



Improving the robustness of laying hens and piglets against parasitic and bacterial infections



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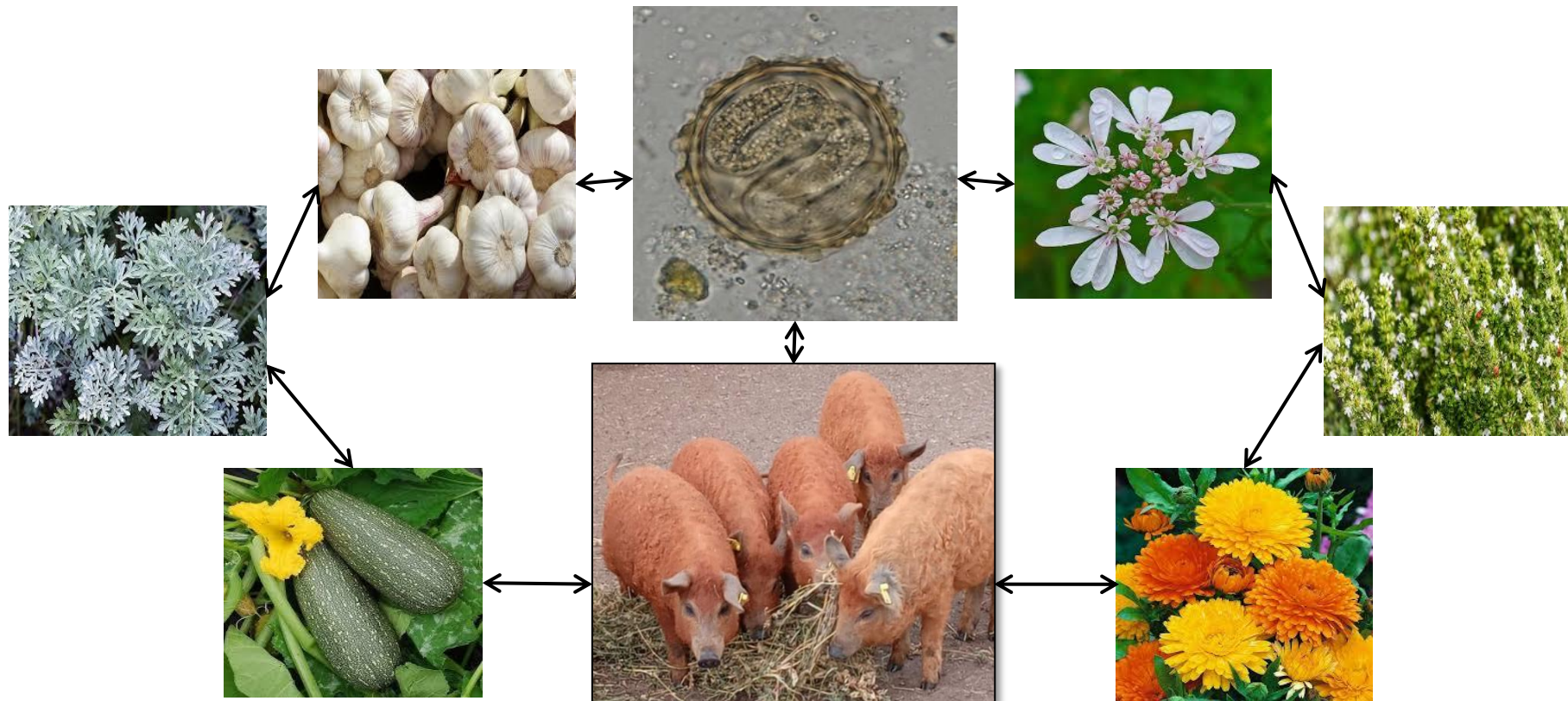
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Introduction

- Parasitic diseases have a considerable effect on pig production, causing economic losses due to high morbidity and mortality.
- Due to continuously increasing drug resistance in parasites and prohibited use of antiparasitic medications in organic pig farming practices, phytotherapy could represent a valid, biologically available and cost effective alternative for parasite control.
- The use of phytotherapeutic remedies has notably increased over the past decade due to their biodegradability, decreased toxicity, environmentally friendliness, and to some extent their antiparasitic effect.



