



A Quality and Technology Network

# Gaseous emissions from soil fertilized with manure of pigs fed with manipulated diets

2007 C3P & NASA TECHNICAL WORKSHOP  
Partnership for Energy and Environmental Stewardship  
November 7,8 & 9, 2007  
PENICHE, PORTUGAL

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# INTRODUCTION

Problems related with intensive livestock:

- Concentration in specific regions (Oeste, Alentejo, Montijo, etc.);
- Insufficient areas available for disposing the manure at farm level;
- Heavy legislative pressure by EU.



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# INTRODUCTION (cont.)

## IPPC – Integrated Pollution Prevention Control

Installations are required to apply for Environmental License, with the adoption of Best Available Techniques



Strategies of waste management



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# OBJECTIVES

## PROJECT AGRO 440:

Financed by the Portuguese Agriculture Ministry (2004-2007)

### Consortium Partners:

EZN – Estação Zootécnica Nacional

EAN – Estação Agronómica Nacional

ISQ – Instituto de Soldadura e Qualidade

LQRS – Laboratório Rebelo da Silva



FPAS – Federação Portuguesa de Associação de Suinicultores

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# METHODOLOGY -Productive trials

-45 Large White x Land Race growing/finishing males (35-90 Kg)

- 3 experimental diets

Diet T – 18% crude protein bicalcic phosphate

Diet N – 15 % crude protein, amino acid balanced

Diet P – 18 % crude protein, monocalcic phosphate

- Integral collection and storage of manure T,N,P (Physical, chemical and microbiological evaluation).



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# METHODOLOGY (cont.)

## Agronomical Studies

- Manure were evaluated in fertilization studies  
4 levels of application (0 to 170 Kg/ha of organic N).  
Complete randomized block design, with three replications
- Sorghum was used as plant test (60 kg/ha);
- Vegetal biomass production was quantified.



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Figure 1:  
Spreading the manure



Figure 2:  
Monitoring analyzer



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# METHODOLOGY (cont.)

Air Emissions were monitored

For the treatment corresponding to the highest dose of N application (170 kg/ha)

At six times after soil application:

- Before spreading (initial situation);
- 15 minutes and 4 hours after spreading (time of the day with the highest temperature);
- 12 hours after the scattering (the night period);
- 15 minutes and 4 hours after incorporation in the soil (the highest temperature).



