

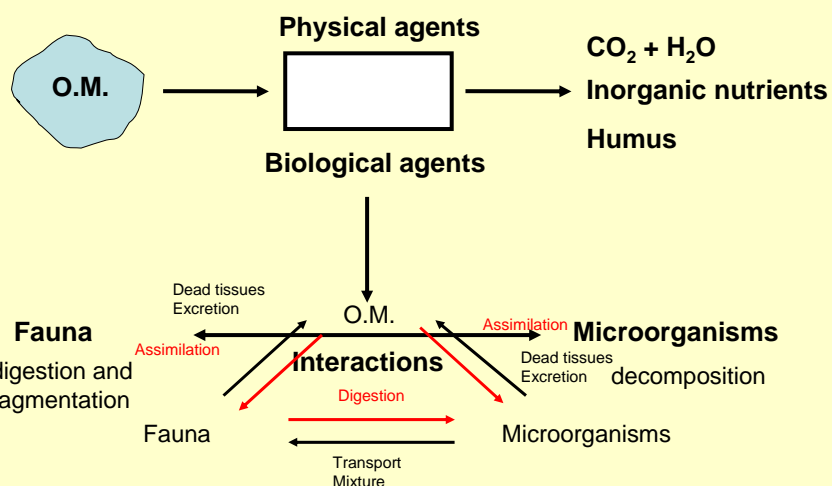
Earthworms and microorganisms: disentangling the black box of vermicomposting

