Parasite control with red Chicory extract

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ABSTRACT

Authors conducted studies in 2021 at the sheep farm of Karcag Research Institute. Searching for methodologies to reduce endoparasitosis. Traditional medical application of weed roots, with a focus on tannin and inulin content were tested. Extracts from Cichorium intybus and Cichorium intybus var. foliosum were made and administered to infected ewes. Strongylus sp. eggs significantly reduced after treatment due to inulin and tannin content. Further experiments should be reveal whether dried or diluted extracts are more efficient.

***Keywords*:** *sheep parasites, chicory*

ÖSSZEFOGLALÁS

A juhok endoparazitozisának mérséklése lehetőségeinek feltárása céljából végeztünk vizsgálatokat 2021-ben, a Karcagi Kutatóintézet juhászatában. Mint feltételes népi gyógymódot, a Cichorium intybus és a Cichorium intybus var. foliosum gyökerének tannin kivonatát és fagyasztva tárolás után pépesített, vizzel hígított változatának hatását vizsgáltuk endoparazitával fertőzött anyajuhoknál. Vizsgálatainkat csak előkísérletnek tekinthetjük a vizsgált juhok csekély egyedszáma miatt, de a Cichorium intybus gyökeréből kivont tannin tartalom hatására a Strongylus fajok esetében egyértelmű csökkenést mértünk.

***Kulcsszavak*:** *juh paraziták, cikória*

INTRODUCTION

One of the cornerstones in sheep farming is a parasite-free livestock population, which can then develop its productive potential without serious infections. Parasite control should be part of the animal health protocol for all farmers, but despite these efforts two major threats still occur (Kidane et al., 2020). Parasiticide resistance is the first response from nature. Routine control measures often neglect the identification of pest risk (Tóth et al., 2018). The changing pasture environment (replace pastoral grazing with closed pasture systems) turns to be a hotspot for continuous chain infections (Varga et al., 2020, 2021). The objective of our research was to verify traditional pastoral knowledge. The root of wild chicory (*Cichorium intybus*), which can be found in natural grasslands is reputedly effective against sheep endoparasites. The effect of red chicory (*Cichorium intybus var. foliosum*) was also tested for possible ease of future cultivation.

MATERIALS AND METHODS

In June of 2021 endoparasite number started to climb among sheep giving the opportunity to administer the prepared chicory extracts. The frozen portions were grinded with blender. Previous trials worked out the recommended amount up to 2 grams essence which is equal with 8 grams of plant chips. It was diluted in water 1:2 ratio. The result is 24 ml of pulp. It was given by oral administration to 3-3 same genotype ewes (Hungarian Merino Sheep) respectively (3 red chicory (C1-C3), 3 wild chicory (K1-K3), 3 control (O1-O3). All subjects were infected, which was confirmed by faecal sample and microscopic examination. After a week, another faecal examination followed. Tannin substance also were used as the most likely active ingredient.

Chicory extracts contain significant amount of inulin (Blanar et al., 2020 – Lab report). This polysaccharide earlier proved to be effective as parasiticide (Petkevicius et al., 2006). Inulin-fed pigs exhibited a significant reduction in female worm fecundity and worm large intestine location was more distal compared to those from pigs on standard diet. These results demonstrate that inclusion of the highly degradable fructose polymer inulin in the diet leads to significant reductions in *Trichuris suis* establishment, egg excretion, and female worm fecundity and can be used as a treatment for patent infections.

RESULTS

At the tannin experiment results are obscure. *Trichostrogylus* egg count reduced but one subject showed remarkable increase. *Strongylus* showed more sensitivity to administered tannin (*Table 1*).

The red- and wild chicory extracts showed more diverse effects. The compared samples presented the parasite elevation in all subjects. However the extracts showed different mechanism. Wild chicory extract showed significant ($p=0.007$) effect on parasite egg elevation (*Table 2, 3*).

Derived from statistical analysis (*Table 3/a*) wild chicory extract (*Figure 1*) had a slight anti-parasite effect ($p \leq 0.007$) which leaves open the question. Whether the dried and shredded chicory roots do have more efficient active ingredients than the methanol extract?

Table 1

Tannin experiment

Ear tag(2)	**Eggs per gramm(1)**			
	Before(3)		***After(4)***	
	Trichostrogylus sp.	*Strongylus sp.*	*Trichostrogylus sp.*	*Strongylus sp.*
71126	70	130	30	10
222	420	30	20	-
71172	790	410	780	60
61380	1490	1210	2450	380

1. táblázat: Tannin kísérlet

Pete/gramm(1), Fülszám(2), Vizsgálat előtt(3), Vizsgálat után(4)

Table 2

Chicory extract experiment (parasite Nº in 2 ml suspension)

Date: 2021.06.17.

Ear tag(1)	*Trichostrogylus sp*	*Strongylus sp.*	*Dicrocoelium dendriticum*	**Sum**
C1 2326	18	3	0	**21**
C1 8337	115	12	0	**127**
C1 425	111	35	0	**146**
K1 4222	97	8	0	**105**
K1 61392	101	10	0	**111**
K1 3291	37	5	0	**42**
O 2293	40	8	0	**48**
O 3251	234	15	0	**249**
O 3289	7	1	0	**8**

C: red Chicory; K: wild chicory; O: Control(2)

2. táblázat: Cikória kivonatos kísérlet 2021.06.17. (2 ml szuszpenzióban lévő parazita szám)

Fülszám(1), C: vörös cikória; K: vad cikória; O: kontrol(2)

Table 3

Chicory extract experiment (parasite Nº in 2 ml suspension Date: 2021.06.24.)

