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EVALUATION OF *Rosa canina* AS A NATURAL SOURCE OF VITAMIN C: IMPACT OF THE FORM OF ADMINISTRATION ON ERYTHROPOIESIS AND RENAL FUNCTION IN ROSS 308 BROILER CHICKENS

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Abstract

This study evaluated the effect of Rosa canina (rosehip) as a phytogenic supplement on the haematological profile of Ross 308 broiler chickens raised at the university experimental farm between July and August 2025. The experiment included a control group and two treatment groups, which received Rosa canina aqueous infusion (G1), and Rosa canina extract (G2) respectively, both administered via drinking water. Haematological parameters, specifically haemoglobin and haematocrit, were monitored and recorded at 7, 14, 21, 28 and 35 days of age. Erythropoietic stimulation was consistently observed in the treated groups compared to the control group. At 14 days of age, G1 showed a marked attenuation of anaemia, with individual haemoglobin values reaching 14.7 g/dL, increased compared to the 10.2 g/dL value obtained from the control group. At 35 days, G2 exhibited a pronounced haematological response attributed to enhanced vitamin C intake. The results also indicate variability in physiological responses, highlighting the need for further research to optimise dosage and forms of administration.

Key words*: haematological indicators, phytotherapy, Rosa canina.*

INTRODUCTION

When the haematocrit value falls below the lower physiological limit, anaemia may be diagnosed, whereas values exceeding the upper reference limit are indicative of polycythaemia (Goodwin, 1992). In general, marginally subnormal or supranormal values reflect an underlying pathophysiological state. Dehydration is a recognised cause of elevated haemoglobin concentration, due to haemoconcentration rather than true erythrocytosis (Barde et al., 2022). In cases of haemoglobin deficiency, the blood's ability to transport oxygen is reduced and this condition must be distinguished from hypoxaemia, which refers specifically to a decrease in the partial pressure of oxygen in the blood. In avian species, an erythrocyte volume exceeding the upper physiological reference limit may indicate the presence of toxic factors disrupting haematopoietic processes (Ogunola et al., 2025). Early-onset physiological anaemia has been documented in young broiler chickens during the first weeks of life (Goodwin et al., 1992; Legroux et al., 2025). An elevated haematocrit (HCT) value, secondary to dehydration, is characteristic of relative polycythaemia, which reflects haemoconcentration rather than true erythrocytosis, whereas decreased HCT values are indicative of the oligocythemic form of anaemia. In the latter condition, the underlying aetiology is most commonly attributable to impaired erythropoiesis within the haematopoietic bone marrow (HBM) (de Oliveira Santana et al., 2025). Of particular relevance in poultry production is the observation that housing facilities characterised by inadequate ventilation and prolonged exposure to elevated ammonia concentrations may overwhelm the physiological compensatory mechanisms, ultimately resulting in hypoxaemia (Barbosa et al., 2024). The ensuing tissue hypoxia triggers a compensatory erythropoiesis response, manifested as an increase in circulating erythrocyte mass. Furthermore, mast cell degranulation occurring under hypoxic conditions results in the local release of histamine which, through its vasoactive properties, initiates and sustains the

inflammatory cascade (Steiner et al., 2003; Nagamine et al., 2024). The subsequent vasodilatation and increased vascular permeability lead to vascular stasis, progressive elevation of blood viscosity, and consequent haemodynamic alterations. The aim of the present study was to investigate the erythropoietic and nephroprotective effects of *Rosa canina*, assessing two forms of administration, aqueous infusion and concentrated extract, in Ross 308 broiler chickens under intensive production conditions.

MATERIALS AND METHODS

A total of 128 Ross 308 hybrid broiler chickens of both sexes were experimentally reared at the experimental farm. All birds received primary vaccination against Newcastle disease (ND) and Infectious Bursal Disease (IBD or Gumboro disease) on day 1 post-hatch, within the hatchery. As part of the study, a repeat dose of the vaccine was administered on days 10 and 21, via ocular and intranasal instillation, consisting of one drop applied to each eye and each nasal cavity per individual. The lyophilised vaccine administered was Avipestisota (Romvac Company, Romania). All experimental procedures were performed in full compliance with the bioethical standards approved under registration number 839/21.10.2024.

