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Exploring the Utilisation of Food Waste to Create a Circular Economy in Poultry Production

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Abstract

Following a pilot study in laying hens, a series of experiments was designed to explore the feasibility of substituting commonly used feed ingredients with food waste inclusions in broiler chickens. After exploring food waste digestibility in an earlier broiler study, a trial was conducted at the University of New England to determine the growth performance of broiler chickens when fed diets consisting of up to 70% food waste. The trial consisted of 4 treatments. Treatment 1 acted as a control, consisting of commonly used commercial ingredients; wheat and soybean meal. Treatment 3 consisted of 30% commercial ingredients and 70% food waste inclusions, including fruit and vegetable meal, bakery meal, meat and bone meal, fish offal, and spent brewer's grain. Treatment 2 was made of a 50:50 blend of treatments 1 and 2, thus consisting of 65% commercial ingredients and 35% food waste inclusions. Treatment 4 consisted of 35% commercial ingredients, and 65% food waste inclusions. The food waste inclusions in treatment 4 included those mentioned previously, as well as experimental ingredients such as pub, restaurant, university, hospital, and nursing home waste. Food Recycle Ltd supplied the processed food waste streams, which were collected and processed according to their patents (PCT/AU2017/051130, PCT/AU2023/050227 & PCT/AU2024/051021). In the starter phase, treatment 2 had the highest weight gain and feed intake. Treatment 3 had the second highest weight gain, and both treatments 2 and 3 had the lowest FCR (0.96). In the grower and finisher phases, treatment 1 had the highest weight gain and feed intake, while treatment 3 had lower weight gain and feed intake. Treatment 2 had intermediate results. In the withdrawal phase, treatment 3 had the highest weight gain and lowest feed intake, with a significantly lower FCR (1.49) than treatment 1 (1.81). Treatment 2 once again had intermediate results. Overall, treatment 3 had lower weight gain (2618 g/bird) and feed intake (3992 g/bird) than treatments 1 and 2 without any significant difference in FCR, having an overall FCR of 1.54. Treatment 1 had the highest weight gain (3200 g/bird) and feed intake (4840 g/bird) with an FCR of 1.45. Treatment 2 had intermediate results (2994 g/bird of weight gain and 4465 g/bird of feed intake), with an FCR of 1.46. Treatment 4 consistently performed below all of the other treatments, having the lowest weight gain and feed intake, and highest FCR in every stage of the trial. There were no significant differences in weight gain or FCR between treatments 1 and 2 overall, suggesting that food waste inclusions of up to 35% maintain performance while reducing feed costs of 8 cents per kg of live gain.

Keywords: broiler nutrition, food waste