

EFFICACY OF HERBAL AND AROMATIC COMPONENTS *IN VITRO* SUGGESTS PREVENTION OF HISTOMONOSIS AND ENTERITIS PROBLEMS IN TURKEYS



J.M. Watier², A. Mahieu², A. Canin², R. Domitile², M. Aoun², F. Laurent¹, D. Liebhart³, D. Schuller³, A. Greuter²
 1. INRAE, Université de Tours, ISP, AIM team, F-37380, Nouzilly, France • 2. IDENA, 21, rue du moulin, F-44880, Sautron, France
 3. University of Veterinary Medicine, Veterinärplatz 1, A – 1210 Vienna, Austria

INTRODUCTION The main challenge for the turkey gut health is to fight against the main parasitic threats, mainly histomoniasis and coccidiosis, against bacterial infections like *E. coli* and *Clostridium* and preserving a positive microflora.

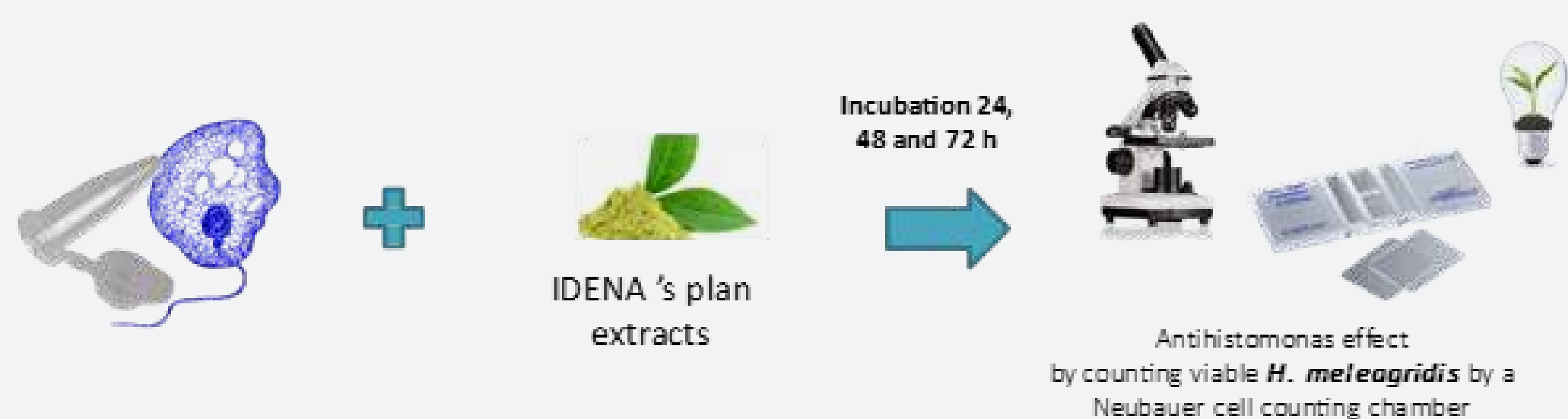
OBJECTIVES To design a phytoproduct able to decrease the risks of histomoniasis outputs and in the same time prevent the coccidiosis and the dysbiosis symptoms. To design this product, we worked with three different researchers teams on the different mode of action of the product.

MATERIAL AND METHODS

Histomonads study:

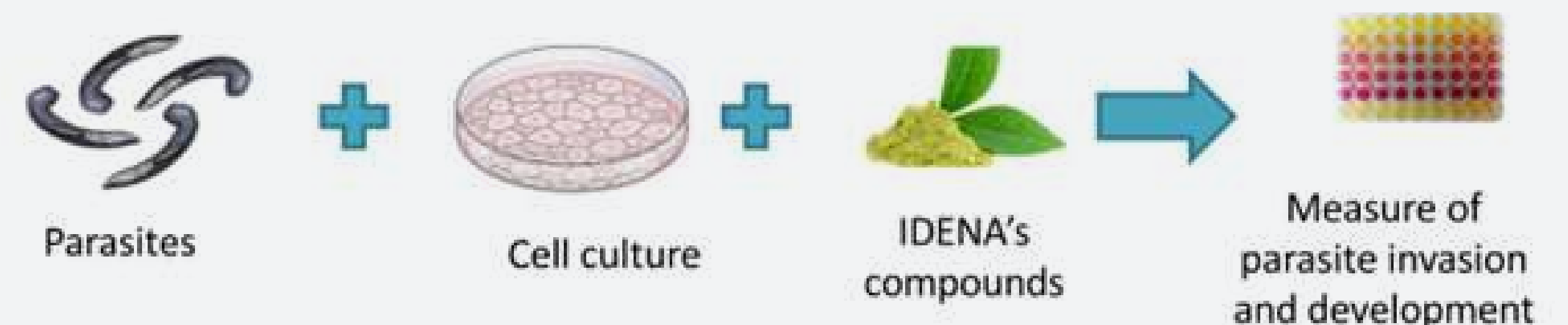
On ten substances (natural, synthetic and mixes) at two concentrations (100 and 500 ppm) were selected and provided by IDENA (Sautron, France).

