

# NITROUS OXIDE EMISSIONS FROM POULTRY FARMING

Werner Berg, Annett Model, Jürgen Kern

## Background

Emissions of ammonia and nitrous oxide from poultry farming can cause environmental damages. Development of new housing systems with special consideration of animal welfare should not lead to increased gaseous emissions. Investigations were done, how straw and hemp shives as litter material for laying hens influence ammonia and nitrous oxide emissions.

## Material and Methods

Fresh excreta from laying hens were mixed with water and straw or hemp shives, respectively. The mixtures with dry matter contents of 28.2 - 30.9% were stored in open containers. Gas fluxes were determined using the ventilated chamber method. The ventilation rate during measurements was adjusted so that the air in the headspace always was changed nearly one time per minute. Over a period of 10 days emissions were measured once per day. Concentrations of ammonia (NH<sub>3</sub>) and nitrous oxide (N<sub>2</sub>O) were determined by a photoacoustic multigas monitor (Fig. 1).



Fig. 1: Equipment for trace gas measurement

## Results

### N<sub>2</sub>O Emissions

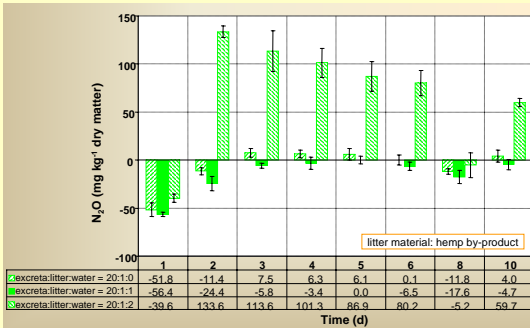


Fig. 2: N<sub>2</sub>O emissions from mixtures of hemp shives and excreta

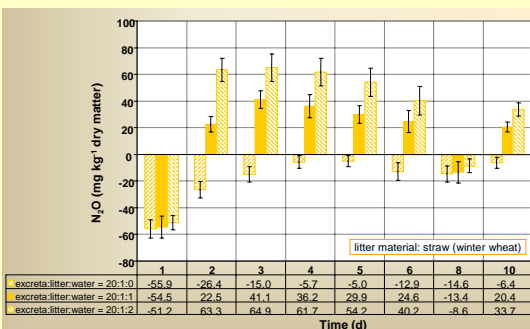


Fig. 3: N<sub>2</sub>O emissions from mixtures of straw and excreta

N<sub>2</sub>O emissions were considerably affected by a lower dry matter content of mixtures when water was added. Columns below zero result from a lower N<sub>2</sub>O concentration in the outlet air than in the air inlet. But so far it is not clarified if excreta can be a N<sub>2</sub>O sink. However, ammonia emissions from poultry excreta are about two orders of magnitude higher than the emissions of N<sub>2</sub>O.

### NH<sub>3</sub> Emissions

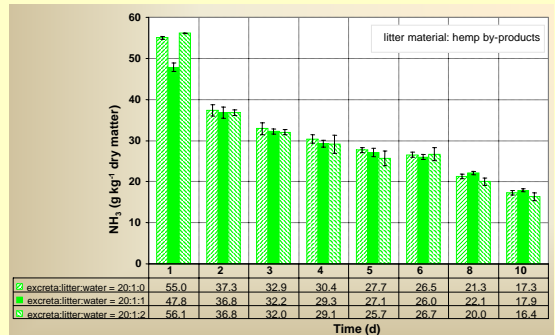


Fig. 4: NH<sub>3</sub> emissions from mixtures of hemp shives and excreta

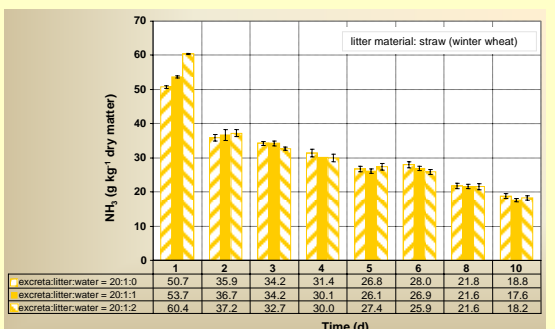


Fig. 5: NH<sub>3</sub> emissions from mixtures of straw and excreta