In order to minimise physiological stress and maintain the stability of the intestinal microbiome, the same feed brand supplied by the hatchery of origin was used throughout the transition period.

The feed was sourced from a certified manufacturer, ensuring rigorous microbiological quality control. This precaution was considered essential in the local context, as long-term studies have demonstrated that certain raw materials, particularly grains received at feed mills in Romania, may be contaminated with mycotoxigenic fungi (Lăpușneanu et al., 2025). By eliminating the risk of mycotoxin exposure, renal and hepatic integrity was preserved, allowing for an accurate assessment of the effects of *Rosa canina* supplementation on the erythropoietic and excretory systems. The birds were fed a three-phase complete compound feed produced by a local manufacturer in northeastern Romania. The dietary phases consisted of a starter (0-10 days), a grower (11-24 days) and a finisher (25 days to slaughter). The specific ingredient inclusion levels for each phase are detailed in Table 1. Feed and water were provided *ad libitum* throughout the experimental period. The feeding regimen was designed to meet the nutritional requirements of the birds at each growth stage.

Table 1. Ingredient composition of the complete compound feed used across dietary phases

Ingredient (%)	Starter (0-10 days)	Grower (11-24 days)	Finisher (25-35 days)
Corn	50.50	60.5	65.50
Soybean Meal	35.50	27	24.00
Soybean Oil	5.50	5	3.50
Fodder yeast	5.00	4	4.00
Minerals/Premix	4.00	3.5	3.00
Total	100	100	100
Kcal ME/kg	3000 - 3200		

ME - Metabolizable Energy.

Birds were randomly allocated into three experimental groups: a control group (GC) and two treatment groups (G1 and G2). The treatment groups received *Rosa canina* via the drinking water, a route of administration previously documented in broiler supplementation studies (Iqbal et al., 2015). The control group (GC) received unsupplemented drinking water throughout the experimental period. Birds assigned to Group G1 received an aqueous *Rosa canina* infusion prepared by steeping dried rosehip fruits in drinking water, whereas birds in Group G2 received commercial *Rosa canina* extract administered according to the same protocol. Supplementation in both treatment groups was initiated 3 – 5 days prior to blood sampling performed at 21 days of age, at minimum doses of 10 g of dried *Rosa canina* fruits per 5 L of drinking water for G1 and 0.25 mL concentrated extract per 5 L of drinking water for G2. Thereafter, the administered doses were progressively increased throughout the experimental period, reaching a maximum concentration of 50 g dried fruits per 5 L of drinking water in G1 and 2.25 mL extract per 5 L of drinking water in G2. Between supplementation periods, birds had *ad libitum* access to unsupplemented drinking water until all supplemented solution had been consumed. The dried rosehip fruits used in the study were obtained from wild mountain rosehips collected from the Brașov region, Romania.

The blood samples were collected from three randomly selected birds per experimental group (n = 3 per group) at 7, 14, 21, 28 and 35 days of age. At 35 days of age, a larger number of samples was obtained (n = 10 per group), as blood collection was performed at the time of slaughter, eliminating the need for additional live bird restraint. Blood samples were obtained prior to slaughter, from the metatarsal vein of the left limb of the bird positioned on its right side. The puncture site was aseptically prepared using cotton wool soaked in 70% ethanol, and venipuncture was performed under sterile conditions using a 2.5 mL syringe for younger birds and a 5 mL syringe for adult birds aged 5 weeks. The blood was transferred into 500µL microtubes containing K_3EDTA (tripotassium ethylenediaminetetraacetic acid) and homogenised by gentle inversion. Haematocrit (HCT) values were determined by standard microhaematocrit method, using heparinised capillary tubes (75 mm) centrifuged in a HAEMATOKRIT 210 centrifuge (Hettich Zentrifugen). Haemoglobin concentration was determined using the Sahli acid-haematin method. Briefly, three drops of 0.1% hydrochloric acid (HCl) were placed into the central graduated tube of the Sahli haemoglobinometer. Subsequently, the blood sample was aspirated into the pipette up to the marked reference line and carefully discharged into the acid-containing tube. The mixture was allowed to react for 1-2 minutes to ensure complete conversion of haemoglobin to acid haematin. Once the colour changed to brown, distilled water was added dropwise with continuous homogenisation until the resulting solution matched that of the permanent brown glass comparator standards. Haemoglobin concentration was read directly from the graduated scale of the haemoglobinometer and expressed in g/dL.