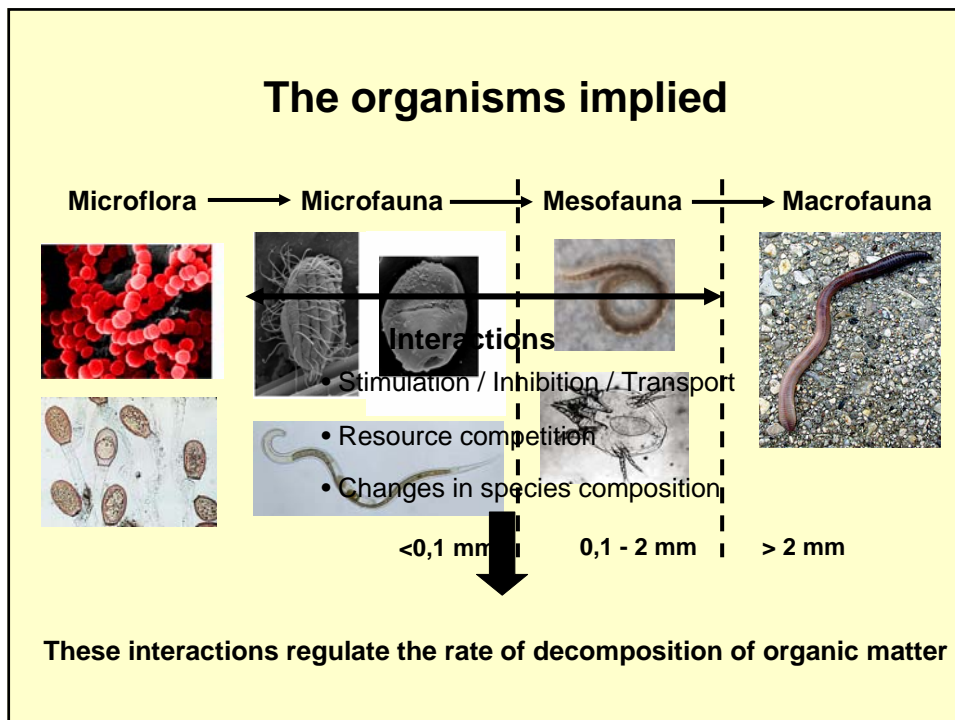


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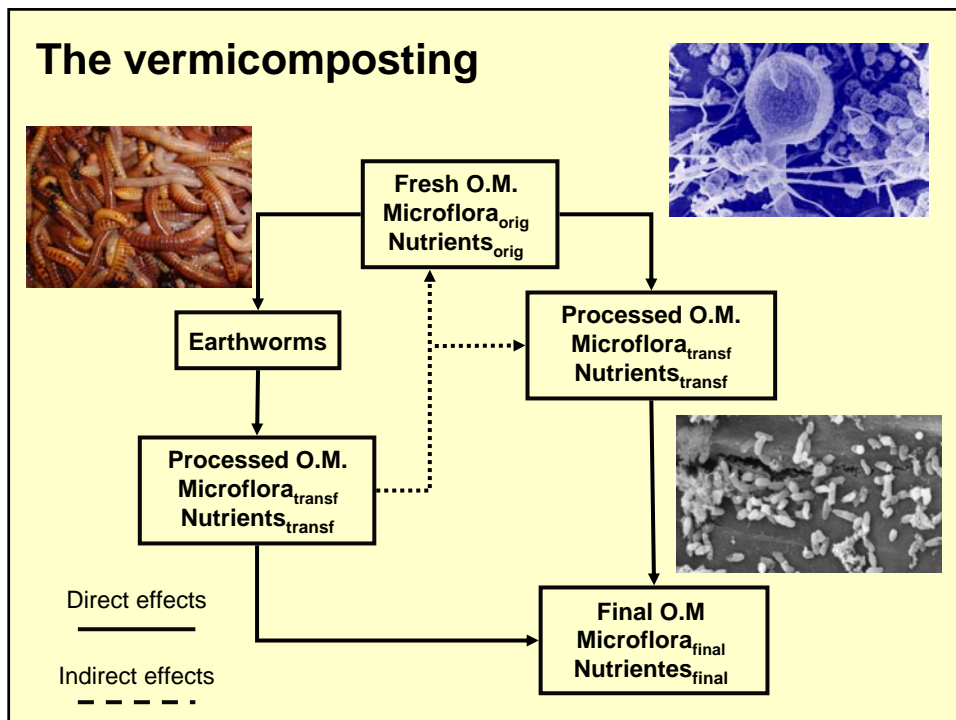
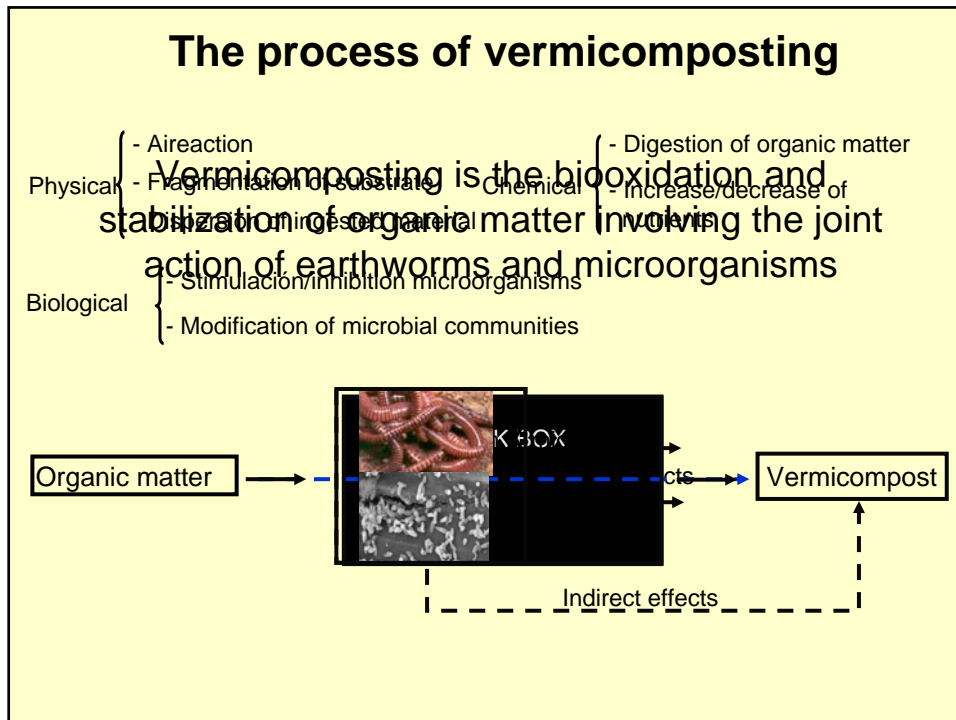
The decomposition of organic matter





The earthworms

- Earthworms are invertebrates occupying the soil profile
- The body comprises **an anterior part**, with the reproductive organs and the first section of the digestive, and **a posterior part** with the intestine
- They ingest soil and decaying organic matter egesting it as casts



OBJETIVES

study the vermicomposting process
from raw manure to vermicompost

study the direct effects of earthworms
through the analysis of fresh casts

study the indirect effects of earthworms
inoculating pig slurry with vermicompost

The vermicomposting process from raw manure to vermicompost



The study of vermicomposting **Material and methods**

Experimental design:

Rate of pig slurry
 1.5 kg
 3 kg

With and without earthworms

Time
 36 weeks

500
Eisenia fetida

6 reactors rates of 1.5 & 3 kg without earthworms

6 reactors rates of 1.5 & 3 kg with earthworms

The study of vermicomposting **Material and methods**

The functioning of continuous feeding reactors

With this system we obtain:

- 1.- A photograph of organic matter decomposition following the vertical of reactor, where every module follows a known age (0-36 weeks)
- 2.- A photograph of earthworms moving in the reactor
- 3.- A photograph of organic matter decomposition following the vertical of reactor, where every module follows a known age (0-36 weeks)

Microbial biomass-C (µg g⁻¹ dw)

Age of layers (weeks)

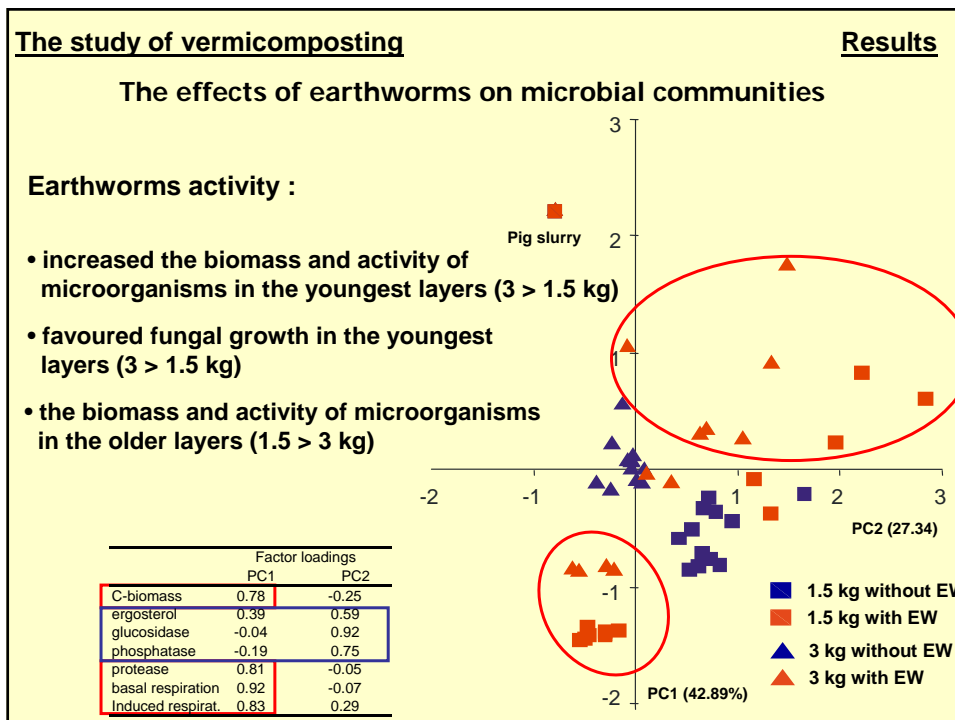
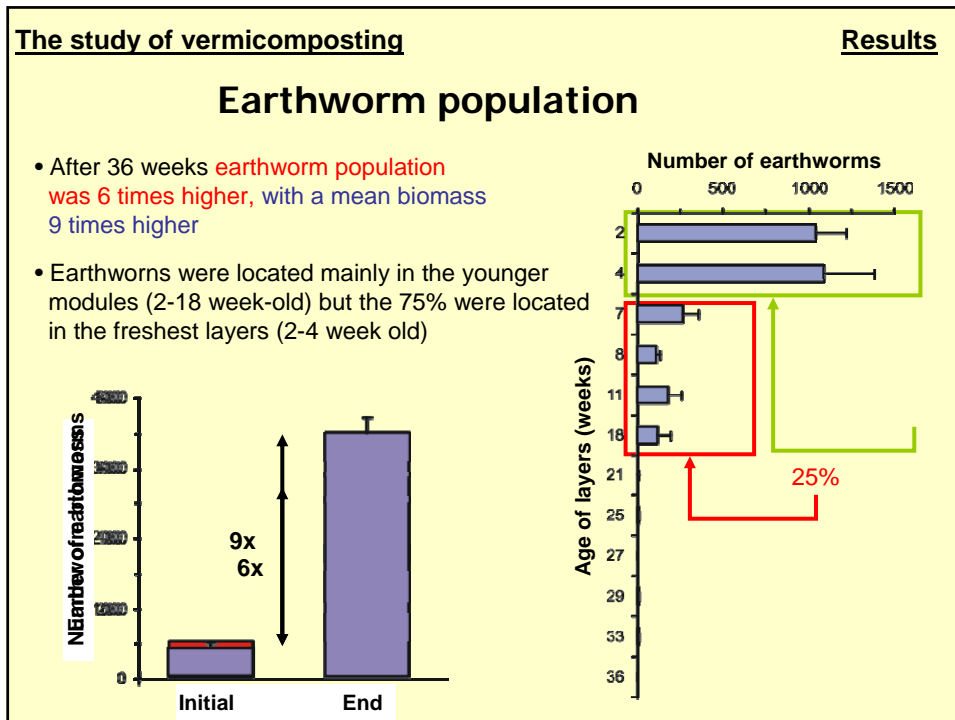
1.- Age up layers

