical parameters were calculated: arithmetic mean ($\bar{x}$), variance (s^2), standard deviation (s), standard error of the mean ($S\bar{x}$), and coefficient of variation (CV%).

RESULTS

Data analysis showed that probiotic administration led to a significant improvement in body weight and feed conversion efficiency compared to the control group.

During the first week, the average body weights of the chicks (Figure 2) were similar across all groups (approximately 130.4–142.5 g), with no statistically significant differences.

Starting from the second week, clear differences were observed in favor of the treated groups, particularly those receiving yogurt (V4) and kefir (V2).

At the end of the 6-week period, the average body weights of the broilers were as follows:

- ✓ V1 (control): 2082.6 g
- ✓ V2 (kefir): 2390.3 g
- ✓ V3 (whey): 2182.2 g
- ✓ V4 (yogurt): 2480.8 g

The growth achieved in the yogurt group (V4) was significantly higher ($p < 0.05$) compared to the control, indicating a clear probiotic effect.

Regarding feed intake (Figure 3), all variants showed comparable values; however, feed conversion efficiency (FCR) was improved in the probiotic-treated groups, particularly in V2 (kefir) and V4 (yogurt).

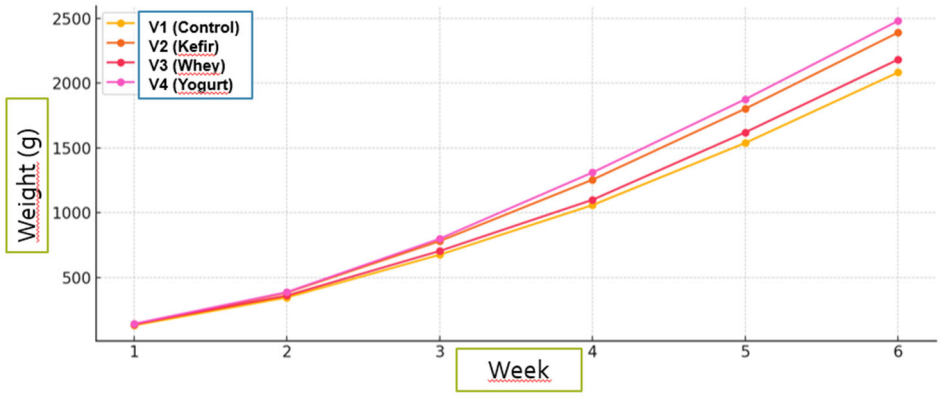

Fig.2 Evolution of Body Weight (g) of the Chickens in the Experimental Groups

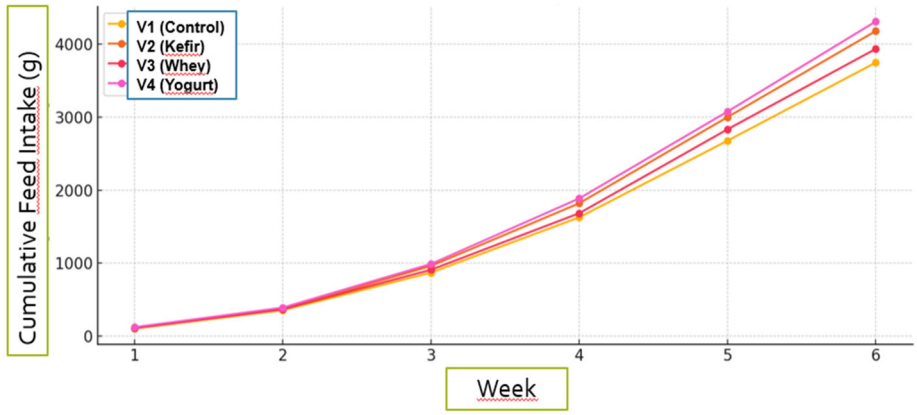

Fig.3 Individual Feed Intake of the Chickens in the Experimental Groups

This demonstrates that the use of probiotics led to a more efficient utilization of feed without increasing total feed consumption.

Mortality was low, with no differences observed between groups, confirming that probiotic administration had no adverse effects on the health of the broilers. Daily clinical observations indicated a good overall condition, clean plumage, and consistent feed intake across all experimental variants.

DISCUSSIONS

The results obtained following the administration of natural probiotics (kefir, whey, and yogurt) to Ross 308 broiler chickens confirm the working hypothesis that these fermented dairy products can improve the productive performance and health status of birds, providing a sustainable alternative to synthetic growth promoters.

Compared to the control group, all experimental variants showed higher body weight gains, with statistically significant differences ($p < 0.05$) observed in the yogurt (V4) and kefir (V2) groups. These findings validate the hypothesis that the administration of natural probiotics, even in moderate doses, contributes to the

optimization of digestive and metabolic processes in broiler chickens.