Statistical comparisons were performed using one-way ANOVA (Single Factor) in Microsoft Excel. For each sampling time point, independent pairwise comparisons were conducted between each treatment group and the control (G1 vs. GC and G2 vs. GC), as well as between the two treatment groups (G1 vs. G2). Data are presented as mean ± standard error of the mean (SEM). Differences were considered statistically significant at $p < 0.05$. Different superscript letters (a, b, c) indicate statistically significant differences between groups within the same sampling age.

RESULTS AND DISCUSSIONS

The reference ranges for haematocrit in broiler chickens according to age, are presented in Table 2.

Table 2. Reference for packed cell volume in young broiler chickens, by age

Age (days)	PCV (%)
3	26-42
7	29-43
14	33-41
21	32-40
27*	27-36
28**	33-42
35	33-42
42	31-41
49	28-40

PCV - Packed cell volume; *Goodwin (1992); **Legroux et al. (2025).

The erythrocyte volume in broiler chickens, as shown in Table 2, remains relatively stable throughout the growing period, ranging from 26-43% during the first week to 28-41% at slaughter age, which is consistent with the physiological maturation of the erythropoietic system and the high metabolic demands of meat-type hybrids (Goodwin, 1992; Meluzzi et al., 1992; Al-Nedawi, 2018; Kongpechr et al., 2020; Scanes and Dridi, 2022; Legroux et al., 2025). Furthermore, previous studies report a transient increase during the second and third weeks of life (33-42%), followed by a gradual decline until slaughter age, reflecting physiological adaptation to increased oxygen demand during fast muscle growth and relative haemodilution associated with increased plasma volume in maturing birds (Sturkie, 1986; Zálešáková et al., 2025). Majekodunmi et al. (2022) reported reference values applicable to this study of PCV: 31.67 ± 0.45% and HGB: 10.77 ± 0.15 g/dL. Additionally, Abdel-Rahman et al. (2022) specified relatively stable values of haemoglobin (HGB) of approximately 10.5 g/dL for 28 days of age. Table 3 presents the results of haematological analyses. Haemoglobin concentration (HGB) was used as the primary indicator of erythrocyte functional status, given the high precision of the analytical method and the strong physiological correlation

between haemoglobin and haematocrit documented in avian species. Statistically significant differences in HGB were observed among experimental groups ($p < 0.05$), reflecting treatment-induced changes in oxygen transport capacity. The haematocrit values exhibited a trend consistent with that of haemoglobin, further supporting the effect of the experimental treatment on the overall haematological profile. According to Ike et al. (2025), a haemoglobin value of 9.98 g/dL ± 1.10 g/dL was reported in Ross 308, in the context of treatment with plant extract (*Phyllanthus amarus* leaf extract).

Table 3. Haematocrit (HCT %) values in Ross 308 broiler chickens by age and experimental group

Age (days)	G1	GC	G2	Reference interval*
7	20	14	10	29-43
14	40	20	30	33-41
21	15	10-26	25	33-41
28	19	20	17	27-42
35	25	23	20	33-42

Values represent individual measurements. *Goodwin (1992) and Legroux et al. (2025).

The haematological profile of G1 is consistent with that of clinically healthy birds, with values within the reference range for the species. The reduced HGB and HCT (20%) values observed in individual birds may be indicative of anaemia, probably secondary to elevated uric acid and glucose concentrations associated with metabolic stress and renal dysfunction in avian species. These findings are consistent with a previous study conducted on the same hybrid under identical phytotherapeutic conditions, in which *Rosa canina* administration via drinking water was associated with preserved renal biochemical markers during the final growth stage, supporting the hypothesis that haematological alterations observed in the current study are not secondary to nephrotoxic impairment (Stătescu et al., 2025).

