

Mushroom stump waste could be inexpensive, healthy chicken feed supplement

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Feed costs for producing broiler chickens accounts for 60% to 70% of total production costs, and stump waste from the production of button mushrooms comprises nearly 30% of total mushroom weight. Marrying the two has the potential to reduce both cost and waste, especially in

Pennsylvania, which is a national leader in the production of broiler chickens and button mushrooms.

To learn whether the two are compatible, a team of Penn State researchers conducted a new study to determine how supplementing the feed of broilers with mushroom stump waste affected the growth and health of the chickens.

In findings available online now, which will be [published](#) in the upcoming June issue of *The Journal of Applied Poultry Research*, the researchers reported that results from the 21-day trial indicate that [broiler chickens](#) fed up to 3% mushroom stump waste grew at the same rate as birds in the study that didn't receive fungi supplementation, and their digestion was unaffected. Supplementation at 4% and 5%, the researchers found, slowed growth and interfered with the birds' digestion of amino acids, or the [organic compounds](#) used to make proteins.

"The use of low-cost unconventional ingredients has become common practice when formulating poultry diets, and alternatives may include by-products that result from food crops used for human consumption," said research team leader John Boney, Vernon E. Norris Faculty Fellow of Poultry Nutrition in the College of Agricultural Sciences. "Mushroom stump waste may include the potential added benefit of novel nutritional benefits for the broilers."

The study included 480 broiler chickens purchased from a commercial hatchery on day of hatch. The birds were randomly selected, weighed, placed into groups and fed six dietary treatments. One [control group](#) received no fungi supplementation; others had diets with 1%, 2%, 3%, 4% and 5% mushroom stump waste. The researchers tested birds in the study for their ability to digest 17 [amino acids](#) and carefully tracked each one's growth and health.

Mushroom stumps for the research were obtained from a commercial mushroom farm in southwest Pennsylvania and transported to Penn State. Mushroom stumps were dried in a small grain drier and ground into appropriate size particles for inclusion in poultry feed.

Pennsylvania is the foremost producer of mushrooms in the U.S., accounting for 64% of all button mushrooms produced in the country from 2021 to 2023, according to the U.S. Department of Agriculture's National Agricultural Statistics Service. The three-year average of the Agaricus, or button, mushroom crop in the United States from 2021–23 was 321,601 metric tons.

During harvest, the mushroom head is separated and used for [human consumption](#), while the stump is composted as an agricultural by-product. On average, the stump waste is nearly 29% of the total mushroom weight, Boney noted.

"Therefore, roughly 93,264 metric tons of button mushroom stumps are composted yearly," he said. "The stump is fibrous and contains therapeutic bioactive compounds with antimicrobial and antioxidant activities. Because of its nutritive and medicinal properties, mushroom stump waste may be a viable feedstuff generated from material previously deemed as waste. That's particularly relevant in Pennsylvania, which ranks fourth in the U.S. in poultry production."

Contributing to the research were Logan Erb, Courtney Poholsky and Alyssa Lyons, who all graduated with doctoral degrees in animal science from Penn State.

More information: L.S. Erb et al, Effects of mushroom stump waste inclusions to broiler diets on amino acid digestibility and d1–21

performance, *Journal of Applied Poultry Research* (2024). [DOI: 10.1016/j.japr.2024.100421](https://doi.org/10.1016/j.japr.2024.100421)

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