- The primary objective of this research was to identify a plant-based formula that exhibits effectiveness in combating pig parasitoses without interfering with their welfare and health.
- The present studies were designed to assess, *in vitro* and *in vivo*, the antiparasitic potential of *Allium sativum*, *Artemisia absinthium*, *Cucurbita pepo*, *Coriandrum sativum*, *Calendula officinalis*, and *Satureja hortensis* on naturally occurring gastrointestinal parasites of swine in two free-range (low-input) farms from Transylvania, and also to evaluate the parasitic prevalence in the same farms.





Prevalence of Swine Gastrointestinal Parasites in Two Free-Range Farms from Nord-West Region of Romania.

The effects of *Allium sativum* L., *Artemisia absinthium* L., *Cucurbita pepo* L., *Coriandrum sativum* L., *Satureja hortensis* L. and *Calendula officinalis* L. on the embryogenesis of *Ascaris suum* eggs during an in vitro experimental study

The *in vitro* anticoccidial activity of Some Herbal Extracts against *Eimeria* spp. oocysts isolated from piglets.

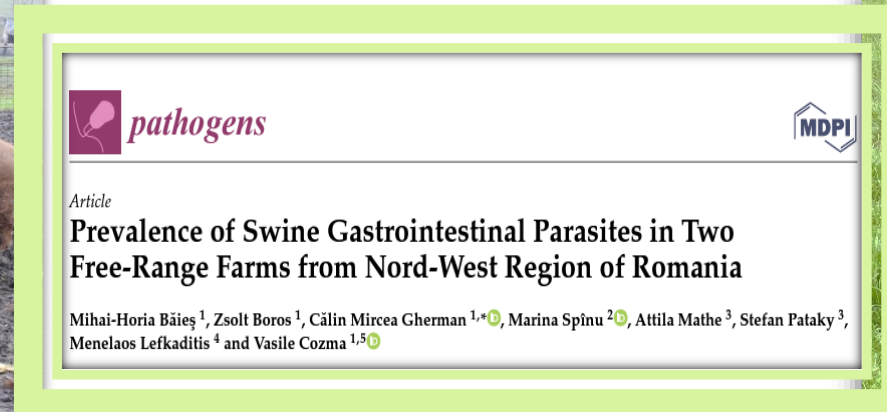
***In vivo* assessment of the antiparasitic effects of *Allium sativum* and *Artemisia absinthium* against gastrointestinal parasites in swine, from low-input farms, in NW of Romania.**

The effects of *Coriandrum sativum* L. and *Cucurbita pepo* L. against gastrointestinal parasites in swine: An *in vivo* study.

***Satureja hortensis* L. and *Calendula officinalis* L., two Romanian plants with *in vivo* antiparasitic potential on digestive parasites of pigs.**

Starting point: Prevalence of Swine Gastrointestinal Parasites in Two Free-Range Farms from Nord-West Region of Romania

- This study provided essential information on Transylvania's distribution of gastrointestinal parasites in pigs.
- Different species of gastrointestinal parasites are present in most pigs reared in free-range farms in the study area (*Eimeria spp.*, *Cryptosporidium spp.*, *Oesophagostomum spp.*, *Trichuris suis*, *Ascaris suum*, *Strongyloides ransomi* and *Balantidium coli*).
- Information of great value to farmers, policymakers, and researchers alike, leading to safer and healthier pork production for public consumption.
- Control strategies are needed to raise awareness among pig farmers about the impact of these parasites on the productivity and health of pigs as well as on human health.



2. The effects of *Allium sativum* L., *Artemisia absinthium* L., *Cucurbita pepo* L., *Coriandrum sativum* L., *Satureja hortensis* L. and *Calendula officinalis* L. on the embryogenesis of *Ascaris suum* eggs during an in vitro experimental study.

Aim

- This study comparatively evaluated the *in vitro* effects of *Allium sativum*, *Artemisia absinthium* L., *Cucurbita pepo*, *Coriandrum sativum*, *Satureja hortensis* L. and *Calendula officinalis* on inhibition of *A. suum* egg hatching and larval development.



