

ALCOHOLIC TINCTURE OF GARLIC (*Allium sativum*) ON GASTROINTESTINAL ENDOPARASITES OF SHEEP- SHORT COMMUNICATION

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ABSTRACT

The continuous and indiscriminate use of anthelmintic drugs has caused a growing problem of parasite resistance to conventional treatments. In this context, plant essential oils and active components can be used as alternatives or in association with current anthelmintic treatment. Garlic (*Allium sativum*) is a herbal medicine with various therapeutic properties: immunostimulating, anticancer, hepatoprotective, antioxidant, antiviral, antifungal and antiparasitic. The aim of this experiment was to evaluate the effect of garlic alcoholic tincture on gastrointestinal

endoparasites of sheep. For this, 54 sheep were randomly divided into three treatments. Treatment 1 (T1) received 40 g of garlic alcoholic tincture orally; treatment 2 (T2) received 60 g orally; T3 was the control group. Fecal samples were collected at days 0, 7 and 14, to perform laboratorial tests. Reduction of eggs per gram of feces in T1 and T2 was 0% on days 7 and 14. No difference in larvae genus was identified between treatments or days. In this experiment garlic alcoholic tincture presented no effect on gastrointestinal endoparasites of sheep.

KEYWORDS: agroecology; helminth; medicinal plants; phytotherapy.

TINTURA ALCOÓLICA DE ALHO (*Allium sativum*) SOBRE ENDOPARASITAS GASTRINTESTINAIS DE OVINOS

RESUMO

O uso contínuo e indiscriminado de anti-helmínticos tem aumentado a emergência de resistência parasitária aos tratamentos convencionais. Neste contexto, óleos essenciais ou princípios ativos de plantas podem ser utilizados como tratamentos alternativos ou em associação a anti-helmínticos comerciais. O alho (*Allium sativum*) é um fitoterápico com diversas propriedades terapêuticas: imunoestimulante, anticancerígeno, hepatoprotetor, antioxidante, antiviral, antifúngico e antiparasitário. O objetivo deste experimento foi avaliar a ação da tintura alcoólica de alho sobre endoparasitas gastrintestinais de ovinos. Para isso foram utilizados 54 ovinos divididos

aleatoriamente em três tratamentos. O tratamento 1 (T1) recebeu 40 g de alho na forma de tintura alcoólica, o tratamento 2 (T2) recebeu 60g, ambos por via oral, e o T3 foi o grupo controle. Amostras de fezes foram coletadas no dia 0, 7 e 14, para realização dos exames coproparasitológicos. O percentual de redução de ovos por grama de fezes do T1 e T2 foi de 0% nos dias 7 e 14. Não foi identificada diferenças nos gêneros larvais entre os tratamentos e dias. Nas condições deste experimento a tintura alcoólica de alho não apresentou efeito sobre endoparasitas gastrintestinais de ovinos.

PALAVRAS-CHAVE: agroecologia; fitoterapia; helminto; plantas medicinais

INTRODUCTION

Helminthiasis in sheep are caused by parasites belonging to Nematoda, Cestoda and Trematoda classes, and the main genera are:

Haemonchus, *Trichostrongylus*, *Strongyloides*, *Moniezia*, *Cooperia*, *Oesophagostomum*, *Trichuris* and *Cysticercus* (1). The parasite eggs or larvae are excreted along with the feces, and they are ingested orally when animals are grazing (2), thus completing

the cycle.

The classic treatment for this disease is anthelmintic administration, which in addition to increasing production costs, undermines the ecosystem through the emergence of resistant parasite strains. Considering the importance of gastrointestinal endoparasites and problems of helminth resistance, studies are needed to find complementary alternatives to traditional methods. They need to be economically viable and less harmful to human health and to the environment (1), so the use of herbal medicine is one such alternative.

Garlic (*Allium sativum*) has been reported to be a parasiticide, amebicide, acarifuge, vermifuge, larvicide, fungicide and immunostimulant, besides other properties (3). The unique flavor and health-promoting functions of garlic are generally attributed to its rich content of sulfur-containing compounds, i.e., alliin, g-glutamylcysteine, and their derivatives. Processing a fresh and intact garlic bulb by crushing, grinding or cutting induces the release of the vacuolar enzyme alliinase, which very quickly catalyzes alliin to allicin (4). In animal nutrition, garlic is used to enhance palatability and stimulates growth in pigs, poultry and sheep (5-7). In mice, Erol et al. (8) reported anti-nematode action of garlic. Ruminants are infected with mixed species of nematodes and it is important to study other uses of garlic in light of its parasiticide and immunostimulant activity.

According to Mehlhorn et al. (2), garlic is also described as an anthelmintic agent. However its efficacy against endoparasites may be associated with the action of herbal plant agents or the stimulation of high passage rate of feed in the gastrointestinal tract, due to the amount of oil contained in this phytotherapy.

The aim of this experiment was to evaluate the effect of garlic alcoholic tincture on gastrointestinal endoparasites of sheep *in vivo*.

RESULTS AND DISCUSSION

No side effects were observed in animals treated with garlic alcoholic tincture. The results of EPG and fecal culture according to treatment are shown in Tables 1 and 2.

At no time a reduction in EPG was observed in treated groups, with no statistical difference. Garlic alcoholic tincture did not present anthelmintic activity.

