EFFECTS OF SPROUTED SOYBEAN INCORPORATION IN DIETS ON GROWTH PERFORMANCE AND CARCASS YIELD OF ROSS 308 BROILER CHICKENS

Abstract

Soybean is a major protein source in broiler nutrition; however, its utilization in raw form is limited by the presence of antinutritional factors. Germination has been reported to improve soybean nutritional value by enhancing protein bioavailability and reducing these compounds. This study evaluated the effects of incorporating sprouted soybean into broiler diets on growth performance and carcass yield of Ross 308 chickens, in comparison with roasted soybean grain and soybean meal. A total of 300 one-day-old chicks were randomly allocated to three dietary treatments: sprouted soybean, roasted soybean grain, and soybean meal. Growth performance was monitored during the starter (d1–d21) and grower (d21–d42) phases, and carcass characteristics were assessed at the end of the trial. From the second week onward, birds fed sprouted soybean exhibited significantly higher feed intake and daily weight gain ($p < 0.05$) than those fed the other diets. Average daily weight gain and feed conversion ratio were markedly improved in the sprouted soybean group (22.99 g/day and FCR = 1.40 during starter; 48.14 g/day and FCR = 1.42 during grower). Carcass evaluation revealed higher plucked and gutted weights and a numerically superior carcass yield in birds fed sprouted soybean, while internal organ weights were largely unaffected. Sensory analysis indicated slightly better juiciness and tenderness in meat from birds fed roasted soybean grain. Overall, the results demonstrate that sprouted soybean enhances growth performance and feed efficiency while maintaining desirable carcass traits, making it a promising and locally adaptable alternative protein source for sustainable broiler production.

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1. Introduction

The poultry sector is a key contributor to animal protein supply, income generation, and rural livelihoods in Benin and across West Africa (Rabobank, 2011). Poultry meat consumption has increased steadily over the last decade, driven by rapid urbanization, population growth, and changing dietary habits toward affordable animal protein sources (FAO, 2019; OECD/FAO, 2021). In Benin, poultry production is regarded as one of the most dynamic livestock subsectors, playing an important role in food security as well as youth and women employment (MAEP, 2020).

Despite this growing demand, the sustainability of broiler production remains largely constrained by the high cost of feed, which represents more than 60% of total production costs in small- and medium-scale poultry systems (FAO, 2019; MAEP, 2020). Protein ingredients constitute the most expensive component of poultry diets, making feed formulation a critical challenge for producers. Soybean and its derivatives, particularly soybean meal, are therefore widely used as primary plant protein sources due to their high crude protein content and well-balanced amino acid profile, which closely matches the nutritional requirements of broiler chickens (NRC, 1994; Ravindran, 2013).

In Benin and neighboring countries, soybean production has expanded in response to national and regional strategies aimed at reducing dependence on imported feed ingredients and strengthening local feed value chains (ECOWAS, 2018; MAEP, 2020). However, improving the nutritional efficiency of locally available soybean through appropriate processing remains a major priority to enhance broiler performance, reduce feed costs, and improve the competitiveness of poultry production systems.

Despite its nutritional advantages, soybean contains several antinutritional factors (ANFs), including trypsin inhibitors, lectins, oligosaccharides, and non-starch polysaccharides, which can impair nutrient digestibility, reduce amino acid availability, and ultimately depress growth performance in broilers when inadequately processed

(Soybean Board, 2011; Teague et al., 2023). Thermal processing methods such as roasting are commonly used to inactivate these compounds; however, when poorly controlled, excessive heat may alter protein structure and reduce digestibility (Gu et al., 2010; Hemetsberger et al., 2021). These limitations highlight the need for alternative or improved processing methods that effectively reduce ANFs while preserving nutrient quality. Among emerging approaches, bioprocessing techniques such as germination and fermentation have shown considerable potential to enhance the nutritional value of soybean and other feed ingredients. Germination activates endogenous enzymes that degrade ANFs, improve protein solubility, and enhance amino acid availability. Fermentation has also been reported to reduce ANFs and improve nutrient digestibility and growth performance in broilers, as demonstrated in several studies and meta-analyses (Irawan et al., 2022). However, while fermented soybean products have been extensively studied, comparative evaluations of soybean germination as a low-tech, biologically driven processing method remain limited, particularly under tropical production conditions.

