

(23)

Litter Phosphorus Load and On Farm-Eutrophication Potential of Naturally Ventilated Open and Tunnel Ventilated-Closed House Broiler Production Systems**Atapattu N.S.B.M.^{1*}, Abeywickrama L.M.¹, Gunawardane W.W.D.A.¹, Munasinghe M.²**¹ *Department of Animal Science, Faculty of Agriculture, University of Ruhuna, Sri Lanka*²*MIND Institute, Colombo, Sri Lanka***mahindaatapattu@gmail.com***Abstract**

Eutrophication of water bodies due to the leaching and run off of nutrients, mainly nitrogen and phosphorus (P) from spent poultry litter has become a severe environmental issue in many countries. Risks of eutrophication of water bodies are increased when spent litter is dumped indiscriminately in and around the farm as practiced by some poultry farms. Given the rapid expansion of poultry production in Sri Lanka, understanding on environmental issues related to utilization and disposal of spent litter are of important. This study compares the environmental impacts related to P excretion and spent litter under naturally ventilated open house (OH) and tunnel ventilated closed house (CH) broiler production systems. Growth performance, litter production and litter P levels and spent litter disposal practices of 130 and 88 production cycles of 130 and 5 OH and CH farms, respectively were analysed. Litter P levels were not significantly different between two production systems. Lower P utilisation efficiency, growth performance and higher total litter production/Kg LW were reported in OH system, resulting in higher litter P out/Kg LW. Litter P out g/Kg of litter of Sri Lankan OH and CH systems exceeded the international recommended levels. All CH farms disposed spent litter effectively while thirty percent of the OH farmers used to dispose spent litter indiscriminately allowing loss of N and P by leaching, run off or volatilisation. On-farm eutrophication potentials (EPfarm) due to N and P emissions from litter during the growing cycle and, indiscriminately dumped litter were 5.7 and 3.2 g PO₄ eq/Kg LW for OH and CH, respectively. Of the EPfarm value of OH system, 29% was due to indiscriminate dumping of spent litter. Meanwhile, 84%, and 16% EPfarm were due to the emissions to air and water, respectively. Contribution of NH₃, NO_x and P were 80, 13 and 7%, respectively. The study concludes that negative impacts related to P utilisation efficiency, litter production and disposal practices were higher under OH than under CH. Improvements in both P utilisation efficiency and growth performance are identified as the main avenue to reduce P waste generation from OH system while for CH operations, improvements in dietary P utilisation efficiency is recommended. The study also alerts about the possible negative impacts due to the use of spent litter as an organic fertilizer on soil P build up and those due to indiscriminate disposal of spent litter in small scale OH operators.

Keywords: Eutrophication, Poultry, Litter, Phosphorus