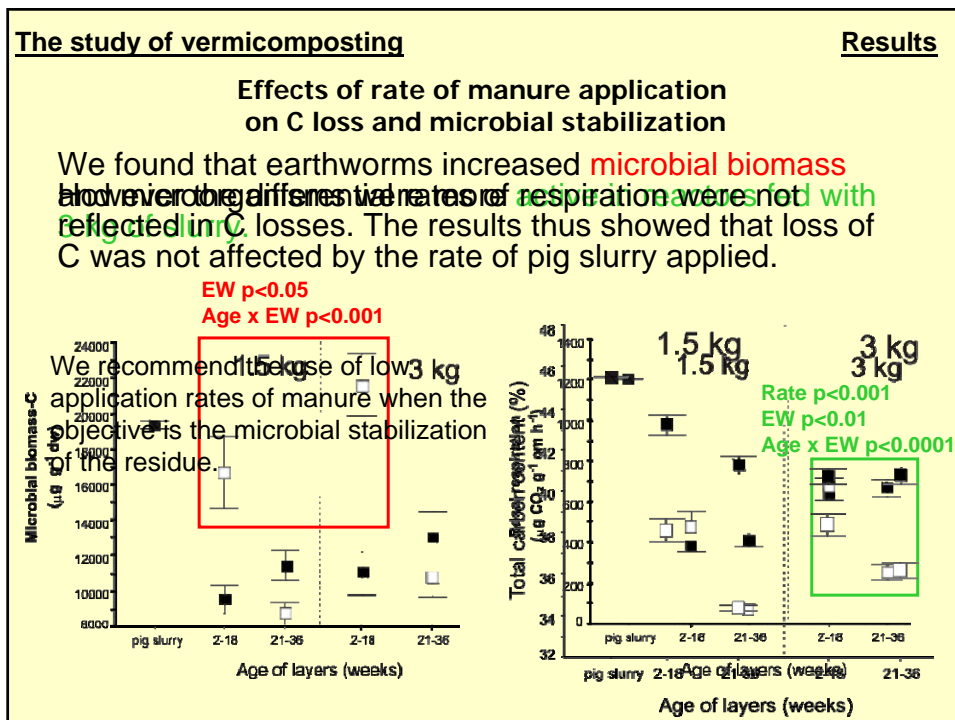
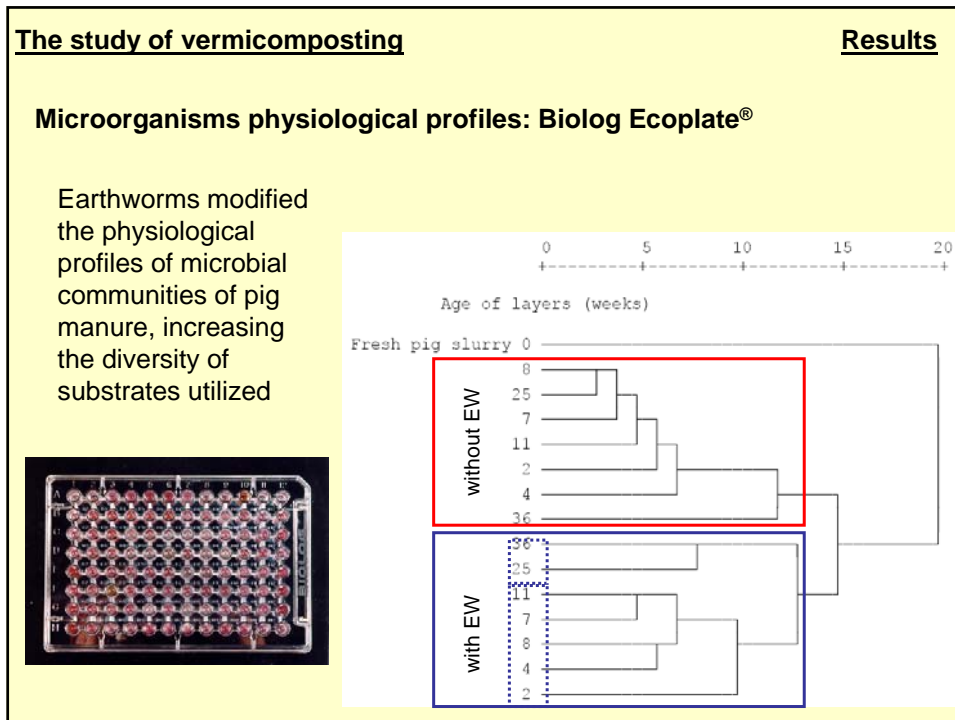
30