Materials and methods

1. Chemical analyses of medicinal plants

HPLC/MS was used for the analysis of biologically active compounds present in the plant extracts University of Medicine and Pharmacy, in Cluj-Napoca)

2. Experimental design

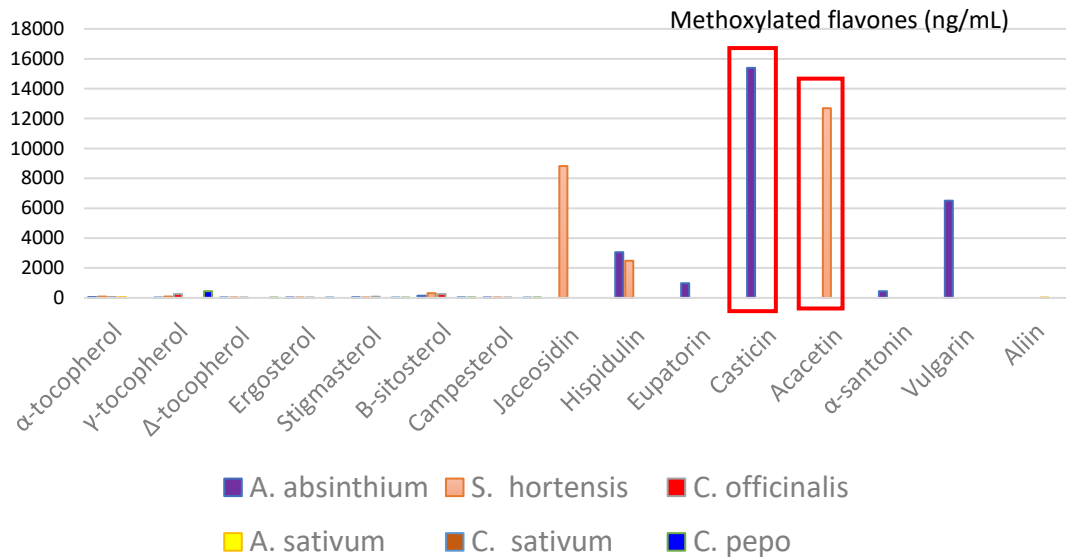
- *A. suum* eggs were collected from randomly sampled of traditionally maintained swine faeces
- Two control : ES + distilled water, ES+ ethanol of 70%, 35%, 17.5%, 8.75%, and 4.375%
- Six experimental groups: ES + **each alcoholic plant extract (10%, 5%, 2.5%, 1.25%, 0.625%) (quintuplicate)**
- All variants were incubated at 27 °C for a total of 21 days, *A. suum* eggs being examined after 2, 14 (L1) and 21 (L2/L3) days.

Results

1. Analysis of plant extracts

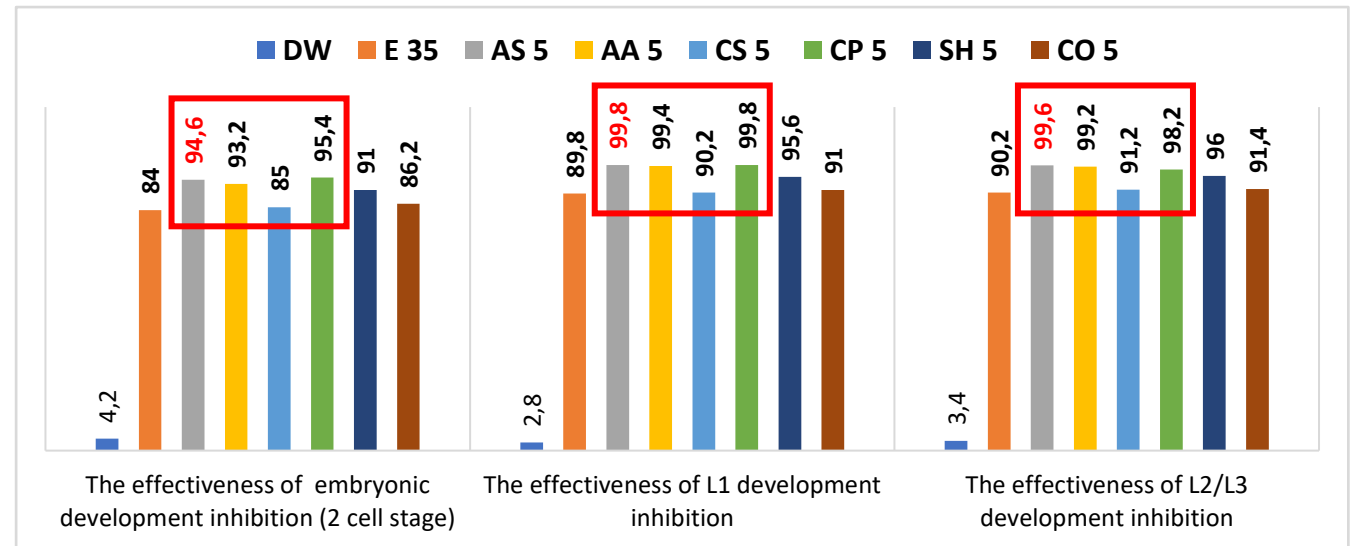
A. absinthium had the highest total polyphenol content 56.754 µg/mL