The low haemoglobin (6.4 g/dL) and haematocrit (20%) values recorded in individual birds from GC at 7 days may reflect the influence of persistently elevated blood glucose concentrations on erythropoietic activity. Hyperglycaemia is a defining physiological feature of avian metabolism, characterised by the predominance of glucagon-mediated regulation over insulin-dependent pathways, which sustains persistently elevated glycaemia relative to mammals. The physiological response to metabolic stress in birds involves compensatory neuroendocrine adaptation aimed at maintaining systemic glucose homeostasis, during which transient hypoglycaemic episodes may secondarily occur. Furthermore, low HCT and HGB values may be associated with vascular hypoxia and, consequently, compromised tissue oxygenation.

Table 4. Results of haematological analyses in 7-day-old broiler chickens

Parameter	G1	GC	G2
HGB (g/dL)	16.4	9.4	8.2
	14.8	6.4	8.9
	15.2	8.8	9.1
Mean ± SEM	15.46 ± 0.48^{a}	8.20 ± 0.92^{b}	8.73 ± 0.27^{b}
P-value	0.00216		0.60677

HGB – Haemoglobin. Values are expressed as mean ± SEM (n = 3). Different superscript letters (a, b) indicate statistically significant differences among groups ($p < 0.05$).

At 7 days of age, birds receiving the *Rosa canina* aqueous infusion (G1) exhibited a marked increase in haemoglobin concentration (15.46 g/dL) compared with the control group (8.2 g/dL; $p = 0.002$), confirming an early antianaemic response. No significant difference was observed between the extract group and the control ($p = 0.60$). A low HGB result (6.4 g/dL) in the control group at 7 days may be associated with reduced blood glucose concentrations, suggesting a possible relationship between transient hypoglycaemia and impaired erythropoietic activity, which warrants further investigation. Hyperuricaemia may develop through two distinct pathophysiological mechanisms: impaired renal excretion secondary to nephropathy or accelerated proteolytic catabolism, which drives enhanced purine nucleotide turnover and a consequent increase in endogenous uric acid synthesis. It is normal for blood uric acid fluctuations to occur depending on biological and circadian rhythms, as well as age and nutritional conditions, thus influencing haematological parameters. Physiological compensatory and adaptive mechanisms are predominantly activated and subjected to maximal functional demand during the correction and homeostatic regulation of alterations in blood parameters. Previous research conducted by Egbuniwe et al. (2018), Johnson et al. (2023) and Al-Khalaifah (2025) highlighted the supportive effect of vitamin C on

haematological parameters, particularly haemoglobin concentration, by enhancing iron absorption (conversion of Fe^{3+} to Fe^{2+}). Furthermore, the protective role of vitamin C is also evident at the metabolic level: while stress (such as heat stress) tends to increase lipaemia, vitamin C intake counteracts this effect by reducing total cholesterol and triglyceride levels (Erfani et al., 2021). In research conducted by Unigwe et al. (2022), no substantial changes in haematological parameters were identified using a dose of 100 mg/kg Vitamin C. The results align with reports by Hassan & Asim (2020), supporting the efficacy of higher doses. In our study, according to Table 3 and Table 5, the administration of rosehip infusion (G1) generated an increase in haemoglobin at 14 days (individual maximum values of 14.7 g/dL vs. 9.7 g/dL in the control group) and haematocrit (40% vs. 20%), demonstrating that the phytochemical constituents from *Rosa canina* provided a sufficient concentration of active compounds to stimulate erythropoiesis, overcoming the limitations observed in studies with low doses.

Haematological analysis of 14-day-old Ross 308 broiler chickens revealed a significant erythropoietic response in the supplemented groups. According to Table 5, both treated groups demonstrated statistically significant elevations in haemoglobin concentration relative to control. The extract group (G2) recorded a mean haemoglobin of 16.46 g/dL, exceeding the upper physiological reference limit (8.70-11.80 g/dL), indicating a stronger erythropoietic stimulation and enhanced iron utilisation. The health status of the birds was considered satisfactory at this age, as no clinical signs of disease or systemic pathology were observed in either treatment group prior to the commencement of *Rosa canina* supplementation.

