

# Effects of a Mealworm Larvae-Based Diet on Laying Performance and Egg Quality in Laying Hens in Algeria

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## Abstract

Soybean is a crucial component of animal feed, especially for poultry and monogastric animals, because of its high protein and amino acid content. However, dependence on soybeans—particularly imported varieties—poses challenges, including price volatility and concerns regarding GMOs. Organic farming, which prohibits GMOs, faces even higher costs to source non-GMO soybean meal. To address these issues, alternative protein sources such as insects are attracting interest. Insects provide a rich supply of proteins, fats, vitamins, and minerals, offering a sustainable substitute for both soybean and fishmeal. Key insect candidates for feed include the black soldier fly, housefly, and yellow mealworm (*Tenebrio molitor*, TM). Research indicates that insect meal can replace traditional feed sources without reducing productivity.

This study, conducted at a poultry farm in Chemini, Bejaia, Algeria, examined 36 Isa-Brown laying hens, 40 weeks old. The hens were divided into 12 pens (3 control and 9 experimental), with experimental groups receiving feed supplemented with 1% (TM1), 2% (TM2), or 4% (TM4) mealworms. Over a four-week period, egg quality (physical and chemical properties) and feed conversion efficiency were evaluated. Data analysis, performed using SAS software with a significance threshold of  $P < 0.05$ , revealed no significant differences in laying rates ( $P = 0.48$ ), although the TM4 group showed a slightly lower rate. However, TM4 achieved the best feed conversion ratio ( $P = 0.03$ ). Egg quality parameters, including weight and shell characteristics, remained consistent across all groups, with no significant differences in cholesterol or essential fatty acids.

Incorporating mealworms into poultry feed thus appears to improve feed efficiency while maintaining egg quality, although there was a slight reduction in laying performance at higher inclusion rates. The relatively small sample size, however, limits the generalizability of these findings.

**Key-words:** Soybean; Insect meal; Poultry feed; *Tenebrio molitor*; Feed conversion efficiency