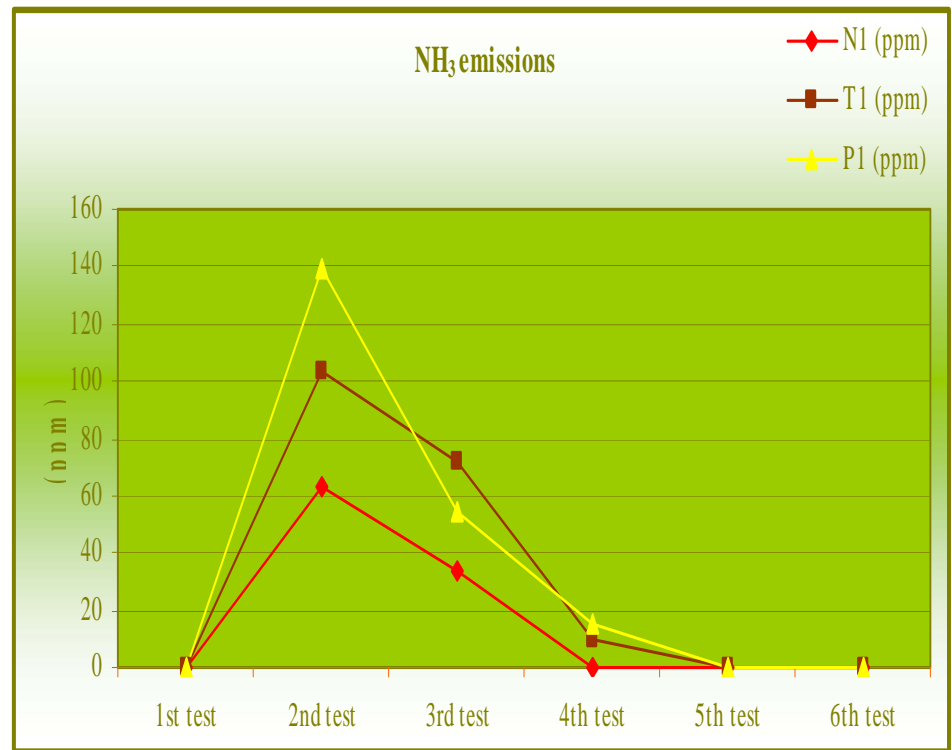
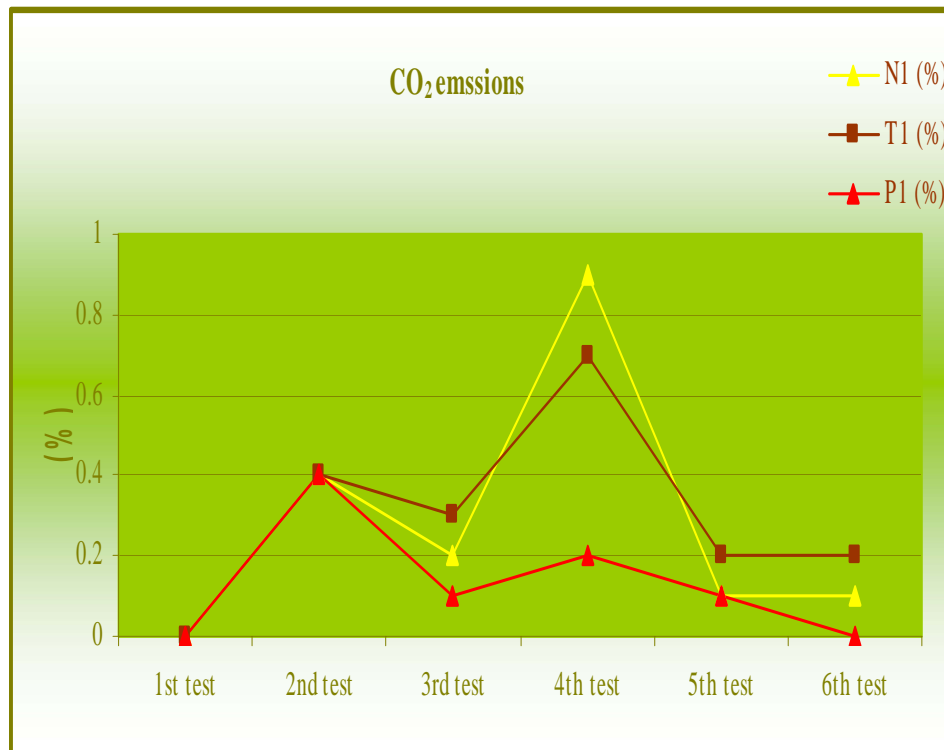
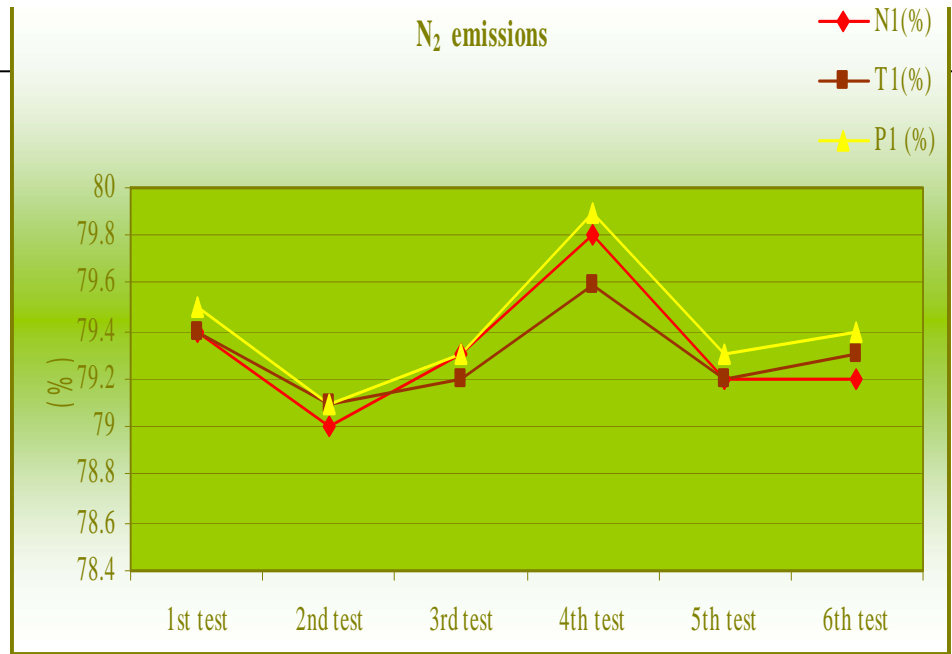
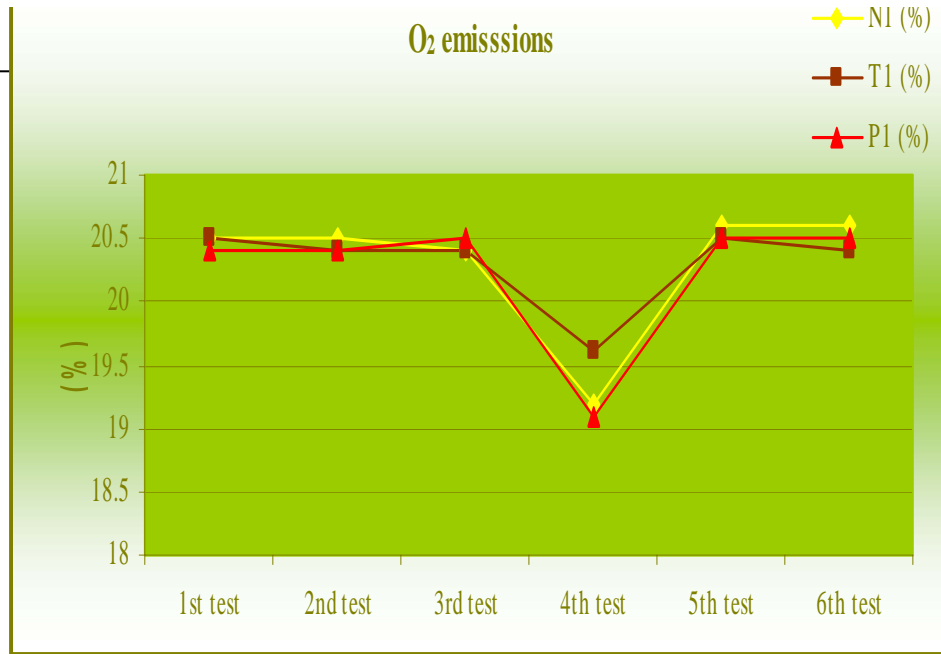


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# RESULTS OF AIR EMISSIONS MONITORING

- The experience was replicated in 2 years (2005 and 2006), in spring time.
- The temperature flouts between 12° C in the night period and 24° C during the day.
- The weather was partially cloud, with high levels of humidity, and weak winds.
- The 4th test was made in the nigh period.





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## SOME CONCLUSIONS

The spreading should be made in optimal weather conditions (in the beginning of the day, weak wind, without heavy rain).

The manure incorporation in soil should be made in the same day of spreading, reducing the nutrients lost (in air emissions form).



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## SOME CONCLUSIONS

The lowest ammonia and CO<sub>2</sub> emissions were observed for manure N.

In terms of evaluation of the environmental impact caused by the application of the manure in the soil, diet N will have a lower impact than P and T.

Tanks for your attention!

