

## **Substitute Animal Feeds: Fermented Azolla as An Alternative for Broiler Chickens**

Lailatul Jaaizah Qusham<sup>a</sup>, Farizan Aris<sup>a\*</sup>

### **Structured Abstract**

**Background:** Poultry farming significantly contributes to economic, cultural, and social development while meeting over 30% of global animal protein needs. Rising urban demand has expanded broiler production, with global output increasing slightly between 2017 and 2018. In Malaysia, poultry is essential due to dietary preferences, particularly among Muslims. Feed costs constitute up to 75% of production expenses, with concerns over the halal status of imported feed influencing consumer choices. Additionally, plant-based feed may hinder broiler growth. This review explores sustainable, locally sourced feed alternatives to address cost and halal concerns, ensuring long-term economic viability in Malaysia's poultry industry.

**Literature Review:** *Azolla spp.*, a free-floating freshwater fern, thrives in tropical and subtropical regions and is known for its rapid growth, high nutritional content, and symbiotic relationship with *Anabaena azollae*, which enables nitrogen fixation. This fern contains 25-35% crude protein, essential amino acids, vitamins, and minerals, making it an ideal feed supplement for poultry, particularly broilers. Its use as a broiler feed ingredient enhances growth performance, nutrient absorption, and overall feed conversion. However, plant-based feed sources may contain anti-nutritional factors (ANFs) that affect digestibility, which can be reduced through processes like fermentation, improving nutrient bioavailability.

**Objective:** This study aims to identify *Azolla* species suitable for animal feed substitution, evaluate its nutritional composition post-fermentation, explore effective microorganisms for optimizing fermentation, assess fermentation techniques for feed quality enhancement, and analyse the impact of fermented *Azolla* on broiler chicken growth performance.

**Conclusion:** In conclusion, this review examines the potential of fermented *Azolla* as a sustainable, cost-effective, and halal alternative to traditional poultry feed. *Azolla*, readily available in wetland areas, can enhance broiler productivity by improving body weight, feed conversion, and intake. The review highlights the need for further research into *Azolla* species diversity, fermentation methods, and optimal inclusion rates to improve broiler performance and sustainability. Such efforts could reduce reliance on imported feed, promote economic viability, and ensure halal compliance.

**Keywords:** *Azolla*, Animal Feed, Fermented Feed, Broiler Chicken

\*Correspondence: [farizan@uitm.edu.my](mailto:farizan@uitm.edu.my)

<sup>a</sup> School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia