THE EFFECTS OF BIOAGUMENTATION ON SELECTED MICROBIAL PARAMETERS OF SWINE SLURRY PITS

Linda A. Torres, Roberto Reinoso, Juan A. Alvarez, Mari Cruz García, Cristina León & Eloy Bécares

UNIVERSIDAD DE LEÓN
Area de Ecología

INSTITUTO DE MEDIO AMBIENTE

INSTITUTO TECNOLÓGICO AGRARIO

Junta de Castilla y León

Additives

Additives:

Substances that are applied to a livestock waste with the intention to alleviate one or more of the problems (e.g. ammonia volatilization, odor release, handling problems)

Bioaugmentation:

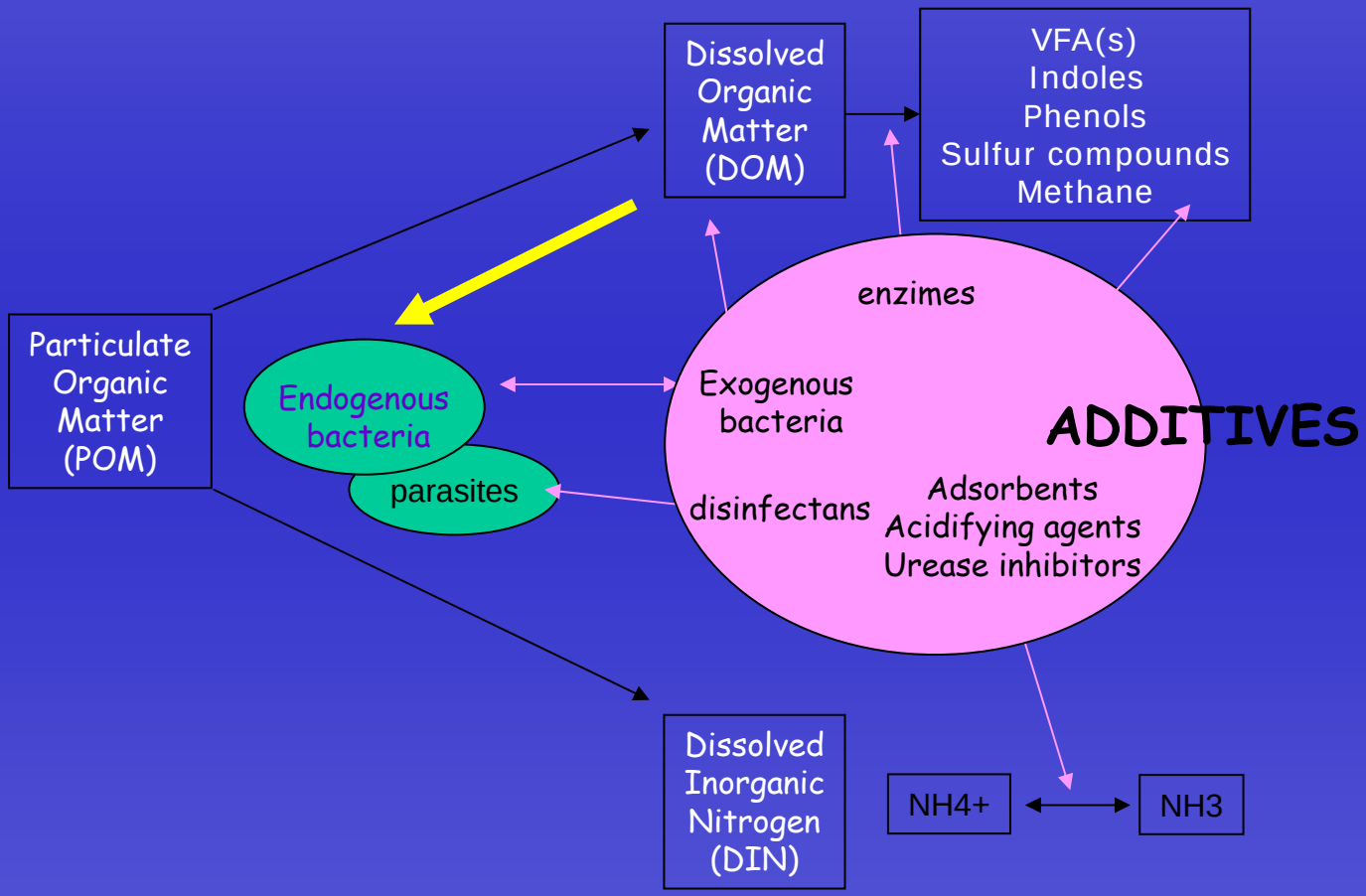
Selected microbial strains and/or enzimes that enhances the biodegradability of livestock wastes

Additives:

Bacteria- enzimes
Plant extracts
Oxidizing agents
Disinfectans
Urease inhibition
Masking agents
Adsorvents

(McCroy and Hobbs (2001)

Additives effect on slurry



PROBLEMS

waste handling

Odor

Pathogens pollution

Air and water pollution

Objectives

-Efficiency of additives is variable and depends on the objective

(good for ammonia in some cases, poor for biologically-driven processes)

-Studies on farms are escarce (most studies under lab. conditions)

-Objective:

To study the effects of one additive (Actilith) under practical conditions in swine farms on selected physico-phemical and faecal bacteria indicators.

Actilith ® (Timac, Inabonos)

ACTIVITY

- Liquifies slurry (hydrolisis of POM)
- Homogenises liquid manure
- Absorbs unpleasant odours
- Mineralises and agronomically valorises liquid manure

COMPOSITION

-Lithothamne (marine algae)

- Clay (benthonite): ionic exchange

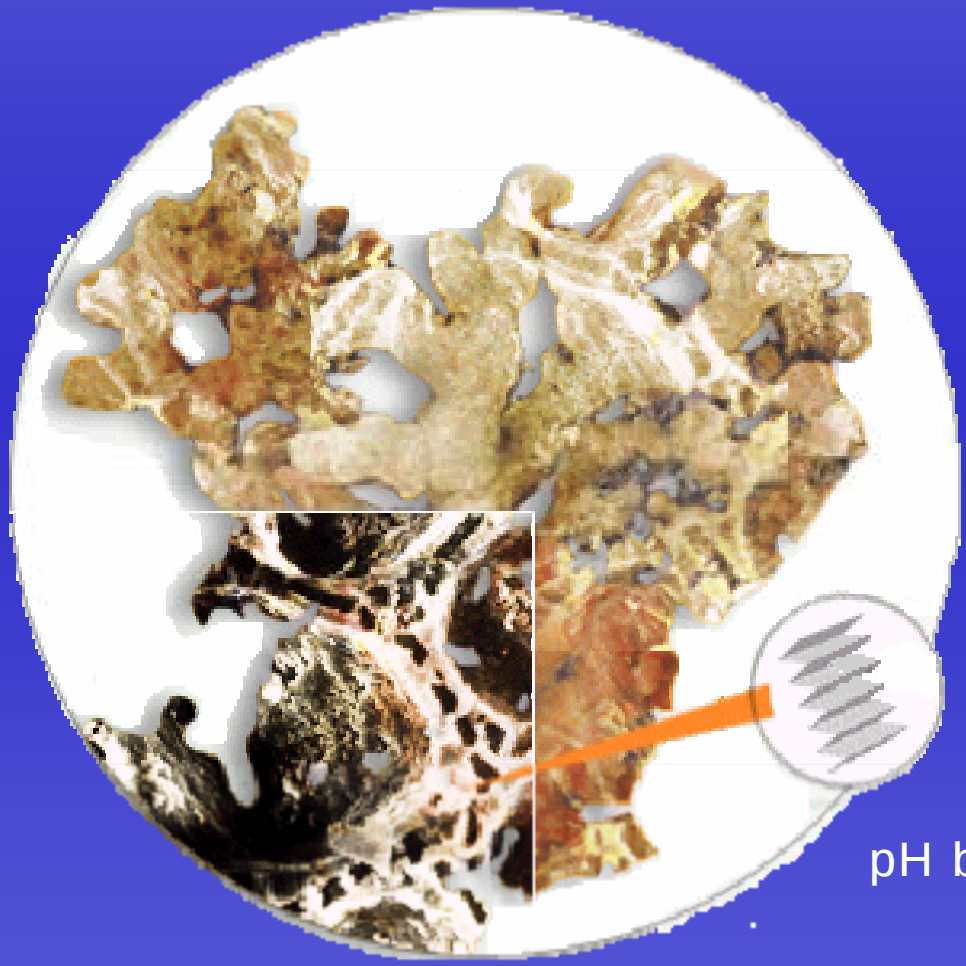
- Bacteria (cellulolitic) 10^5bact/g: degradation of POM

- Brewer's yeast: promotes bacteria growth

- Ascopharm (algae powder): promotes bacteria growth

LITHOTHAMNE

(*Lithothamnium calcareum*)



80 % Carbonates
20 % Oligoelements

High specific surface

17 m²/gr

pH buffer, physical support for bacteria.

Actilith ® (Timac, Inabonos)

ACTIVITY

- Liquifies slurry (hydrolisis of POM)
- Homogenises liquid manure
- Absorbs unpleasant odours
- Mineralises and agronomically valorises liquid manure

COMPOSITION

-Lithothamne (marine algae)

- Clay (benthonite): ionic exchange

- Bacteria (cellulolitic) 10^5bact/g: degradation of POM

- Levadura de cerveza: promotes bacteria growth

- Ascopharm (algae powder): promotes bacteria growth

Actilith ® (Timac, Inabonos)

APPLICATION RATES

Sprinkling the product over the area

Post wearing: 200 g in one application.

Fattenning: 500 g/pig + 2 applications of 200 g/pig

Farrowing: 60 g/sow/day

Pretanks and main tanks: 1 kg/m^3

MATERIAL AND METHODS

TWO FARMS IN CASTILLA-LEÓN REGION

FARM A: slurry from gestating sows
slurry from farrowing sows+ control pit without additive

FARM B: pit slurry from finishing pigs + control pit without additive

STUDY PERIOD

FARM A:

SPRING			SUMMER		
Gestating pits		Farrowing pits	Gestating pits		Farrowing pits
+6 days	+30days	+26 days	+4 d.	+34 d.	+63 d

FARM B: Monthly addition of Actilith to finishing pigs pits + control

Sampling after 30 and 93 days of addition in summer

MATERIAL AND METHODS

MICROBIAL GROUPS

Faecal coliforms (FC)

Faecal streptococci (FS)

E. coli (EC)

Clostridium perfringens (CP)

Staphylococci (ST)

PHYSICO-CHEMICAL ANALYSIS

Chemical oxygen demand (COD),

Total suspended solids (TSS)

Total Kjeldahl nitrogen (TKN)

APHA, AWWA, WEF (1995) Standard Methods for the Examination of Water and Wastewater.

RESULTS

PHYSICO-CHEMISTRY (data in g/L)

	Farm A								Farm B		
	spring				summer				summer		
	gestating		farrowing		gestating		farrowing				
	+6	+30	Cont. +26	+26	+4	+34	Cont. +63	+63	Cont. +93	+30	+93
TSS	38	11	15	4	18	14	7	5	44	10	43
COD	44	19	45	9	30	27	16	23	108	54	104
TKN					15	6	2	4	12	5	16

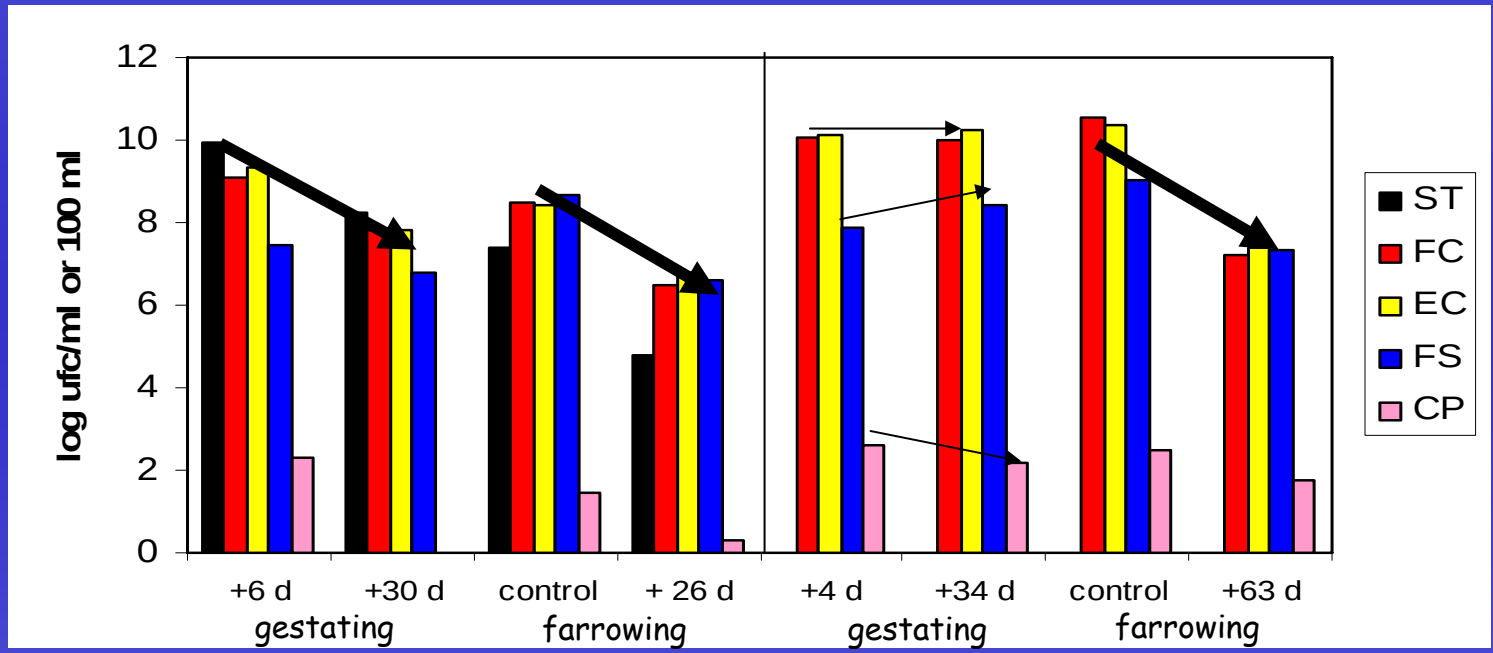
ADDITIVE EFFECT ON ORGANIC MATTER
SEASON DEPENDING EFFECT ?

