Nitrogen Budget of Broiler Production under Closed-House Management Conditions

Atapattu N.S.B.M. 1*, Gunawardana W.W.D.A. 1, Abeywickrama L.M. 1 and Munasinghe M. 2

1Department of Animal Science, University of Ruhuna, Sri Lanka
2MIND Institute, Sri Lanka
*nsbm@ansci.ruh.ac.lk

Abstract

Intensive livestock production systems while relying heavily on external N inputs generate excessive amounts of N pollutants such as NH\textsubscript{3}. In intensive closed-house system of broiler management, external N inputs are either retained in growing birds, excreted into litter, wasted due to mortalities or volatilized as noxious gasses, mainly NH\textsubscript{3}. A clear understanding about the N input flows and the partitioning of N among the products, by-products and wastes is important to increase the N use efficiency of a production process. The present study determined the fate of N inputs during the 41 day production cycle of broiler chicken in closed-house system, with a view of suggesting strategies for higher environmental sustainability of the system.

A total direct N balance trial was conducted for three production cycles (from day 1-41) in three closed houses, each housed 32500 birds. The directly measured N inputs were day old chicks, feeds and paddy husk while the N outflows were mortalities, broilers slaughtered for market and spent litter. The difference between the sum of direct N inflow and outflow was considered as the loss of N as NH\textsubscript{3}. 101±4.2 kg of external N inputs were required per 1000 chicks enter into the system. Feed accounted for as high as 98% of the N inputs while day old chicks and paddy husk as the litter material accounted only 1.2 and 0.7%, respectively. Feed fed after day 20 accounted 64% of the total feed contribution.

Reflecting high growth performance parameters of the closed house system, 64.8% of the total N inputs was retained in final marketable live weights. However, as high as 21.5% of N built-up in litter and 13% loss of N as NH\textsubscript{3} indicate not only the gravity of the problem but also the possible means of interventions for better N utilization efficiencies of the system. NH\textsubscript{3} loss was equivalent to 13.2 g of NH\textsubscript{3} per chick in, 6.1 g of NH\textsubscript{3}/Kg live weight and 7.2 g of NH\textsubscript{3}/Kg of dressed broiler meat. Though the loss of N due to mortalities was low (0.6%), the same could further be reduced. Possibilities of improving N utilization efficiency through better feed efficiency are argued to be low under closed-house conditions. Consequently, means of reducing NH\textsubscript{3} formation in the litter, recycling of waste and by-products such as litter, dead birds and offal are proposed to increase the environmental sustainability of broiler production under closed-house conditions.

Keywords: Nitrogen, Budget, Broiler, Ammonia, Efficiency