36

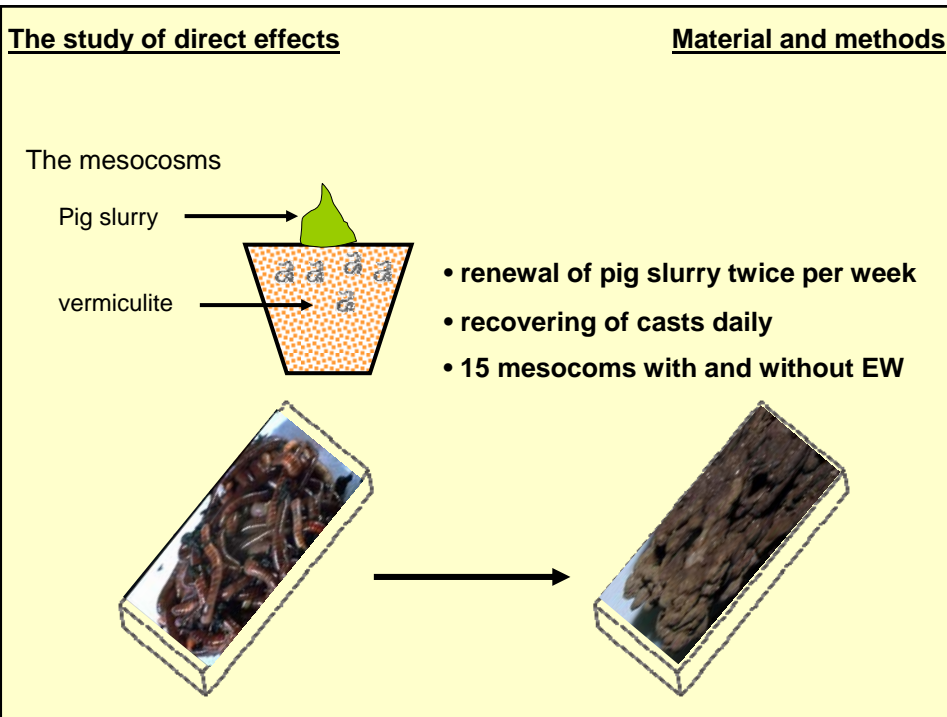
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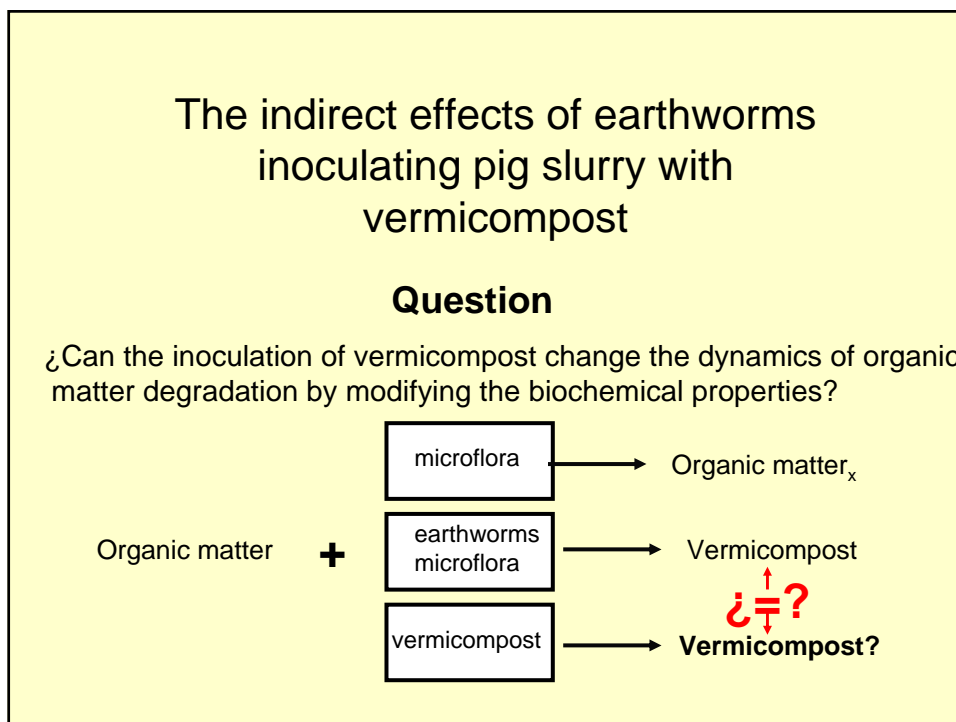
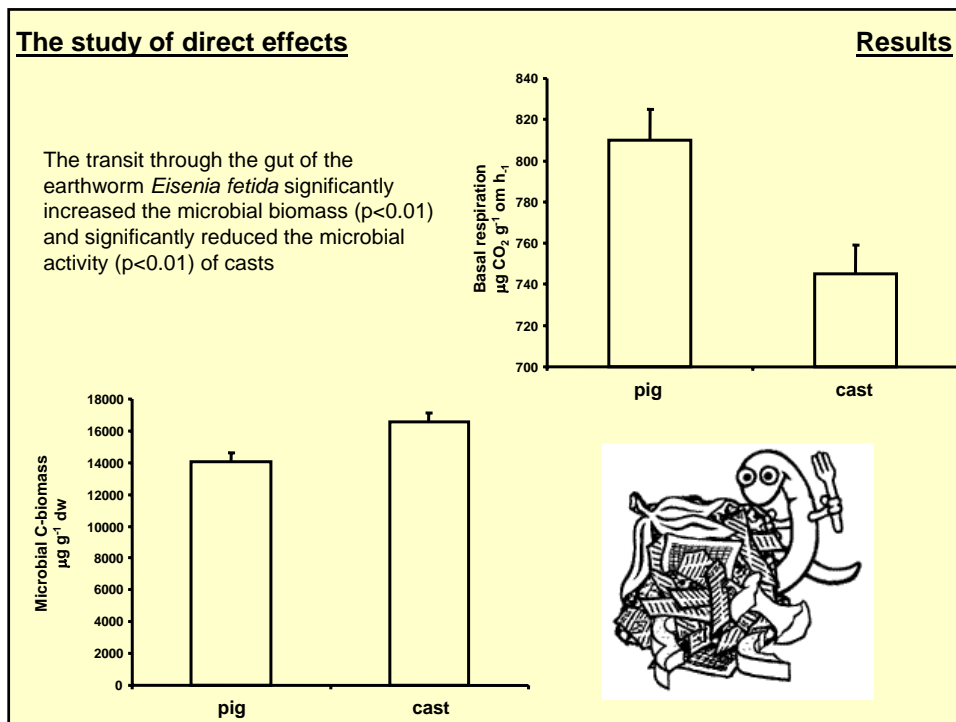
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The direct effects of earthworms through the analysis of fresh casts