The mechanism by which probiotics enhance body growth is closely related to the balance of the intestinal microbiota and the stimulation of endogenous digestive enzymes, leading to better nutrient utilization and consequently, increased growth rates. The results obtained are consistent with the observations reported by Mountzouris et al. (2007) [8] and Lan et al. (2003) [9], who demonstrated that dietary supplementation with lactic probiotics significantly increased body weight and reduced feed conversion ratio.

Similarly, Kabir et al. (2004) [14] observed comparable effects on body weight and intestinal morphology in broiler chickens fed with Lactobacillus strains, suggesting that the presence of beneficial bacteria in the digestive tract promotes intestinal epithelial regeneration and increases nutrient absorption surface area. This phenomenon may explain the superior growth performance observed in variants V2 and V4 in the present study.

In the scientific literature, probiotic efficiency varies considerably depending on source, dosage, and rearing conditions. For example, Mutuş et al. (2006) [15] reported significant improvements in skeletal parameters and bone mineral content following Lactobacillus plantarum administration, while Karaoglu and Durdag (2005) [16], using Saccharomyces cerevisiae yeast, found no significant differences in body weight.

The results of the current study are more closely aligned with those reported by Toghyani et al. (2015) [17] and Rosa et al. (2017) [18], who highlighted the positive effects of kefir on digestibility and feed conversion, confirming the importance of mixed lactic bacterial cultures present in this product. In contrast, the more modest effect observed for whey (V3) may be explained by its lower microbial density compared to yogurt or kefir, which limits its direct probiotic impact on the intestinal microbiota.

From an applied perspective, the results confirm that the daily administration of natural probiotics in drinking water represents a simple, safe, and effective method to improve productive performance in broiler chickens raised under household or semi-intensive conditions. This strategy also offers the additional advantages of low cost and the valorization of dairy by-products, contributing to the sustainability of small and medium-sized farms.

Furthermore, the data support the integration of natural probiotics into modern strategies aimed at reducing antibiotic use and promoting clean production, in accordance with the principles of circular agriculture and European policies on animal welfare.

CONCLUSIONS

The study on the use of natural probiotics (kefir, whey, and yogurt) in the feeding of Ross 308 broiler chickens highlights a concrete and sustainable approach to improving poultry productivity and health through natural, safe, and economical means.

The results obtained demonstrate that natural lactic probiotics can serve as a viable alternative to synthetic growth promoters, contributing to the optimization of the birds' digestive and metabolic processes and to the reduction of the impact of antibiotics on the food chain.

This work provides original data on the comparative effects of the three natural probiotic sources administered through drinking water, emphasizing that yogurt and kefir show superior efficiency due to their complex content of lactic acid bacteria and beneficial yeasts. These findings support the concept of natural microbiota balancing as a strategy for enhancing growth and immunity in poultry farming.

From a practical standpoint, the application of these products in household

and semi-intensive farms is easy to implement, requiring no major additional investments and making use of local resources (fermented dairy products and by-products from milk processing).

In a global context focused on reducing antibiotic use and increasing sustainability in animal husbandry, the conclusions of this study confirm the potential of natural probiotics as functional tools for safe, healthy, and competitive poultry production.