The superior haematological parameters, specifically elevated HCT and HGB values observed exclusively in the *Rosa canina*-supplemented groups, compared to the lower values recorded in the control group, may be attributed to the synergistic action of the bioactive compounds inherent to *Rosa canina* fruit, particularly ascorbic acid (vitamin C) and glutathione-activating polyphenols (Peña et al., 2023). Ascorbic acid is a well-established cofactor in haem biosynthesis, facilitating the reduction of ferric iron (Fe^{3+}) to the absorbable ferrous form (Fe^{2+}), thereby enhancing intestinal iron bioavailability and supporting the activity of ferrochelatase, which is the final enzymatic step in haem biosynthesis pathway, responsible for incorporating ferrous iron into protoporphyrin IX (Obi et al., 2022; Feijo et al., 2023). Concurrently, the polyphenolic compounds present in *Rosa canina*, including flavonols and catechins, are known to upregulate endogenous glutathione synthesis, which in turn protects erythroid progenitors from oxidative stress during active erythropoiesis in the HBM, preserving erythrocyte membrane integrity and extending erythrocyte lifespan (de Oliveira Santana et al., 2025). The cumulative effect of these mechanisms is reflected in the statistically superior HCT and HGB values recorded in the treated groups, suggesting that *Rosa canina* supplementation promotes erythropoietic efficiency via dual mechanisms: improved iron utilisation and antioxidant-mediated protection of erythropoietic precursor cells within the haematopoietic bone marrow (Aldemir et al., 2021).

Table 5. Haemoglobin concentration in 14-day-old broiler chickens

Parameter	G1	GC	G2
HGB (g/dL)	14.7	9.7	17.2
	13.5	9.1	16.4
	14.1	10.2	15.8
Mean ± SEM	14.10 ± 0.35^{b}	9.66 ± 0.32^{c}	16.46 ± 0.41^{a}
P-value	0.00070		0.00019

HGB – Haemoglobin; Values are expressed as mean ± SEM (n = 3). Different superscript letters (a, b, c) indicate statistically significant differences among groups ($p < 0.05$).

According to Table 6, no statistically significant differences in haemoglobin concentration were observed among experimental groups. These results likely reflect physiological haemodilution due to increased plasma volume during rapid growth, rather than suppression of erythropoiesis (Sitmo et al., 2023). The reduced haematocrit values recorded at this age are consistent with physiological haemodilution secondary to plasma volume expansion, rather than a primary haematological pathology.

The results presented in Tables 3 and 6 suggest that the botanical additive may have induced haemodilution with a consequent reduction in haematocrit, potentially attributable to an

increase in circulating plasma volume. Furthermore, *Rosa canina* contains not only ascorbic acid but also polyphenols and tannins, which are known to chelate non-haem iron and may thereby inhibit intestinal iron absorption, potentially contributing to the development of iron deficiency anaemia in broiler chickens.

Table 6. Results of haematological analysis at 21 days of age

Parameter	HGB (g/dL)		
	G1	GC	G2
Mean ± SEM	11.50 ± 1.88[a]	11.03 ± 0.12[a]	9.26 ± 0.81[a]
P-value[*]	0.81677		0.09746

HGB – Haemoglobin; Values are expressed as mean ± SEM (n = 3); [*]Not significant ($p > 0.05$)

According to Table 7, a modest but statistically significant improvement in haemoglobin concentration was observed in G1, whilst G2 showed no significant difference from GC. This phase may coincide with the onset of oxidative stress associated with accelerated metabolic activity, suggesting that the antioxidant compounds in the infusion provided partial protection to erythrocytes (Fathi et al., 2025).

Table 7. Haemoglobin concentration in 28-day-old broiler chickens

Parameter	HGB (g/dL)		
	G1	GC	G2
Mean ± SEM	9.80 ± 0.17[a]	8.16 ± 0.43[b]	8.23 ± 0.35[b]
P-value	0.02489		0.91030

HGB – Haemoglobin; Values are expressed as mean ± SEM (n = 3). Different superscript letters (a, b) indicate statistically significant differences among groups ($p < 0.05$).