MATERIAL AND METHODS

The experiment was conducted at the Agricultural School of the Federal University of Santa Maria (UFSM), Santa Maria, physiographically located in the Central Depression of Rio Grande do Sul, during the Spring. It was used 54 Suffolk x Ilê de France sheep, of both sexes, aged between three and five years, with an average weight of 50kg. The sheep remained in the same paddock of native grassland in continuous grazing, with water *ad libitum*. The last administration of anthelmintic took place 40 days before the beginning of the experiment. There were three treatments (T), designated T1 (40 g garlic/animal), T2 (60 g garlic/animal) and T3 (untreated control group), each containing 18 randomly allocated animals.

For alcoholic tincture production, in T1, 720 g of raw garlic was peeled and crushed in a blender with ethanol, remaining in extraction for 72 hours. After this period, the mixture was leached in a sieve, totalizing 1080 mL. In T2, 1080 g garlic was used in the same process, totalizing 1080 mL. Each animal received the tincture as a single dose administered orally with a syringe.

Fecal samples were collected from all sheep on the day of garlic alcoholic tincture administration (day 0) and on days 7 and 14. Feces were collected directly from the rectum, identified and kept in refrigeration at the Laboratory of Parasitic Diseases of UFSM. The examinations performed were egg counts per gram of feces (EPG) and infective larvae identifications originated from stool cultures performed in pooled feces from each group, through the methods of Gordon & Whitlock (9) and Roberts Sullivan (10), respectively. The reduction percentage of each treatment was calculated from the reduction test of egg count per gram of feces, according to the following formula, and the results were submitted to Chi-squared statistical test:

$$\% \text{ of reduction} = \frac{\text{average EPG day 0} - \text{average EPG day(7 or 14)}}{\text{average EPG day 0}} \times 100$$

Regarding coproculture, no significant difference between larvae genus and day of analysis nor larvae genus and groups of sheep was verified. *Haemonchus* spp. was the most frequent parasite identified.

Batatinha et al. (11) evaluated the effect of *Allium sativum* alcoholic juice *in vivo* on goats, and these authors reported no anthelmintic effect of garlic. On the other hand, Masamha et al. (12) found that the administration of garlic reduced the EPGs of *Trichostrongylus* and *Strongylus* in sheep. These

authors believe that the antihelmintic effects of garlic can be attributed to the high tannin content, which may have a direct effect on the resident worm population, disrupting the normal physiological functions. This statement agrees with Bastidas (13) who asserted that *Allium sativum* does not prevent the egg production, but may prevent the eggs of certain parasites from developing into larvae.

Table 1. EPG percentage reduction (% reduction) and EPG average in sheep treated with 40 g (T1) and 60 g (T2) of garlic alcoholic tincture and control group untreated (T3)

TREATMENT	DAY		
	0	7	14
T1	766	823 a	800 a
% reduction		0%	0%
T2	800	932 a	933 a
% reduction		0%	0%
T3	666	767 a	787 a
% reduction		0%	0%

Means followed by letter "a" are not statistically different from each other at 5% probability by Chi-square.

Means followed by letter "b" are statistically different from each other at 5% probability by Chi-square.

Table 2. Coproculture (in percentual) of gastrointestinal parasites of sheep treated with 40 g (T1) and 60 g (T2) of garlic alcoholic tincture and control group untreated (T3)

TREATMENT	GENRES	DAY		
		0	7	14
T1	<i>Haemonchus</i>	91	92	94
	<i>Cooperia</i>	4	4	5
	<i>Trichostrongylus</i>	5	4	1
T2	<i>Haemonchus</i>	98	97	97
	<i>Cooperia</i>	1	2	2
	<i>Trichostrongylus</i>	1	1	1
T3	<i>Haemonchus</i>	99	96	95
	<i>Cooperia</i>	-	2	5
	<i>Ostertagia</i>	1	2	-

In goats, Batatinha et al. (11) reported that garlic administration continuously presents partial control of nematodes *in vivo*. In adult Boer goats, Worku et al. (14) reported that concentrated garlic juice did not present an anthelmintic effect, although it may be useful for controlling coccidiosis. The authors suggested that garlic extract may be an additional or substitute management approach to control *Coccidia* numbers in conventional and organic goat production.

The effect of garlic aqueous extract (60g and 90g) in a single dose on gastrointestinal endoparasites in sheep was studied by Santos et al. (15), with no difference between groups treated or not with garlic. Santos et al. (16) also evaluated

garlic juice at concentrations of 15 g and 30 g administered orally in a single dose and found that during the experimental period there was no reduction in average EPG nor a significant alteration in parasites genera found in stool cultures. These findings corroborate those found in the present study and may be related to a reduced dose of garlic tested and the period of administration of the herbal medicine, as well as the fact that administration was in a single dose and not continuous.

Garlic may (17) or may not (18) stimulate the animal's immune system. If garlic were to stimulate the immune system of goats, long-term exposure to garlic may lead to a lower susceptibility to gastrointestinal parasites. This would not be

practical using the liquid form, but a powdered form could be added to a feed supplement or mineral product. It is also necessary to carry out a further study regarding minimum and maximum dose.

Different results have been obtained by different authors, and these might be attributed to factors related to the plant: composition of garlic, extraction time, cultivation form; or due to experimental methodology: extraction method, experimental period, number of administrations, dose; or depending on the tested animals: parasitic load, gastrointestinal tract repletion and individual response.

In the present *in vivo* experiment, garlic alcoholic tincture had no effect on gastrointestinal endoparasites of sheep.

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