Chemical components by plant



2. Analysis of Plant Extracts Activity

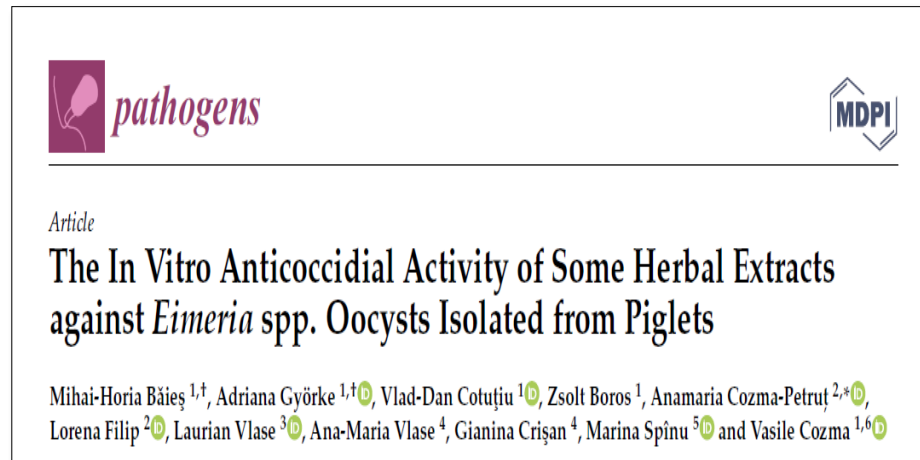
- A direct concentration dependent activity was observed
- Anti-embryogenic effects were expressed by all plants (most effective *A. sativum*, *A. absinthium*, *C. pepo* and *S. hortensis* extracts at all tested concentrations)



3. The *in vitro* anticoccidial activity of some herbal extracts against *Eimeria* spp. oocysts isolated from piglets.

Aim

- to evaluate the effects of the alcoholic extracts from *Allium sativum* L. (garlic), *Artemisia absinthium* L. (wormwood), *Coriandrum sativum* L. (coriander), *Cucurbita pepo* L. (pumpkin), *Satureja hortensis* L. (summer savory), and *Calendula officinalis* L. (marigold) on the sporulation of *Eimeria suis* and *Eimeria deblickei* oocysts, isolated from piglets.
- Statistical analysis showed that all plant extracts were effective in inhibiting the sporulation of both *E. suis* and *E. deblickei* oocysts as well as destroying them
- **The alcoholic extracts of *C. officinalis*, *A. absinthium*, and *C. sativum* were the most potent and obtained the lowest LC50 values.**
- As our *in vitro* results demonstrated that the APEs at higher concentrations had a dual effect, both inhibitory and destructive, their use as disinfectants in livestock shelters seems encouraging.



In vivo tests

Background & Aim

- The current studies aimed at evaluating, the *in vivo* antiparasitic activity of *Allium sativum*, *Artemisia absinthium* L., *Cucurbita pepo*, *Coriandrum sativum*, *Satureja hortensis* L. and *Calendula officinalis* powders against digestive parasites in swine, in two low-input farms from Transylvania area based on the facts that
 - Phytotherapeutic remedies can be used for prophylaxis and therapy of digestive parasitosis and are a viable and sustainable alternative to chemical antiparasitics, but few of them have been subjected to scientific validation.
 - Low-input swine farming in Romania adopted the traditionally use of the phytotherapy for controlling the pathogens in livestock.