Table 8. Mean haemoglobin concentration (g/dL) between G1 and G2 at selected time points

Age (days)	G1 Mean ± SEM	G2 Mean ± SEM	*P – value*	Significance
21	11.50 ± 1.88	9.26 ± 0.81	0.33713	NS
28	9.80 ± 0.17	8.23 ± 0.35	**0.01573**	*
35	9.03 ± 0.20	8.86 ± 0.20	0.59225	NS

Values are expressed as mean ± SEM (n = 3); [*]Differences were considered significant at $p < 0.05$; NS – not significant.

Haemoglobin represents the principal carrier of oxygen in the bloodstream and serves as an indicator of tissue oxygenation capacity. The relationship between HGB, HCT, and erythrocyte count reflects the metabolic and nutritional status of the organism. Reduced iron bioavailability contributes to impaired haemoglobin synthesis. Under conditions of haemodilution associated with a rosehip-based supplementation, erythropoiesis may be disrupted. Additionally, under the oxidative stress conditions evident at 28 days of age, mild haemolysis may occur as a consequence of reduced erythrocyte lifespan. The lowest haemoglobin and haematocrit values were recorded in GC and G2, consistent with this proposed mechanism.

The pairwise comparison of haemoglobin concentration between treatment groups, presented in Table 8, reveals a stage-dependent divergence in erythropoietic response. At 21 days, no significant difference was detected between G1 and G2, a result likely influenced by the high individual variability observed in G1, consistent with physiological haemodilution secondary to plasma volume expansion. However, at 28 days, G1 recorded a significantly higher mean haemoglobin concentration compared to G2 (9.80 ± 0.17 g/dL vs. 8.23 ± 0.35 g/dL), a finding that may be partially attributable to the nephroprotective properties of *Rosa canina* aqueous infusion. In avian species, impaired renal tubular excretion of uric acid leads to hyperuricaemia, which suppresses erythropoietin synthesis and consequently reduces erythropoietic activity within the haematopoietic bone marrow (Stătescu et al., 2025). The ascorbic acid and polyphenolic constituents present in the infusion may attenuate this mechanism by reducing oxidative renal tubular injury, thereby preserving erythropoietin-mediated stimulation of erythropoiesis. By 35 days, no significant difference had been observed between groups, suggesting a progressive convergence of haematological response as birds approached slaughter age.

Table 9. Haemoglobin concentrations in broiler chickens at 35 days of age

Parameter	G1	GC	G2
Mean ± SEM	9.03 ± 0.20[a]	8.70 ± 0.26[a]	8.86 ± 0.20[a]
P-value[*]	0.37390		0.64333

Values are expressed as mean ± SEM (n = 3). [*]Not significant ($p > 0.05$).

According to the results presented in Tables 9 and 10, although the birds in G1 received additional vitamin C through rosehip tea, a substantial proportion of individuals recorded haemoglobin values below the lower physiological limit. This suggests that the administered dose of ascorbic acid, or the

bioavailable concentration of active phytochemical constituents in the infusion, was insufficient to fully counteract physiological growth-related anaemia across all individuals. At 35 days, although no statistically significant differences were detected ($p > 0.05$), the maximum haemoglobin values observed in the G2 (up to 13.3 g/dL) exceeded the upper physiological limit (11.8 g/dL). This finding indicates a sustained erythropoietic response driven by the higher bioavailability of ascorbic acid found in the extract form.

Table 10. Descriptive statistics of the minimum haemoglobin concentration in treatment groups at age of 35 days

Group	Results Mean ± SEM	Interval for HGB (g/dL)	Reference interval
G1	7.96 ± 0.10	7.0 – 8.6	8.70 – 11.80
G2	8.24 ± 0.14	7.4 – 9.3	

HGB – Haemoglobin; Values are expressed as mean ± SEM (n = 10).