REFERENCES

1. Paul, S.S.; Rama Rao, S.V.; Hegde, N.; Williams, N.J.; Chatterjee, R.N.; Raju, M.; Reddy, G.N.; Kumar, V.; Phani Kumar, P.S.; Mallick, S.; et al. Effects of Dietary Antimicrobial Growth Promoters on Performance Parameters and Abundance and Diversity of Broiler Chicken Gut Microbiome and Selection of Antibiotic Resistance Genes. *Front Microbiol* **2022**, *13*, 905050, doi:10.3389/fmicb.2022.905050.
2. John, A.; Makinde, J.; Acheneje, E.; Felix, M.; Adewara, O. Antibiotics in broilers chicken production: a review of impacts, challenges and potential alternatives. *Veterinary Integrative Sciences* **2024**, *22*, 559-578, doi:10.12982/VIS.2024.039.
3. Rahman, M.R.T.; Fliss, I.; Biron, E. Insights in the Development and Uses of Alternatives to Antibiotic Growth Promoters in Poultry and Swine Production. *Antibiotics* **2022**, *11*, 766.
4. Obianwuna, U.E.; Chang, X.; Oleforuh-Okoleh, V.U.; Onu, P.N.; Zhang, H.; Qiu, K.; Wu, S. Phytobiotics in poultry: revolutionizing broiler chicken nutrition with plant-derived gut health enhancers. *Journal of Animal Science and Biotechnology* **2024**, *15*, 169, doi:10.1186/s40104-024-01101-9.
5. Halder, N.; Sunder, J.; De, A.K.; Bhattacharya, D.; Joardar, S.N. Probiotics in poultry: a comprehensive review. *The Journal of Basic and Applied Zoology* **2024**, *85*, 23, doi:10.1186/s41936-024-00379-5.
6. Yaqoob, M.U.; Wang, G.; Wang, M. An updated review on probiotics as an alternative of antibiotics in poultry - A review. *Anim Biosci* **2022**, *35*, 1109-1120, doi:10.5713/ab.21.0485.
7. Jha, R.; Das, R.; Oak, S.; Mishra, P. Probiotics (Direct-Fed Microbials) in Poultry Nutrition and Their Effects on Nutrient Utilization, Growth and Laying Performance, and Gut Health: A Systematic Review. *Animals* **2020**, *10*, 1863.
8. Mountzouris, K.C.; Tsirtsikos, P.; Kalamara, E.; Nitsch, S.; Schatzmayr, G.; Fegeros, K. Evaluation of the efficacy of a probiotic containing Lactobacillus, Bifidobacterium, Enterococcus, and Pediococcus strains in promoting broiler performance and modulating cecal microflora composition and metabolic activities. *Poult Sci* **2007**, *86*, 309-317, doi:10.1093/ps/86.2.309.
9. Lan, P.T.; Binh le, T.; Benno, Y. Impact of two probiotic Lactobacillus strains feeding on fecal lactobacilli and weight gains in chicken. *J Gen Appl Microbiol* **2003**, *49*, 29-36, doi:10.2323/jgam.49.29.
10. Blajman, J.E.; Frizzo, L.S.; Zbrun, M.V.; Astesana, D.M.; Fusari, M.L.; Soto, L.P.; Rosmini, M.R.; Signorini, M.L. Probiotics and broiler growth performance: a meta-analysis of randomised controlled trials. *Br Poult Sci* **2014**, *55*, 483-494, doi:10.1080/00071668.2014.931930.
11. Ghasemi-Sadabadi, M.; Ebrahimnezhad, Y.; Shaddel-Tili, A.; Bannapour-Ghaffari, V.; Kozehgari, H.; Didehvar, M. The effects of fermented milk products (kefir and yogurt) and probiotic on performance, carcass characteristics, blood parameters, and gut microbial population in broiler chickens. *Arch Anim Breed* **2019**, *62*, 361-374, doi:10.5194/aab-62-361-2019.
12. Paraskeuas, V.V.; Papadomichelakis, G.; Brouklogiannis, I.P.; Anagnostopoulos, E.C.; Pappas, A.C.; Simitzis, P.; Theodorou, G.; Politis, I.; Mountzouris, K.C. Dietary Inclusion Level Effects of Yoghurt Acid Whey Powder on Performance, Digestibility of Nutrients and Meat Quality of Broilers. *Animals* **2023**, *13*, 3096.
13. Opazo, R.; Salinas, C.; Villasante, A. Formulation strategies of probiotics in broilers: systematic review and meta-analysis of their effects on production performance. *Frontiers in Animal Science* **2025**, *Volume 6 - 2025*, doi:10.3389/fanim.2025.1679614.
14. Kabir, S.M.L.; Rahman, M.; Rahman, M.; S.U, A. The dynamics of probiotics on growth performance and immune response in broilers. *International Journal of Poultry Science* **2004**, *3*, 361-364, doi:10.3923/ijps.2004.361.364.

15. Mutuş, R.; Kocabagli, N.; Alp, M.; Acar, N.; Eren, M.; Gezen, S.S. The effect of dietary probiotic supplementation on tibial bone characteristics and strength in broilers. *Poult Sci* **2006**, *85*, 1621-1625, doi:10.1093/ps/85.9.1621.
16. Karaoğlu, M.; H, D. The Influence of Dietary Probiotic (Saccharomyces cerevisiae) Supplementation and Different Slaughter Age on the Performance, Slaughter and Carcass Properties of Broilers. *International Journal of Poultry Science* **2005**, *4*, doi:10.3923/ijps.2005.309.316.
17. Toghyani, M.; Mosavi, S.K.; Modaresi, M.; Landy, N. Evaluation of kefir as a potential probiotic on growth performance, serum biochemistry and immune responses in broiler chicks. *Anim Nutr* **2015**, *1*, 305-309, doi:10.1016/j.aninu.2015.11.010.
18. Rosa, D.D.; Dias, M.M.S.; Grześkowiak Ł, M.; Reis, S.A.; Conceição, L.L.; Peluzio, M. Milk kefir: nutritional, microbiological and health benefits. *Nutr Res Rev* **2017**, *30*, 82-96, doi:10.1017/s0954422416000275.