In many West African production systems, access to high-quality industrial soybean meal is constrained by price volatility and inconsistent supply, leading producers to rely increasingly on locally available soybean grains. Processing methods that can be implemented at the farm or community level, such as germination, may therefore provide practical and cost-effective solutions to improve feed quality and broiler performance. By reducing antinutritional factors and enhancing nutrient bioavailability, germination may positively influence feed intake, growth performance, and feed efficiency in broiler chickens.

Given these considerations, the present study aimed to evaluate the effects of dietary inclusion of sprouted (germinated) soybean grain on feed intake, growth performance, feed conversion ratio, carcass characteristics, and sensory quality of meat in Ross 308 broiler chickens, in comparison with roasted soybean grain and conventional soybean meal diets. It was hypothesized that germinated soybean would enhance nutrient utilization and growth performance due to reduced antinutritional factors and improved digestibility, thereby representing a viable alternative protein source for broiler diets under local production conditions.

2. Materials and Methods

2.1. Experimental site

The experiment was conducted at the experimental farm of the Faculty of Agricultural Sciences, 69 University of Abomey-Calavi (Benin), located in the municipality of Abomey-Calavi. The region has a subequatorial climate characterized by two dry seasons (August to mid-September and December to March) and two rainy seasons (March to July, and mid-September to early December). The average annual rainfall is approximately 1,200 mm. Mean monthly temperatures range from 27 to 31°C, while relative humidity varies from 65% (January to March, dry season) to 74 97% (June to July, rainy season).

2.2. Experimental animals and design

A total of 300 one-day-old Ross 308 broiler chicks were obtained from a commercial hatchery. Upon arrival, chicks were individually weighed and stratified by live body weight to ensure uniformity among experimental units. The birds were then randomly allocated to three dietary treatments: roasted soybean grain (SG), sprouted soybean grain (SGG), and soybean meal (TS). Each treatment comprised 100 chicks, subdivided into four replicates of 25 birds each.

All birds were raised under identical housing, environmental, and management conditions throughout the experimental period. Brooding temperature was maintained using appropriate heat sources during the first weeks and gradually reduced according to the age of the birds to ensure optimal thermal comfort. Birds were housed on deep litter, and strict hygiene measures were applied to minimize health risks. Feeders and drinkers were cleaned and disinfected regularly.

During the first three days, chicks were offered cracked maize to facilitate digestive adaptation. From day 4 onward, birds received the experimental diets corresponding to their assigned treatments. Feed was supplied ad libitum and replenished twice daily, while clean drinking water was continuously available throughout the trial.

A standard health and prophylactic program were implemented, including routine vaccinations against Newcastle disease and Gumboro disease, in accordance with local veterinary recommendations. Mortality was recorded daily for each replicate and expressed as a percentage of the initial number of birds using the following formula:

$$\text{MR (\%)} = \frac{Number\ \ of\ dead\ birds}{Total\ number\ \ of\ birds} x\ 100$$

2.3. Diets and feeding management

Three isonitrogenous and isoenergetic experimental diets were formulated to meet or exceed the nutritional requirements of Ross 308 broilers according to standard recommendations. The dietarytreatmentswere as follow:

- SG: diet containing roasted soybean grain as the main protein source
- SGG: diet containing sprouted (germinated) soybean grain
- TS: diet containing conventional soybean meal

Soybean grains intended for germination were thoroughly cleaned, soaked in potable water, and allowed to germinate under controlled conditions for a predetermined period. After germination, the grains were dried to constant weight and finely milled before incorporation into the experimental diets. Roasted soybean grains were subjected to heat treatment using traditional dry-roasting methods, followed by grinding. All experimental diets were prepared and offered in mash form throughout both the starter and grower phases. The feed formulation of the experimental diets
is presented in Table 1.

