(94)

Nitrogen Budget of Broiler Production under Closed-House Management Conditions

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Abstract

Intensive livestock production systems while relying heavily on external N inputs generate excessive amounts of N pollutants such as NH_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_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_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_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_3 loss was equivalent to 13.2 g of NH_3 per chick in, 6.1 g of NH_3/Kg live weight and 7.2 g of NH_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_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