

Gas emission in the poultry production

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Abstract Among the greenhouse gases produced in broiler chicken production environments, ammonia stands out for being present in higher concentrations and for significantly affecting human and animal health. Thus, this review evaluates the various sources of ammonia generation in animal production facilities, the damages caused by ammonia emissions in broiler chicken production facilities, and the accompanying economic losses. The main source of ammonia in broiler production is the nitrogen ingested in the diet, which is broken down into uric acid and, eventually, into ammonia that is volatilized from the bed to the environment. High ammonia concentrations in such facilities can affect productivity and result in economic losses. The effects on the environment are eutrophication of water bodies and ground water contamination. Ammonia emission control in poultry production facilities is therefore inevitable to avoid economic losses, prevent environmental damage, and increase feed efficiency.

Keywords: air quality, ammonia emission, broilers

Introduction

Intensive animal production in confinement, in particular in the case of poultry farming with the use of reused avian beds, is responsible for the emission of a significant amount of air pollutants. The most commonly emitted gases are carbon monoxide (CO), carbon dioxide (CO₂), and ammonia (NH₃), with NH₃ being the main gas which negatively affects birds and workers (Angus et al., 2006) and is generally found in high concentrations in poultry farms (Owada et al 2007).

For more than a decade, the impacts of NH₃ emissions on the environment have been the focus of research studies in several European countries and in North America (Faulkner and Shaw 2008; Mosquera et al 2005; Scholtens et al., 2004), where gas inventories have already been carried out and

protocols to reduce ammonia emissions have been established. In these countries, studies evaluating pollutant emissions from animal production facilities can generally be performed relatively easily, since most of the facilities are closed and, therefore, control the volume of air in the coats (Osorio-Saraz et al 2014).

For regions with tropical and subtropical climates, such as Brazil, the determination of pollutant emissions from animal production is much more complex (Mendes et al 2014). This is mainly due to the fact that almost all animal production facilities in Brazil, as well as in other countries with a hot climate, are kept open for most of the time (Tinôco 2001), thus constituting open thermodynamic systems influenced by wind currents and other non-controllable external factors, making it difficult to quantify emission levels (Saraz et al 2013).

For countries with hot climates, there are only a few studies on atmospheric pollutant emissions from food production; most of these studies have focused on animal farming in intensive breeding systems, as the amount of waste produced has become a serious issue in this industry. In this review, we have focused on ammonia emissions in animal production in order to evaluate the issues of high emissions in poultry production systems under tropical and subtropical climates. Such a review can also raise awareness of this problem and contribute to maintain environmental quality standards associated with the production of low-cost food, such as chicken, with the aim to increase food production sustainability.

For this, we searched the literature aiming to review the main sources of ammonia in animal production facilities, main damages caused by the emission of particulate pollutants in the poultry industry, specifically ammonia, and the resulting economic losses.

Main sources of ammonia emissions