Table 1

The feed formulation of the experimental diets (%)

Ingredients (%)	Roastedsoybean (SG)	Sproutedsoybean (SGG)	Soybeanmeal (TS)
Soybean source	30.0	33.0	24.0
Maize	58.0	55.0	64.0
Wheat bran	3.0	3.0	3.0
Cottonseed cake	3.0	3.0	3.0
Oyster shell	1.8	1.8	1.8
Red palm oil	1.0	1.0	1.0
Lysine	0.1	0.1	0.1
Methionine	0.2	0.2	0.2

Ingredients (%)	Roastedsoybean (SG)	Sproutedsoybean (SGG)	Soybeanmeal (TS)
Dicalcium phosphate	1.0	1.0	1.0
Salt (NaCl)	0.2	0.2	0.2
Premix	0.2	0.2	0.2
Broilerconcentrate	1.5	1.5	1.5
Total	100	100	100

2.4. Growth performance and feed efficiency

Feed intake (FI) was recorded weekly by replicate. Body weight was measured at the beginning of the experiment and subsequently at weekly intervals. Average daily weight gain (DWG) was calculated for the starter phase, grower phase, and the entire rearing period. Feed conversion ratio (FCR) was calculated as the ratio of feed intake to body weight gain for the corresponding periods.

Live body weights were recorded weekly for each replicate. The following performance indicators, daily feed intake (FI), daily weight gain (DWG), feed conversion ratio (FCR) was calculated using the following formula:

$$FI\ (g/jr) = \frac{Distributed\ feed - Remaining\ feed}{Period\ given * Number\ of\ subject}$$

$$DWG\ (g/jr) = \frac{Weight\ of\ the\ current\ week - Weight\ of\ the\ previous\ week}{Rowth\ period}$$

$$FCR = \frac{Feed\ intake}{Weight\ gained}$$

2.5. Carcass characteristics

At day 42, a representative sample of birds from each treatment group was randomly selected for carcass evaluation. Birds were fasted for 12 hours, weighed, and humanely slaughtered following standard poultry processing procedures. The following parameters were recorded: live weight, bleeding weight, plucked weight, gutted weight, carcass weight, and the weights of major cuts and internal organs (liver, heart, gizzard, spleen). Sex effects and diet × sex interactions were also evaluated. Carcass yield (%) was calculated as:

$$Carcass\ yield\ (\%) = \frac{Carcass\ weight}{Live\ weight\ at\ slaughter} * 100$$

2.6. Sensory evaluation

Meat samples from the leg, wishbone, and thigh were cooked under standardized conditions (boiled in water at 100 °C until an internal temperature of 75 °C was reached) and subjected to sensory analysis. Evaluation was performed by a trained panel of 10 members (5 men and 5 women, aged 22–45), recruited and trained according to ISO 8586:2012 guidelines for sensory panel selection and training (ISO, 2012). Panelists underwent two training sessions to familiarize themselves with poultry meat sensory descriptors and to calibrate their use of the evaluation scale. A 9-point hedonic scale (1 = dislike extremely, 9 = like extremely), widely validated in poultry meat sensory studies (Meilgaard *et al*., 2007), was used to score appearance, flavor, tenderness, juiciness, and overall acceptability. Each sample was coded with random three-digit numbers and presented in a randomized order to minimize bias. Water and unsalted crackers were provided between samples for palate cleansing.

Meat samples from leg, wishbone, and thigh were cooked and evaluated by a trained panel of 10 members (5 men, 5 women, aged 22–45). Panelists were familiarized with poultry sensory descriptors before evaluation. They scored appearance, flavor, tenderness, juiciness, and overall acceptability using a 9-point hedonic scale (1 = dislike extremely, 9 = like extremely).