The *in vitro* tests were performed at the Clinic for Poultry and Fish Medicine, University of Veterinary Medicine Vienna.



Coccidia study:

In collaboration with INRAE, we evaluated a wide range of bioactives against avian coccidiosis agents by carrying out an *in vitro* screening. It aimed at evaluating their capacity to limit the sporulation, invasion and/or the replication of the parasites in epithelial cells.



Antibacterial study:

The aim was to determine the Minimum Inhibitory Concentration (MIC) using agar dilution method, as antibiotic molecules. Around thirty combinations of active ingredients were tested.

RESULTS AND CONCLUSION

Efficacy on Histomonads:

We have succeeded in choosing bioactives that have the same non-regrowth effect as dimetridazole on histomonads.

Example of results obtained *in vitro* on histomonas compared with the positive control (DMZ**)

Mixtures tested	Bioactives concentration	Average number of <i>H. meleagridis</i> before and after 24, 48 and 72 h of incubation x 10 ³ histomonas				
		0 h	24 h	48 h	72 h	Regrowth
FORKEY LS	1/5 normal dose of use	100	32	103	241	YES
	normal dose of use	100	0	0	0	NO
DMZ**	0,4 ppm	100	0	0	0	YES
Negative control		100	154	163	301	YES

** DMZ: DiMetridaZole

At the FORKEY LS using dose, *in vitro* tests showed equivalent activity to DMZ on *Histomonas meleagridis*.

Antibacterial effect:

With the right choice of the components, only the negative bacteria are affected. These bioactives have strong effect on *Clostridium*, on other negative (e.g. *Enterococcus spp*) bacteria but did not affect the positive bacteria (like *Lactobacillus spp*).

CONCLUSION It is possible to formulate an alternative solution able to stop the development of *Histomonas meleagridis*, breaking the parasitic cycle of *Eimeria*, and obtaining an antiseptic effect to fight bacterial infections (mainly *C. perfringens*).

For several years, some turkey production companies have been using FORKEY LS without encountering any clinical cases of histomoniasis.

Efficacy on coccidia:

Three main substances were chosen to act on the different parts of the coccidia cycle:



Ingredients	sub toxic concentration ^a	%max efficacy ^b	TC ₅₀ ^c	IC ₅₀ ^d	SI ^e	sub toxic concentration ^a	%max efficacy ^b	TC ₅₀ ^c	IC ₅₀ ^d	SI ^e	IC ₅₀ ^f	%max efficacy ^g
Essential oil A	0,0005	1	0,008	0,006	0,2	0,0005	74	0,003	0,0004	7,9	<0,03	97,0
Essential oil B	0,0150	50	0,040	0,011	3,5	0,0150	50	0,009	0,003	3,5	-	4,9
Plant extract	-	0	5,670	no IC ₅₀	N/A	-	50	0,360	0,051	7,1	-	-

The SI ratio (Selectivity Index = efficacy/toxicity ratio) is used to select the most effective active ingredients and the least toxic for the epithelial cell

Making a micro-emulsion to enhance the global effectiveness of the product:

FORKEY LS benefits from IDENA's ECHV Technology increasing its effectiveness.

Technological advantages	Zootechnical advantages
→ Fine dispersion	→ Palatability : reduces olfactory impact
→ Homogeneity : no phase shift	→ Safety : reduces toxicity to membranes
→ Actives ingredients protection and retention	→ Efficiency : microparticles with a high surface activity
→ Stability over time	→ Economy : reduces doses