The study of indirect effects **Material and methods**

Experimental design

Vermicomposts from :
Eudrilus eugeniae
Eisenia fetida
Eisenia andrei

inoculated → Manure 100g
 0 2.5 y 10%
 N = 105

15 days → n = 35
 30 days →
 60 days →



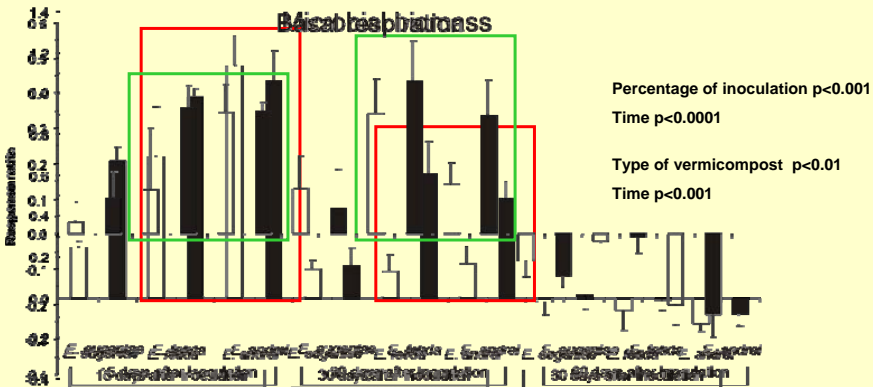
VARIABLES ARE EXPRESSED AS RESPONSE RATIO
 RESPONSE RATIO = (VARIABLE - CONTROL)/CONTROL

The study of indirect effects **Results**

Indirect effects of earthworms via inoculation of worm-worked substrates showed to have a significant weight modelling the microbial biomass and activity through time

Microbial activity increased depending on type percentage of substrate and on the samples inoculated with, since showing the samples inoculated with higher composts of *Eisenia fetida* and decreased microbial activity values decreased microbial biomass values

Bacterial biomass



Percentage of inoculation p<0.001
 Time p<0.0001
 Type of vermicompost p<0.01
 Time p<0.001