Materials and methods

- 2160 faecal samples were collected from weaners, fatteners, and sows.
- Coproparasitological methods, including flotation, centrifugal sedimentation, Ziehl-Neelsen staining as modified by Henricksen, a modified Blagg technique, and faecal cultures

1. Biochemical analyses of medicinal plants

2. Experimental design and swine husbandry

For each farm and plant:

- 3 control groups
 - 10 weaners, 10 fatteners and 10 sows
- 3 experimental groups
 - 10 weaners, 10 fatteners and 10 sows
 - a) received [A. sativum](#) in a dosage of [180 mg/kg BW/day](#) and [A. absinthium](#) in a dosage of [90 mg/kg BW/day](#) for 10 consecutive days
 - b) received [C. sativum](#) in a dosage of [170 mg/kg BW/day](#) and [C. pepo](#) in a dosage of [500 mg/kg BW/day](#) for 10 consecutive days
 - c) received [C. officinalis](#) in a dosage of [140 mg/kg bw/day](#) and [S. hortensis](#) in a dosage of [100 mg/kg BW/day](#) for 10 consecutive days



A. absinthium



C. officinalis



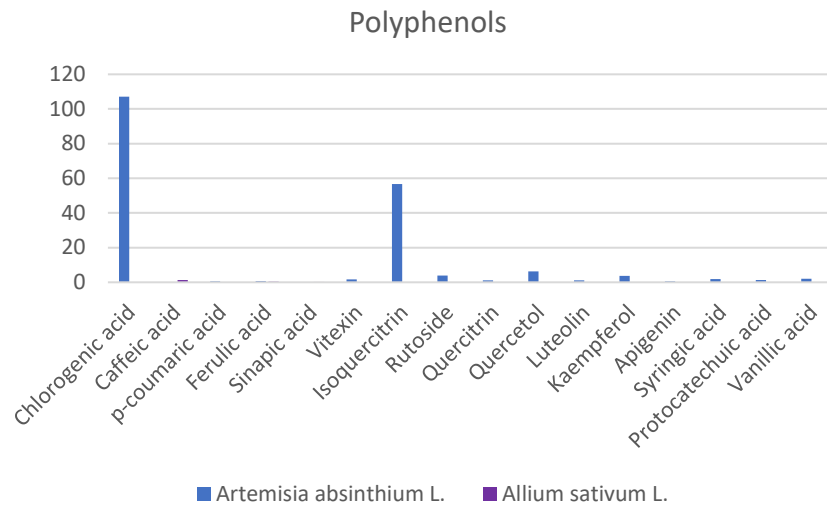
C. pepo

3. Assessment of antiparasitic efficacy

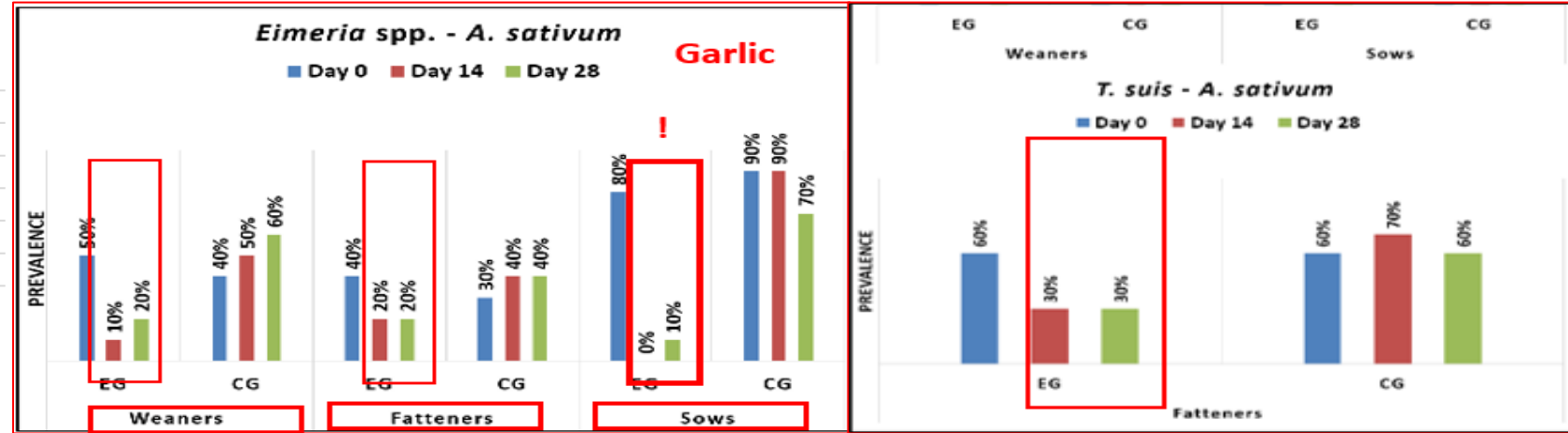
- Faecal egg count reduction test: $FECR (\%) = 100 \times (1 - [T2/T1] \times [C1/C2])$
- T1 and T2 are the mean pre- and post-treatment faecal egg counts (FEC) of a treated group
- C1 and C2 are the mean pre- and post-treatment FEC of control group