2.7. Statistical analysis

Growth performance data were analyzed using linear mixed-effects models implemented in R (nlme package). Diet was included as a fixed factor, while individual animals were treated as random effects with time (weeks) specified as a repeated measure, to account for the correlation between successive measurements on the same animal. Carcass traits and sensory evaluation scores were analyzed using linear models (agricolae package), with diet as the main fixed factor. Economic parameters were compared using one-way ANOVA. Least-square means were estimated and compared using Tukey's HSD test with adjustment for multiple comparisons (emmeans package).
Model assumptions of normality and homogeneity of variances were assessed by visual inspection of residual plots, Shapiro–Wilk tests for normality, and Levene's tests for homoscedasticity. Where necessary, data were log- or square-foot transformed to better meet model assumptions, and results are reported for the transformed data. Model fit and adequacy were further evaluated by examining AIC values and residual diagnostics.

2.8. Chemical composition and nutritional values of feed ingredients

The experimental diets were formulated to be isoenergetic and isoproteic, in accordance with established nutritional requirements for broiler chickens during the starter and grower phases. The formulation was based on NRC (1994) recommendations, and the chemical composition and calculated nutrient values of the experimental diets are presented in Table 2.

Table 2
Chemical composition and nutritional values of experimental diets

Nutrients	Roastedsoybean	Sproutedsoybean	Soybeanmeal
Crudeprotein (%)	18.64	18.64	18.64
Ether extract (%)	9.30	9.28	4.04
Crudefiber (%)	3.66	3.93	3.82
Ash (%)	5.92	6.09	6.06

Nutrients	Roastedsoybean	Sproutedsoybean	Soybeanmeal
Calcium (%)	1.05	1.06	1.04
Total phosphorus (%)	0.62	0.62	0.60
Lysine (%)	1.01	1.03	0.99
Methionine (%)	0.50	0.50	0.50
Met + Cys (%)	0.80	0.80	0.81
Metabolizable energy (kcal/kg DM)	2923.2	2924.6	2925.3

3. Results

3.1. Feed intake

Feed intake was significantly affected by the experimental diets throughout the rearing period (Figure 1). From the second week onward, birds fed the sprouted soybean diet (SGG) showed a higher feed intake compared with those receiving the roasted soybean grain (SG) and soybean meal (TS) diets. This difference became more pronounced during the grower phase (d21–d42), indicating improved palatability and/or nutrient availability associated with soybean germination.

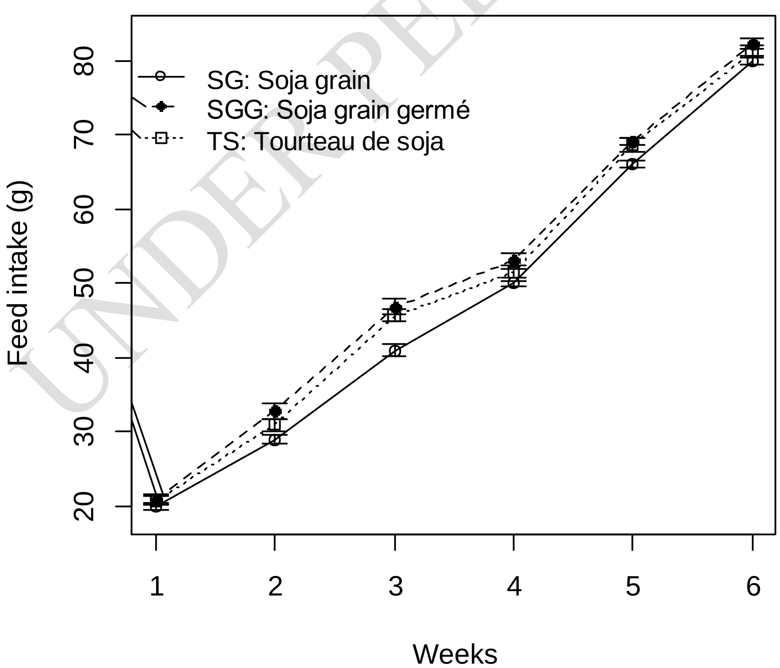

Figure 1: Effect of experimental diets on feed intake

3.2. Live body weight and average daily weight gain

The evolution of live body weight is presentedin figure 2. Birds fed the sprouted soybean diet consistently exhibited higher body weights compared with the other dietary groups throughout the experimental period.

