

Valorization of Olive Cake as a By-product in Broiler Ration and its Effect on Growth, Carcass Characteristics, and Blood Parameters.

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Introduction

Innovation in agriculture aims to achieve a "zero waste" economy, in which waste from raw materials is used to produce new goods and applications (Mirabella et al., 2014). On the other hand, the fast-expanding chicken farming industry raises feed costs and consumption dramatically. Feed expenses account for over 70% of production costs in the chicken sector (Mikail et al., 2021). The byproducts of olive oil manufacturing are not typical feed items in chicken nutrition. Despite their low nutritional value, they can provide energy and nutrients, as well as bioactive compounds, for broiler chicken nutrition (Moneca et al., 2020).

Olive oil manufacturing produces significant amounts of by-products and waste, which can be harmful to the environment due to their high organic content and phytotoxicity (Nunes et al., 2016).

Olives contain polyphenols like oleuropein, hydroxytyrosol, and tyrosol, which have antimicrobial, antiatherogenic, antioxidant, anti-inflammatory, anticoagulant, antihypertensive, hypolipidemic, and anticancer properties in animals (Ghanbari et al., 2012; Leskovec et al., 2018; Şahin and Bilgin, 2018).

Previous research has found that adding olive industry products to grill diets may have a detrimental impact on growth performance indicators, but only to a certain level (Sayehban et al., 2020). The goal of this study was to employ solid-state fermentation technology to bio-transform and valorize olive cake, a byproduct of the Egyptian olive industry, to add value to chicken feed. In this situation, the issue is to allow the complex fibers found in olive cake—lignin, cellulose, and hemicellulose—to break down and be consumed by birds.

Material and methods

The study aimed to employ solid-state fermentation technology to bio-transform and valorize olive cake, a byproduct of the Egyptian olive industry, in order to increase the value of chicken feed. In this case, the goal is to make the olive cake's complex fibers—lignin, cellulose, and hemicellulose—easier for birds to digest.

The ISIS and SEKEM Company (Agricultural Seeds, Herbs and Plants Mixed Spices, Belbis, Sharkia governorate, Egypt) provided the by-product (olive cake), aromatic and herbal plants. In this study, three kinds of fragrant herbs—lemongrass, chamomile, and mint—were combined and administered as feed additives to treatment 2 at a rate of 4%.

The nutritional value of the ingredients was determined using the Association of Official Analytical Chemists (AOAC) Official Methods. Afterward, the Institutional Animal Care and Use Committee (CU-IACUC), Cairo University, Egypt, authorized the animal housing and handling guidelines. Feeding studies with the broilers were conducted in floor pens under similar growing conditions. Water and pelleted feed were always available. The broilers were fed the control food, and the experimental diet contained olive cake. Broilers were fed growing meals containing 23% crude protein. Also investigate the impact of output on growth rate, feed intake, European production index, blood parameters, and economic efficiency.

Results and discussion

Regardless of the amount of OC, administering herbal and aromatic plants significantly increased the growth rate and output index. The addition of 40% and 50% OC to broiler diets showed no obvious effect on feed intake, growth rate, or the European production index. Furthermore, regardless of OC level, supplementing with herbal and aromatic compounds resulted in a significant increase in the growth rate of the European production index. The addition of

herbal and aromatic ingredients to meals containing 40% and 50% OC had a substantial effect on the birds' blood parameters. Furthermore, broiler-fed diets include 40%-50% lower feed costs.

Conclusions

Even if the cost of chicken ration is rising and animals are competing with humans for food, it is recommended that part of the waste olives that humans do not consume be used as an alternate source of feed additives for poultry. Rations are supplied when the proper processing techniques are applied since olive byproducts can be added to grill rations without affecting the animals' health, performance, digestibility, aroma, or nutrient content. The economical and efficient use of these wastes will assist businesses by lowering feed costs.

It has been discovered that employing these wastes as a feed component in broiler rations, combined with proper processing methods, can improve broiler growth performance, lower total broiler production costs, and minimize the number of pollutants emitted into the environment.

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References

- Ghanbari, R. (2012).** Valuable nutrients and functional bioactives in different parts of olive (*Olea europaea* L.) - a review. *International Journal of Molecular Sciences*, 13(3), 3291-3340. <https://dx.doi.org/10.3390/ijms13033291>
- Leskovec, J. (2018).** Effects of olive leaf and marigold extracts on the utilization of nutrients and on bone mineralization using two different oil sources in broilers. *Japan Poultry Science Association*, 55(1), 17-27. <https://doi.org/10.2141/jpsa.0170059>
- Manca Pečjak, Alenka Levart, Janez Salobir, Vida Rezar (2020).** Effect of the supplementation of olive leaves and olive cake on growth performance and bone mineralisation of broiler chickens. *Acta fytotechn zootechn*, 23, 105-111.
- Mikail Y., Ayşe G. F. and Gökhan F. 2021.** the effect of olive wastes for poultry feed on growth performance of broilers: a review. *J. Glob. Innov. Agric. Sci.*, 9(4):163-166
- Mirabella, N., V. Castellani, S. Sala. 2014.** Current options for the valorization of food manufacturing waste: a review. *J. Clean. Prod.* 65:28-41.
- Nunes, M. A. et al. (2016).** Olive by-products for functional and food applications: Challenging opportunities to face environmental constraints. *Innovative Food Science and Emerging Technologies*, 35, 139-148. <https://doi.org/10.1016/j.ifset.2016.04.016>
- Sahin, S. and Hilgin, M. (2018).** Olive tree (*Olea europaea* L.) leaf as a waste by-product of table olive and olive oil industry: a review. *Journal of the Science of Food and Agriculture*, 98(4), 1271-1279. <https://doi.org/10.1002/jsfa.8619>
- Sayehban, P., A. Seidavi, M. Dadashbeiki, A. Ghorbani, W. A. G. de Araújo, A. Durazzo, M. Lucarini, P. Gabrielli, B. Omri, L. F. T. Albino, E. B. Souto and A. Santini. 2020.** Olive Pulp and Exogenous Enzymes Feed Supplementation Effect on the Carcass and Offal in Broilers: A Preliminary Study. *Agriculture*. 10:359.