Table 11. Descriptive statistics of the maximum haemoglobin concentration in treatment groups at age of 35 days

Group	Mean ± SEM	Interval for HGB (g/dL)	Reference interval
G1	9.68 ± 0.09	9.0 – 10.5	8.70 – 11.80
G2	11.40 ± 0.25	9.3 – 13.3	

HGB – Haemoglobin; Values are expressed as mean ± SEM (n = 10).

The data presented in Table 11 reveal that the majority of haemoglobin values fell within the physiological reference range. However, a peak value of 13.3 g/dL was recorded in G2, which exceeded the upper reference limit of 11.8 g/dL. This compensation indicates a higher bioavailability of iron, mediated by the elevated ascorbic acid concentration present in the extract form. The study conducted by Hieu et al. (2022) confirmed that antioxidant supplementation, particularly with vitamin C, increases haemoglobin concentration by facilitating the reduction of ferric iron (Fe^{3+}) to ferrous iron (Fe^{2+}) in the duodenum. A decrease in Fe^{2+} availability represents a disturbance in the balance between the erythrocyte production and destruction, frequently associated with gastrointestinal disorders and impaired enteral absorption.

In contrast to the aqueous infusion group (G1), in which haemoglobin concentrations generally remained below the physiological threshold of 8.70 g/dL, indicating a tendency toward anaemia, the extract group (G2) showed a stimulation of erythropoiesis, with maximum values reaching 13.3 g/dL (Table 11). These results are consistent with those of Hussain and Al-Salhie (2022), who reported that supplementation with 100 mg/L of vitamin C in drinking water significantly improved haematological parameters, including erythrocyte count, haemoglobin concentration, and packed cell volume or haematocrit, by protecting erythrocyte membrane integrity against oxidative stress and damages (Opoola et al., 2018). The differential response between G1 and G2 underscores the importance of achieving an optimal phytochemical concentration and appropriate dosage to elicit a clinically meaningful haematological response (Gabriel et al., 2025). *Rosa canina* supplementation was associated with changes in haemoglobin concentration and significantly influenced erythropoietic activity in Ross 308 broiler chickens during the early and mid-growth stages. At 7 and 14 days of age, both treatments elicited significant increases in haemoglobin concentration ($p < 0.05$). No significant differences were recorded at 21 and 35 days ($p > 0.05$), although a modest but statistically significant improvement in HGB persisted in G1 at 28 days ($p = 0.025$), suggesting a progressive attenuation of the erythropoietic response as birds approached slaughter age. The transient reduction in haematocrit and haemoglobin at 21 and 28 days is consistent with physiological haemodilution associated with rapid somatic growth, rather than pathological anaemia. These results indicate that *Rosa canina*, as a natural source of vitamin C and antioxidant polyphenols, may effectively support erythropoiesis and maintain haematological balance in fast-growing broilers, representing a viable phytogenic alternative to synthetic ascorbic acid supplementation under intensive production conditions (Urban et al., 2025).

CONCLUSIONS

Rosa canina supplementation, administered as aqueous infusion or concentrated extract via drinking water, exerted a significant and stage-dependent erythropoietic effect in Ross 308 broiler chickens. The aqueous infusion (G1)

demonstrated superior efficacy in preventing physiological anaemia during the first weeks of life, whilst the concentrated extract (G2) elicited a more pronounced erythropoietic response at later growth stages (35 days). A modest but statistically significant improvement in haemoglobin concentration persisted in G1 at 28 days ($p = 0.025$), further supporting the sustained antianaemic potential of the aqueous infusion. The transient haematological decline observed at 21 days was consistent with physiological haemodilution rather than treatment-induced impairment. The preservation of renal integrity throughout the experimental period confirmed that the haematological findings were not confounded by nephrotoxic impairment.

Overall, *Rosa canina* supplementation demonstrated a dose- and stage-dependent erythropoietic effect, supporting its potential role as a natural source of vitamin C with antioxidant capacity in attenuating early post-hatch anaemia and enhancing the haematological status of broilers under intensive production conditions. Further studies are warranted to elucidate the optimal dosage, administration protocol and long-term effects on productive performance and carcass quality.

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