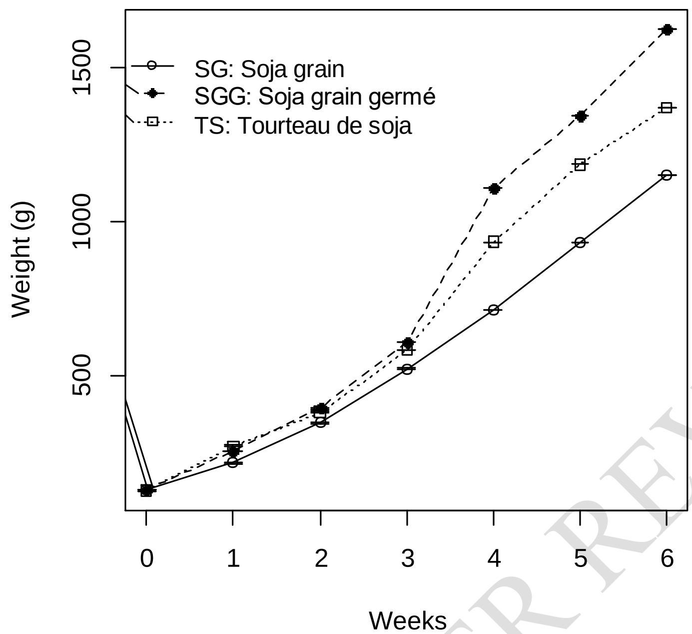

Figure 2: Evolution of live body weight

Average daily weight gain (DWG) was significantly influenced by diet during both the starter (d1–d21) and grower (d21–d42) phases, as well as over the entire rearing period (d1–d42) (Table 3).During the starter phase, DWG was highest in birds fed SGG (22.99 ± 0.06 g/day), followed by TS (21.64 ± 0.03 g/day), while the lowest DWG was observed in birds fed SG (18.76 ± 0.03 g/day; $p < 0.001$). A similar trend was observed during the grower phase, where birds receiving SGG achieved significantly higher DWG (48.14 ± 0.01 g/day) compared with TS (37.36 ± 0.02 g/day) and SG (29.88 ± 0.07 g/day; $p < 0.001$). Over the entire experimental period, cumulative DWG remained significantly higher in the SGG group (39.57 ± 0.03 g/day), followed by TS (29.50 ± 0.01 g/day), and SG (24.33 ± 0.05 g/day; $p < 0.001$).

Table 3: Effect of diet on average daily weight gain

DWG	Diets	P

	SG	SGG	TS	
d_1-d_{21}	18.76^{a}±0.03	22.99^{b}±0.06	21.64^{c}±0.03	0.001
d_{21}-d_{42}	29.88^{a}±0.07	48.14^{b}±0.01	37.36^{c}±0.02	0.001
d_1-d_{42}	24.33^{a}±0.05	39.57^{b}±0.03	29.50^{c}±0.01	0.001

a and b: means with different letters are significantly different (p < 0.05)

Feed conversion ratio (FCR) was significantly affected by dietary treatment at all growth stages (Table 4). During the starter phase, birds fed the SGG diet exhibited the lowest FCR (1.40 ± 0.05), indicating superior feed efficiency compared with SG (1.60 ± 0.01) and TS (1.47 ± 0.01; $p < 0.001$).

During the grower phase, FCR remained significantly lower in the SGG group (1.42 ± 0.01) compared with TS (1.80 ± 0.07) and SG (2.19 ± 0.02; $p < 0.001$). Over the entire rearing period (d1–d42), birds fed SGG maintained the best feed efficiency (FCR = 1.41 ± 0.05), followed by TS (1.68 ± 0.10), while the poorest FCR was observed in the SG group (1.96 ± 0.01; $p < 0.001$).

