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Quillaja saponaria and Yucca schidigera: Growth Performance and Nutrient Digestibility in Broilers

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Introduction

There has been a growing interest in utilizing plant-based feed additives in poultry nutrition. *Q. saponaria* and *Y. schidigera* are two plants known for their high content of saponins, which possess surfactant properties and polyphenols, which exhibit antioxidant, antimicrobial and anti-inflammatory properties. This study aimed to investigate the effects of an additive derived from a proprietary blend of *Q. saponaria* and *Y. schidigera* biomass on the growth performance, nutrient digestibility and intestinal morphology of broiler chickens. Broilers were divided into four dietary treatment groups: a nonsupplemented control diet Control. The control diet supplemented with a commercial additive containing polyphenols and saponins from *Q. saponaria* and *Y. schidigera* at a rate of 250 g/ton from day 1 to 42, QY supplementation from day 28 to 42 and QY supplementation from day 35 to 42. The researchers evaluated various parameters including body weight gain, feed intake, carcass yield, blood biochemistry, nutrient digestibility and intestinal measurements. No significant effects of the dietary treatments were observed on body weight gain, feed intake, carcass yield, or blood biochemistry parameters.

Description

These birds also exhibited increased villus height, which is associated with improved nutrient absorption and decreased crypt depth, indicative of a healthier intestinal environment. The utilization of a polyphenol and saponin additive derived from *Q. saponaria* and *Y. schidigera* biomass positively influenced the growth performance, nutrient digestibility and intestinal morphology in broilers. The improved FCR observed in birds supplemented with QY suggests enhanced feed utilization and efficiency. Moreover, the additive demonstrated beneficial effects on intestinal health, as indicated by reduced intestinal permeability, increased villus height and decreased crypt depth. These findings highlight the potential of plant-based feed additives, specifically those rich in polyphenols and saponins, in optimizing broiler production [1].

The use of *Q. saponaria* and *Y. schidigera* biomass as a natural additive may provide a viable alternative to conventional growth promoters, contributing to improved sustainability and animal welfare in the poultry industry. Further research is warranted to explore the underlying mechanisms and optimize the dosage of these additives to maximize their benefits in poultry nutrition. The results of this study demonstrate the potential of the polyphenol and saponin additive derived from *Q. saponaria* and *Y. schidigera* biomass in improving the growth performance, nutrient digestibility and intestinal morphology of broiler chickens. The observed effects can be attributed to the bioactive compounds present in these plants, such as saponins and polyphenols, which have been recognized for their diverse biological activities.

One of the notable findings of this study is the improvement in Feed Conversion Ratio (FCR) in broilers supplemented with the QY additive throughout the entire experimental period. FCR is an important parameter in poultry production as it reflects the efficiency of feed utilization. The lower FCR observed in the QY-supplemented groups suggests enhanced nutrient absorption and utilization, leading to improved growth performance. This finding is consistent with previous studies that have reported the positive impact of saponins on nutrient utilization in poultry. Intestinal health plays a crucial role in nutrient absorption and overall performance of broiler chickens. In this study, broilers receiving the QY additive demonstrated reduced intestinal permeability, which indicates enhanced gut barrier function [2].

Maintaining a healthy intestinal barrier is essential for preventing the entry of harmful substances and pathogens into the bloodstream. The reduction in intestinal permeability observed in the QY-supplemented groups suggests a protective effect on intestinal integrity, potentially reducing the risk of gut-related diseases and improving overall health. The improved nutrient digestibility observed in the QY-supplemented groups further supports the beneficial effects of the additive on intestinal health. Enhanced ileal digestibility of dry matter, nitrogen and energy indicates improved nutrient absorption in the small intestine, where most of the digestion and absorption processes occur. This finding suggests that the QY additive promotes better utilization of dietary nutrients, leading to improved growth and performance [3].

The morphometric measurements of the intestine provide valuable insights into the structural changes induced by the QY additive. Broilers supplemented with QY from day 28 to 42 exhibited higher villus height and lower crypt depth compared to the control group. These morphological changes indicate an increase in the absorptive surface area of the intestine, which is essential for efficient nutrient uptake. The longer and more developed villi provide a larger surface area for nutrient absorption, while the reduction in crypt depth suggests a healthier gut environment with improved nutrient processing and absorption capabilities. The lack of significant effects on carcass yield and blood biochemistry parameters suggests that the QY additive does not negatively impact meat quality or induce adverse effects on the physiological parameters measured in this study.

This finding is important as it indicates the safety and suitability of the additive for use in poultry production. The inclusion of a polyphenol and saponin additive derived from *Q. saponaria* and *Y. schidigera* biomass in broiler diets positively influenced growth performance, nutrient digestibility and intestinal morphology. The observed improvements in FCR, intestinal permeability, nutrient digestibility and intestinal morphology highlight the potential of this natural plant-based additive in optimizing broiler production. The utilization of such additives can offer sustainable alternatives to conventional growth promoters in poultry nutrition, contributing to improved efficiency, gut health and overall performance of broiler chickens. Further research is needed to elucidate the underlying mechanisms of action and optimize the dosage and application strategies for achieving the maximum benefits of these plant-based additives in broiler diets [4].

While this study provides valuable insights into the effects of the *Q. saponaria* and *Y. schidigera* additive on broiler performance, nutrient digestibility and intestinal morphology, there are several avenues for further investigation. Understanding the underlying mechanisms through which the polyphenols and

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saponins exert their effects on broiler health and performance is essential. Further research should focus on elucidating the molecular pathways involved in nutrient absorption, gut barrier function and immune modulation influenced by the additive. This could involve gene expression analysis, metabolomic profiling and studying the interactions between the additive and gut microbiota. Investigating the optimal dosage levels and timing of supplementation is crucial to maximize the benefits of the additive.

This study evaluated different supplementation durations, but further investigations could explore a range of dosage levels to determine the most effective and economical inclusion rates for various stages of broiler growth. Gut Microbiota Modulation: The gut microbiota plays a vital role in nutrient metabolism, immune response and gut health. Exploring the impact of the *Q. saponaria* and *Y. schidigera* additive on the composition and activity of the gut microbiota could provide insights into its mode of action. Microbiome analysis techniques, such as 16S rRNA sequencing or metagenomics, can be employed to assess the microbial changes associated with the additive supplementation. Evaluation of Meat Quality: Assessing the impact of the additive on meat quality parameters, such as tenderness, flavor and oxidative stability, would provide a comprehensive understanding of its effects on broiler production. Future studies could investigate the sensory attributes and storage stability of broiler meat from birds supplemented with the additive, ensuring that the improved performance translates into desirable meat quality traits. Long-Term Effects: This study evaluated the effects of the additive over a relatively short period. Long-term studies are needed to assess the sustained impact of the additive on broiler performance, health and production efficiency throughout the entire growth cycle [5].

Conclusion

Additionally, examining the carryover effects of the additive on breeder performance and subsequent generations would provide a more comprehensive understanding of its overall benefits. The utilization of a polyphenol and saponin additive derived from *Q. saponaria* and *Y. schidigera* biomass holds promise for improving broiler growth performance, nutrient digestibility and intestinal morphology. The findings of this study highlight the potential of plant-based additives as sustainable alternatives to conventional growth promoters in poultry nutrition. Further research should focus on elucidating the mechanisms of action, optimizing dosage levels and timing, exploring the impact on the gut microbiota, assessing meat quality parameters and investigating long-term effects. Continued investigation into the use of natural additives in poultry nutrition will contribute to the development of effective and sustainable strategies for optimizing broiler production and health.

Acknowledgement

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Conflict of Interest

None.

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