Slurry application dependent effect

RESULTS

MICROBIOLOGY

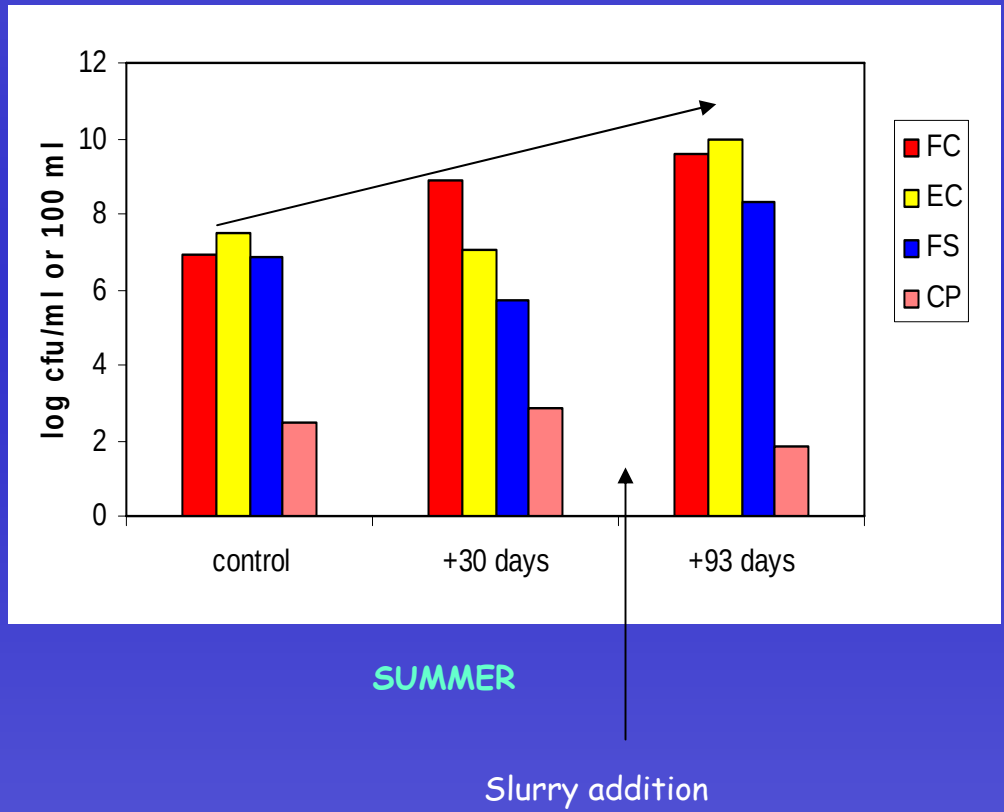
FARM A



RESULTS

MICROBIOLOGY

FARM B



CONCLUSIONS

1. The additive helps to reduce COD, SS and TKN

2. Faecal bacteria indicators were reduced in some cases by the additive.

3. The efficiency of bioaugmentation under practical conditions at pig farms seems to be highly dependent on the season and patterns of slurry application to the pits. Additive should be be added at the same frequency than the slurry.


"That's
all
folks!"