Ear tag(1)	*Trichostrogylus sp*	*Strongylus sp.*	*Dicrocoelium dendriticum*	**Sum**	**Elevation %(2)**
C1 2326	19	6	0	**25**	119.05
C1 8337	154	12	0	**166**	130.71
C1 425	0	0	0	**0**	0.00
K1 4222	224	7	1	**232**	220.95
K1 61392	184	7	0	**191**	172.07
K1 3291	207	10	1	**218**	519.05
O 2293	77	3	0	**80**	166.67
O 3251	700	16	0	**716**	287.55
O 3289	18	1	0	**19**	237.50

C: red Chicory; K: wild chicory; O: Control(3)

3. táblázat: Cikória kivonatos kísérlet 2021.06.24.

Fülszám(1), Szintemelkedés %(2), C: vörös cikória; K: vad cikória; O: kontrol(3)

Table 3/a

Statistical analysis of the experiment

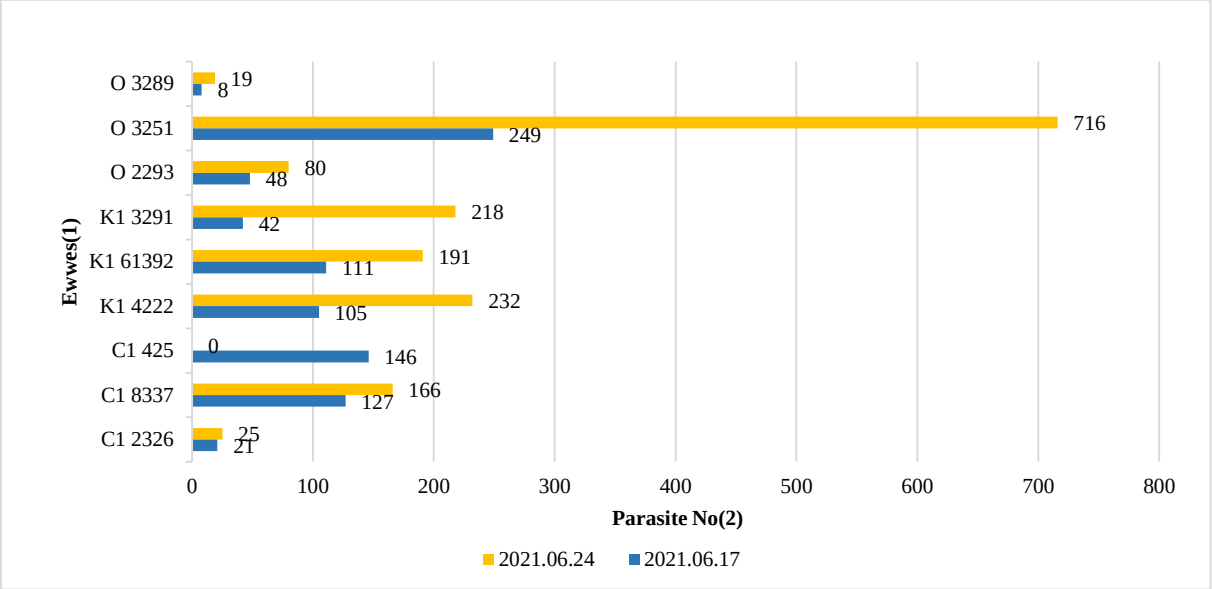
Chicory average elevation (%)(1):		83.25
Wild chicory average elevation (%)(2):		304.02
Controll average elevation (%)(3):		230.57
Chicory p-value(4)	**0.624**	NS
Wild chicory p-value*(5)	**0.007**	S*
Controll p-value(6)	**0.509**	NS

Note: S* – Significant, NS – Not significant(7)

3/a. táblázat: A kísérlet statisztikai értékelése

Cikória átlagos szintemelkedés(%)(1), Vad cikória átlagos szintemelkedés(%)(2), Kontrol átlagos szintemelkedés(%)(3), Cikória p-érték(4), Vad cikória (p-érték)*(5), Kontrol p-érték(6), S*-Szignifikáns; NS-Nem szignifikáns(7)

Figure 1: **Dynamics of parasite egg elevation during 1 week period**



C: red Chicory; K: wild chicory; O: Control(3)

1. ábra: A paraziták petéinek emelkedésének dinamikája az egy hetes vizsgálati periódusban

Anyajuhok(1), Parazitaszám(2), C: vörös cikória; K: vad cikória; O: kontrol(3)

DISCUSSION

In this brief trial we attempted to confirm traditional pastoral, on field treatment with various results. Other plants like bushclover (*Sericea lespedeza*) has also been shown to reduce hatchability and fecundity (egg laying ability) of internal parasites, and in that way, it will help reduce pasture contamination with larvae. Also, when used for longer periods of time, it can reduce the number of adult worms (Coffey et al., 2007). The critical point in pasture based sheep farming is to predict and prevent endoparasitosis outbrakes. Alternative treatments with medicinal plants could be effective if administered individually. Wild chicory root extract, combined with freezing preservation is not convincing approach. During the lab analysis, further perspective came to focus. Dried chicory chips may have the potential to preserve integrity of active ingredients, therefore more suitable for alternative treatment than extracts.

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