Table 4: Effect of diets on feed conversion ratio

FCR	Diets			P
	SG	SGG	TS	
d_1-d_{21}	1.60^{a}±0.01	1.40^{b}±0.05	1.47^{c}±0.01	0.001
d_{21}-d_{42}	2.19^{a}±0.02	1.42^{b}±0.01	1.80^{c}±0.07	0.001
d_1-d_{42}	1.96^{a}±0.01	1.41^{b}±0.05	1.68^{c}±0.10	0.001

a and b: means with different letters are significantly different (p < 0.05)

The effects of diet, sex, and their interaction on carcass traits are summarized in table 5. Diet had a significant effect on plucked weight ($p = 0.034$), gutted weight ($p = 0.031$), and rate weight ($p = 0.001$), whereas no significant effects were observed for live weight, carcass weight, or most cut parts. Sex and the interaction between sex and diet did not significantly influence the majority of carcass parameters.

Table 5
Effect of diet, sex on carcass yield

Parameters	Effect of diet	Effect of sex	Sexe*Diet
Live weight	0.086	0.239	0.668
Bleeding weight	0.050	0.270	0.686
Plucked weight	0.034	0.198	0.656
Gutted weight	0.031	0.280	0.269
Carcass weight	0.429	0.067	0.184
Head and leg weight	0.181	0.957	0.955
Wishbone weight	0.224	0.388	0.327

Weight of thigh with bone	0.297	0.362	0.355
Weight of boneless thigh	0.153	0.809	0.960
Leg weight with bone	0.149	0.802	0.976
Weight of boneless leg	0.388	0.392	0.380
Carcassyield	0.143	0.108	0.066
Gizzard weight	0.407	0.372	0.419
Heart weight	0.707	0.054	0.964
Liver weight	0.306	0.401	0.091
Rate weight	0.001	0.934	0.992

Mean values of carcass yield and organ weights according to diet are presented in Table 6. Birds fed the sprouted soybean diet exhibited higher plucked weight (1.34 ± 0.04 kg) and gutted weight (1.07 ± 0.04 kg) compared with those fed the soybean grain diet ($p < 0.05$). Carcass yield tended to be higher in the SGG group (72.10 ± 1.02%) and TS group (71.87 ± 1.17%) compared with SG (66.76 ± 1.39%), although these differences were not statistically significant.

Regarding internal organs, diet significantly affected rate weight, which was lower in birds fed SGG (0.001 ± 0.001 kg) compared with SG and TS ($p < 0.05$). No significant differences were observed among diets for gizzard, heart, and liver weights.

Table 6
Carcass yield and organ weight

Paramètres	Rations		
	Soja grain	Soja grain germé	Tourteau de soja
Live weight	1.22±0.07	1.41±0.05	1.32±0.04
Bleeding weight	1.17±0.06	1.37±0.04	1.27±0.04
Plucked weight	1.30^{b}±0.06	1.34^{a}±0.04	1.25^{ab}±0.04
Gutted weight	0.92^{b}±0.05	1.07^{a}±0.04	1.08^{a}±0.03
Carcass weight	0.81±0.05	0.81±0.15	0.95±0.03
Head and leg weight	0.10±0.01	0.11±0.01	0.42±0.20
Wishbone weight	0.07±0.01	0.09±0.01	0.11±0.07
Weight of thigh with bone	0.05±0.01	0.08±0.01	0.09±0.02
Weight of boneless thigh	0.06±0.01	0.06±0.01	0.04±0.01
Leg weight with bone	0.06±0.01	0.07±0.01	0.05±0.01

Weight of boneless leg	0.05±0.01	0.06±0.01	0.04±0.01
Carcassyield	66.76±1.39	72.10±1.02	71.87±1.17
Gizzard weight	0.04±0.01	0.04±0.01	0.08±0.02
Heart weight	0.007±0.001	0.006±0.002	0.007±0.001
Liver weight	0.02±0.01	0.02±0.01	0.03±0.01
Rate weight	0.005[a]±0.001	0.001[b]±0.001	0.005[a]±0.001

The sensory evaluation of meat quality is illustrated in Figure 3. Although quantitative sensory scores were not statistically analyzed, meat from birds fed soybean grain appeared to show slightly higher scores for juiciness and tenderness compared with the other dietary treatments. However, these differences did not offset the superior growth performance and carcass traits observed in birds fed the sprouted soybean diet.