4. *In vivo* assessment of the antiparasitic effects of *Allium sativum* and *Artemisia absinthium* against gastrointestinal parasites in swine, from low-input farms, in NW of Romania

Results

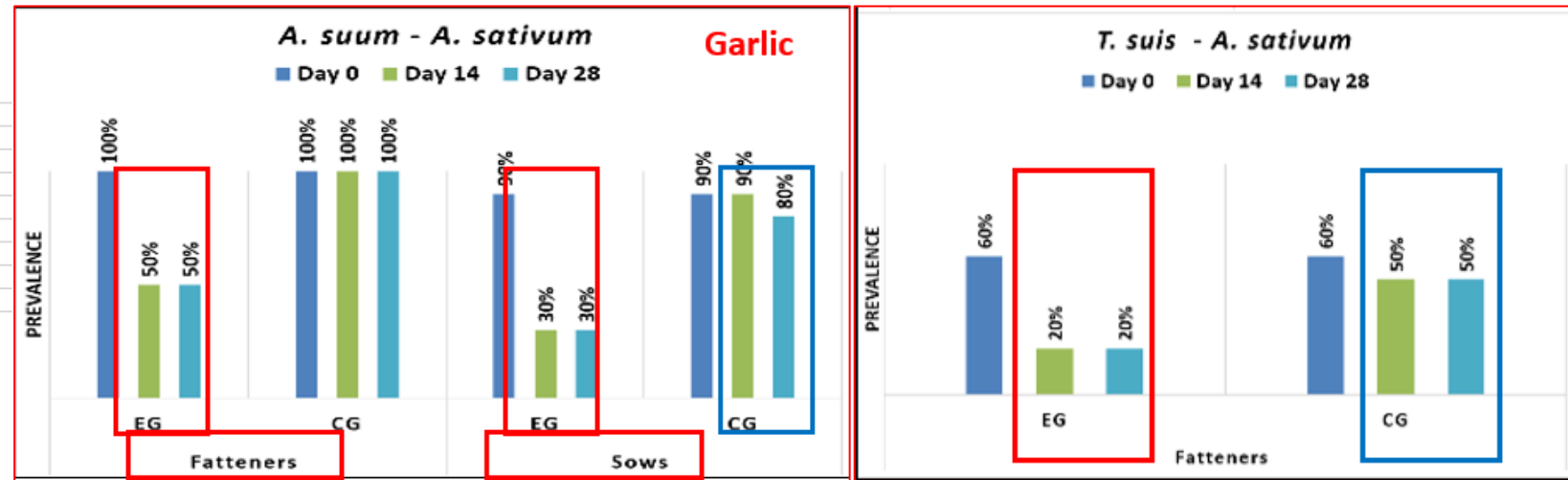
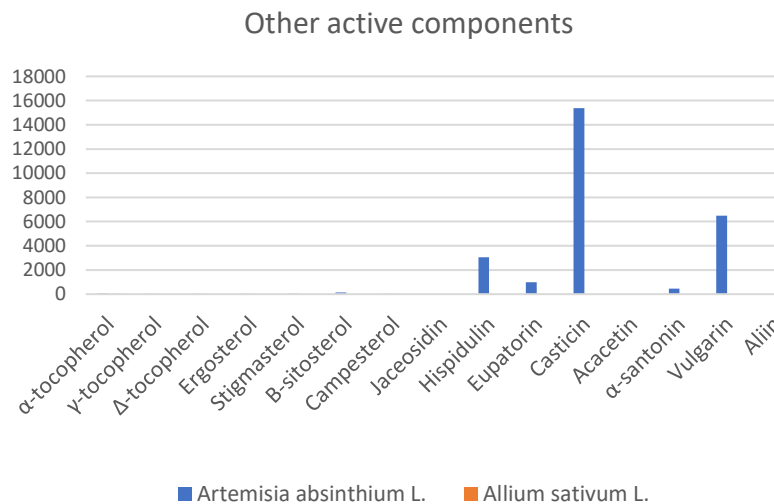


Farm 1



Farm 2

EG experimental group, CG control group



5. The effects of *Coriandrum sativum* L. and *Cucurbita pepo* L. against gastrointestinal parasites in swine: An *in vivo* study

Results



Coriandrum sativum L.

