

Reduction of ammonia emissions from pig houses

BioAktiv Powder

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3 FOREWORD

At the end of 1997 and the start of 1998 Mr. W Wijnbergen commissioned a trial to monitor the levels of ammonia emissions in piggeries. Mr. Wijnbergen from Holland Green International supplied the product BioAktiv that was then introduced to the manure to the pits.

The trial measurements have shown that the concentration of ammonia levels has been significantly reduced. Further test were then conducted in the piggery business owned by Mr. Druijff in Voorthuizen (Niederlande)

We are very thankful for the support and cooperation of both Mr. Wijnbergen and Mr. Druijff for their introduction and services to the trials.

Peter Groot Koerkamp

Project Manager

1 Introduction

The most important components in our environment is SO_2 , NO_x (NO and NO_2) and NH_3 , together with the reaction products SO_x , NO_y and NH_x .

In 1993 there was generally 86% emission contamination existing within the atmosphere through NH_3 , part of this emission came from natural activity and 92% coming from general agricultural activity.

The side effect from NH_3 (ammonia emission) and the total contamination or pollution caused by NH_3 in Holland in 1993, was measured at 46% (Heij and Schneider, 1991) The Government of Netherlands set a task to reduce the agricultural emission by 50% between 1980 -2000, and by the year 2005, another 20%, a total of 70%. To realistically reduce it, scientist would have to find and implement emission reducing technology and systems.

One way to reduce ammonia emission in the pens is in the way the compost is treated in the pits. By adding other components to the manure pits to stimulate natural fermentation reaction, it is possible to treat the manure slurry pit and reduce the ammonia emission.

This is a trial undertaken to measure the effect of Bio-active powder when added to pig feed and applied to the pig manure.

2 Materials and Method

2.1 Conditions of the pigpens.

This research was conducted on the farm property of Mr. W. Druijj in Holland

The research was conducted in a pig pen with two separate Divisions each measuring 9.3 x 6.5m) Each division has pens for 10 pigs with one meter wide walk way. The pens are 3m wide and 2.6m deep = 0.78m² per animal to use. The enclosed area is with (Leichte Grefalle) and floor heating with flush pits, 3 meters wide x 1.2 meters deep.

The food troughs were filled once or twice per day either by hand or automatic dispenser with a mix of water and flour, morning and night. There is only one window, during feed times they used artificial light. They installed an automatic temperature regulator/thermostat. The air comes through the hall and doors through the partitions. The air vents are 45 cm diameter situated in the front of the measuring ventilators with installed flaps which are shut down when needed according to regulator. The partitions have separated trenches (about 0.5m deep) in which the pig manure can be stored far up to 12 weeks.

2.2 Tests/Trial

The next tests/trial were conducted over 4 time periods.

*In section 1 the 45cm ventilation had only single fans whereas in the section 2 the ventilation had a multi fan operation where emission from the ventilation is monitored through a computer . (General translation)

*Temperature relative to the humidity in the air from 4 pens. Every 5 minutes the computer checks and registers the humidity in the air and this stored in the computer database.

*NH₃ concentrations of two pens. The pens are monitored by the Nasa-chemische Method. There is one pump that takes a small air sample which is measured and then compare with the standard guide of European Air Pollution IMAG -DLO NEN 6472 (General translation)

Despite all the calculation and measurements of the amount of ammonia on a daily basis to how much airflow is required to disperse the ammonia, there is some allowance for some variables.

2.3 Treatment and Method (Examination of Ammonia Emission)

Partition 1 - no test took place in this pen

Partition 2 - applied Bioaktiv treatment to reduce ammonia.

Partition 2

Was sprayed with water mixed with Bioaktiv added according to the recommended portion/rate. Also spray the manure product in the pits through the manure pits only according to the application rate and guidelines.

Table 2 lists the test periods and treatments between period 1 and 2; no treatments were carried out in partition 1 and 2. In this period they sterilized the pens and grids. In Table 2 they recorded the OPLEG – data and bench marked each test period and recorded. Prior to the pigs being introduced in the pens, the pens and the pit's manure is flushed the out and totally cleaned and disinfected. To prepare for the application on the 29/11/97 (the piggery) pen 1 got totally clean out and pen 2 got a normal clean out. The partition was removed; all the manure was flushed outward and hosed down and after drying was disinfected with Formalin. In November 1997 the current feed system was replaced by a feed installation unit with auto feed transport (Brocken & Nippel) in a trough in the corner of the Bench.

During Test Period 3-Treatment in partition/pen 2. (start 13/1/98: once into manure pit and weekly it was introduced into the grids and the pig feed.

Table 1 Overall testing period under controlled environment

Period	Date	Testing days	Situation /controlled environment
1	16.09 1997 - .09.1997	6	0 – situation/ no application (handling)
2	06.01.1998 - 09.01 1998	3	0 – situation/ no application
3	23.02.1998 - 02.03.1998	6	Application pen 2

Table 2 Overall testing period of the existing pigs during the trial period as recorded for 1 – 3

Period	Pen 1	Pen 2
1 start of trial	14.07.1997	02.07.1997
1 Total pigs	60	60
2 and 3 Pigs in pen	29.11.1997	29.11.1997
2 Total pigs	60	60
3 Total pigs	53	59

In table 7 you will find the absolute and relative emission from pen 1 (reference point) and 2 (treatment applied)

Table 7 absolute (g NH₃/n per animal area) and relative ammonia emission from the pens. 1 and 2 for the test period 1 to 3. The average standard tolerance/result is shown in brackets.

Period	N	Pen 1	Pen 2	Pen 2 versus Pen 1
1	6	0,241(0,017)	0,234(0,010)	0,98(0,03)
2	3	0,268(0,014)	0,377(0,005)	1,41(0,06)
3	6	0,216(0,008)	0,205(0,002)	0,96(0,03)

Based on the tests in pen 2 one could make a comparison between period 2 (untreated) and period 3 (treated with Bioaktiv powder) In period 2 the emission in pen 2 was 41% higher (1,41) than in partition 1. After the treatment (period 3) the emission in partition 2 was 4% lower (0,96) compared to the emission from partition 1. You could say that the emission from the pens is 45% lower against the reference pen (without treatment)

4 Discussion and Summary

It can be said that the test on the ammonia concentration and emission showed results after being treated with the Bioaktiv powder. The emission from pen 2 in comparison to the reference pen was found to be 45% lower through the use of Bioaktiv powder. This took into account the ammonia reading during the trial.

During the research no manure samples were taken for analysis to determine the changes and effects that may have occurred. Therefore only a part of the trial was tested.

There are testimonials of people prepared to describe their usage and results from using Bioaktiv powder in reduction of ammonia emission in pig pens. Further research is recommended.