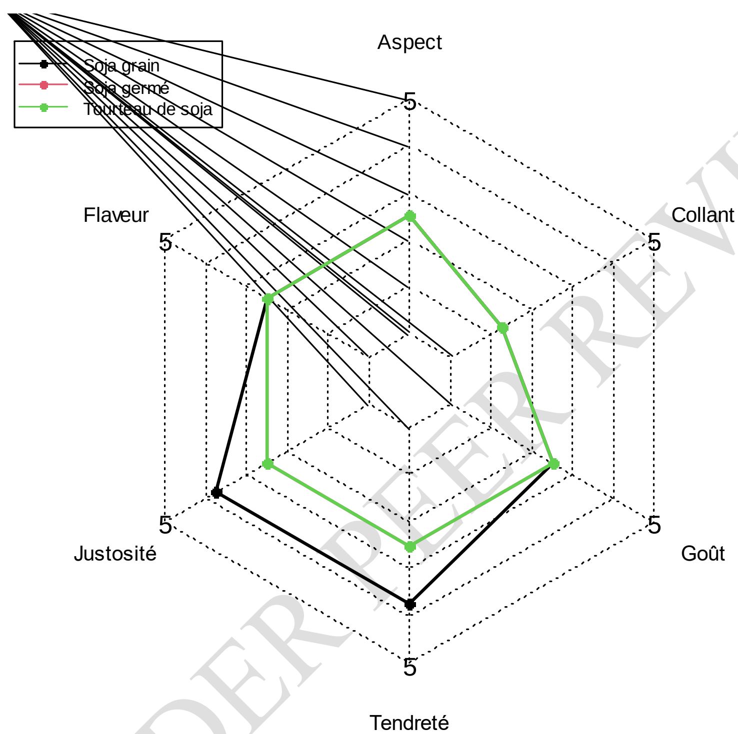

Figure 3: Sensory quality

4. Discussion

The higher feed intake observed in broilers fed the sprouted soybean diet (SGG) from the second week onward is consistent with the documented effects of germination on the nutritional and functional properties of legumes used in poultry diets. Germination activates endogenous hydrolytic enzymes, leading to partial degradation of storage carbohydrates and proteins, a reduction in non-starch polysaccharides and flatulence-causing oligosaccharides, and improved palatability of feed ingredients. These biochemical changes generally enhance voluntary feed intake and nutrient utilization in broilers fed sprouted grains or legumes (Frias et al., 2008; Shi et al., 2021). In a comprehensive review of sprouted feed ingredients for broilers, Sugiharto (2021) reported that germination consistently improves feed consumption due to reduced antinutritional factors and improved digestibility, supporting the higher feed intake recorded in the present study.

The significantly higher daily weight gain recorded in birds fed the SGG diet across all production phases clearly demonstrates the growth-promoting effect of sprouted soybean. During the starter phase, SGG birds achieved 22.99 g/day, significantly exceeding those fed roasted soybean grain (SG) and soybean meal (TS) ($p = 0.001$). Early growth responses are nutritionally critical, as improved nutrient availability during the starter phase strongly influences muscle fiber development and final body weight in broilers (NRC, 1994). Comparable early growth advantages have been reported in broilers fed germinated and fermented soybean products, where improvements were attributed to enhanced protein digestibility and amino acid bioavailability (Lee et al., 2010).