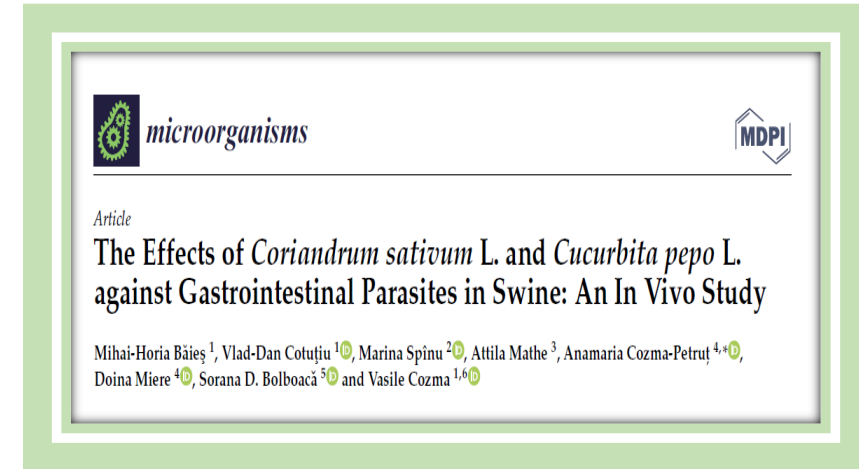


Cucurbita pepo L.

■ Both plant powders at the previously mentioned doses for 10 consecutive days, were efficient against gastrointestinal parasites in swine. coriander was more effective against protozoa while pumpkin showed better efficacy against helminths.

■ Considering all the constraints of Romanian livestock farming, these results are a beacon of hope for better management and welfare practices in the swine farming.

■ In addition, to the best of our knowledge, this is the first ethno-pharmacological report on the antiparasitic effects of *C. pepo* and *C. sativum* traditionally used in Romania for treating protozoa and nematode infections in swine.



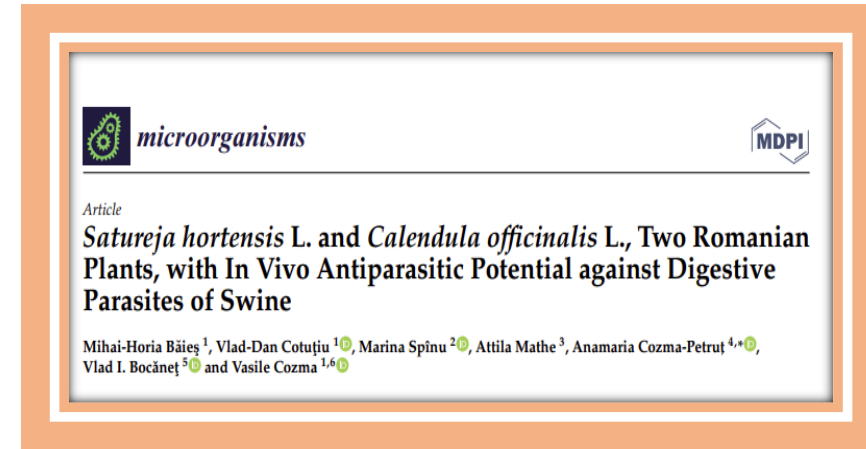
6. *Satureja hortensis* L. and *Calendula officinalis* L., two Romanian plants with *in vivo* antiparasitic potential on digestive parasites of pigs



Calendula officinalis L.



Satureja hortensis L.



- Both plant powders at the previously mentioned doses for 10 consecutive days, showed promising *in vivo* antiparasitic activity.
- *C. officinalis* had a strong antiprotozoal activity and mildly antihelmintic effects while *S. hortensis* was very effective against both helminths and protozoa infections.
- The antiparasitic efficacy can be attributed to the presence of polyphenols, sterols, tocopherols and flavonoids.
- The current study is the first report about the antiparasitic effects of *C. officinalis* and *S. hortensis* against digestive parasites of pigs, from Romania.



Thank you for your attention!



PPILOW

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