The superiority of the SGG diet became more pronounced during the grower phase, where daily weight gain reached 48.14 g/day, compared with 29.88 g/day for SG and 37.36 g/day for TS. Over the entire production cycle, cumulative daily weight gain under SGG (39.57 g/day) confirmed a sustained growth advantage. These results are in agreement with studies demonstrating that germination reduces soybean trypsin inhibitor activity and phytate content, thereby improving protein and mineral utilization in broilers (Shi et al., 2021). Sugiharto (2021) further emphasized that the improved biological value of proteins and enhanced enzyme accessibility in sprouted grains contribute directly to higher growth rates, particularly when sprouted ingredients partially replace conventional protein sources.

The marked improvement in feed conversion ratio (FCR) observed in birds fed the SGG diet provides strong evidence of enhanced nutrient utilization efficiency. The overall FCR of 1.41 recorded under SGG was substantially lower than those observed for SG (1.96) and TS (1.68) ($p = 0.001$). Soybean antinutritional factors, particularly trypsin inhibitors and lectins, are known to impair protein digestion and increase endogenous nitrogen losses when soybeans are inadequately processed (Kerley et al., 2003; Clarke & Wiseman, 2007). Germination has been shown to significantly reduce these compounds while improving enzymatic access to nutrients, leading to superior feed efficiency (Frias et al., 2008). In line with the present findings, Lee et al. (2010) reported significantly improved FCR in broilers fed diets containing germinated and fermented soybean without adverse effects on organ development.

Dietary treatment significantly affected plucked and gutted weights, with birds fed sprouted soybean showing superior values. The higher carcass yield observed under the SGG diet (72.10%) compared with the roasted soybean grain diet (66.76%) indicates a more efficient partitioning of nutrients toward edible tissues. Similar responses have been reported when germinated soybean or other sprouted grains were used to partially replace conventional protein or energy sources in broiler diets, resulting in increased slaughter weight and carcass yield without compromising carcass composition (Sugiharto, 2021). The absence of significant sex × diet interactions further suggests that the beneficial effect of sprouted soybean on carcass traits is stable across sexes.

Organ weights were largely unaffected by dietary treatment, except for spleen weight, which was significantly lower in birds fed the SGG diet. A reduced spleen weight may indicate lower immune or inflammatory stimulation, possibly associated with reduced gut irritation and improved intestinal environment resulting from lower antinutritional factor content. Studies on germinated soybean have similarly reported no adverse effects on liver, heart, or gizzard weights, confirming the physiological safety of germinated soybean products in broiler nutrition (Lee et al., 2010).

Although growth performance and carcass yield favored sprouted soybean, sensory analysis indicated slightly higher juiciness and tenderness in birds fed roasted soybean grain. Heat processing is known to influence muscle protein denaturation and intramuscular fat distribution, which may enhance certain sensory attributes (Adeyemi &Sazili, 2014). However, previous studies on germinated soybean have shown that improvements in growth performance and feed efficiency are generally achieved without major negative effects on meat physicochemical quality, and occasional sensory differences do not outweigh the overall production benefits (Lee et al., 2010).

Overall, the findings of the present study clearly demonstrate that sprouted soybean outperforms roasted soybean grain and rivals soybean meal in supporting broiler growth performance, feed efficiency, and carcass yield. These results are strongly supported by the broader body of literature on sprouted grains, which identifies germination as a simple, low-cost, and effective processing method for enhancing nutrient availability, improving feed utilization, and promoting sustainable broiler production systems, particularly in feed-cost-constrained regions (Sugiharto, 2021).

5. Conclusion

The incorporation of sprouted soybean in broiler diets significantly improved growth performance and feed efficiency of Ross 308 chickens compared with roasted soybean grain and soybean meal. Birds fed sprouted soybean showed higher daily weight gain and a lower feed conversion ratio throughout the production cycle, indicating superior nutrient utilization. Carcass evaluation revealed higher plucked and gutted weights and a numerically greater carcass yield without adverse effects on internal organs or sex-related responses. Although minor sensory differences were observed, sprouted soybean proved to be a nutritionally effective and safe protein source, offering a practical alternative for sustainable broiler production, particularly in feed-cost-constrained systems.

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