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Research paper

Gastrointestinal strongyles burden monitoring in a flock of Zerasca sheep treated with homeopathy

Lorella Giuliotti[a], Francesca Pisseri[b], Paolo Roberti di Sarsina[c,f], Bianca Marina Azzarello[d], Giuliana Terracciano[e], Maria Novella Benvenuti[a,*]

[a] Department of Veterinary Science, University of Pisa, Viale delle Piagge 2, 56124 Pisa, Italy
[b] Veterinarian, CIMI, Roma, Italy
[c] Observatory and Methods for Health, University of Milano-Bicocca, Milano, Italy
[d] Veterinarian, Auxerre, France
[e] Animal Prophylaxis Research Institute for Lazio and Toscana, S.S. dell'Abetone e del Brennero 4, 56123 Pisa, Italy
[f] Charity for Person Centered Medicine-Moral Entity, Bologna, Italy

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ABSTRACT

Introduction: The widespread use of conventional drugs in farm animals has resulted in anthelmintic resistance as well as the contamination of deleterious molecules in animal products and in the environment. Researchers are thus focusing on production systems that rely less on chemicals. The aim of this study was to monitor the gastrointestinal strongyle burden, blood count, body condition scores (BCS), and FAffa MAlan CHArt (FAMACHA) in a local Italian breed of sheep reared in natural conditions.
Methods: The study was carried out in a farm where homeopathy was utilised. Over a one-year period, faeces were sampled six times from ten Zerasca ewes to evaluate the fecal eggs count using a modified McMaster technique. At the same time, blood samples were collected to evaluate white blood cells, red blood cells, hemoglobin, packed cell volume, mean corpuscular volume, mean corpuscular hemoglobin, mean corpuscular hemoglobin concentration, and red cell distribution width. BCS and FAMACHA were also recorded.
Results: Results showed low parasite levels in most of the samples with the highest value in the spring. Blood parameters were within the normal range, with significant fluctuations during the sampling period. BCS values corresponded to an adequate nutritional condition of the animals and FAMACHA scores did not suggest a worrying state of anemia.
Conclusion: In this farm, a thorough monitoring of the gastrointestinal parasite burden together with a BCS and FAMACHA evaluation allowed the amount of chemical treatments to be limited, normally administered twice a year without laboratory tests.

1. Introduction

In small ruminants, breeding management is carried out on extensive systems mainly based on pasture that represents the environment where gastro-intestinal parasites complete their biological cycle. Controlling parasitic diseases is thus important for animal health and welfare. In fact, gastrointestinal parasites are one of the most important challenges for health management in sheep breeding and can lead to significant losses in productivity, and can even be lethal when infection becomes severe [1]. Gastrointestinal parasitism greatly impairs animal productivity through reduction in voluntary food intake and/or decrease in the efficiency of nourishments, particularly, in the inefficient use and absorption of nutrients. Disturbance in protein metabolism and reduced assimilation and/or retention of minerals are particularly significant. As a consequence, growth, milk, wool production and reproductive efforts could be reduced in parasitized animals [2].

Chemical drugs are broadly applied without laboratory tests. Their abuse has had a great impact on the rural environment and they have become a worrying problem regarding food safety [3,4].

Anthelmintics offer a short-term, cost-effective method of controlling nematodes. These drugs kill existing parasites and reduce eggs production. Unfortunately, reports of anthelmintic resistance date back to the early 1960s, when the modern chemical

* Corresponding author.
E-mail address: novella.benvenuti@unipi.it (M.N. Benvenuti).

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assault on nematode parasites began [3]. Another imperative for change is the increasing consumer demand for uncontaminated agricultural products [5]. In fact, consumer concern regarding food quality is increasing together with the preference for meat with minimal chemical contamination [6].

Thus, the best approach to tackle endoparasite problems in extensive farming involves the effective management of pastures, the use of breeds well adapted to the environment [7], the use of complementary and alternative medicine (CAM), [8], and the monitoring of the parasite burden. The frequent use of anthelmintic drugs however, is no longer considered sustainable. The use of CAMs is widespread in humans and is increasingly being applied for animal care. The CAMs are based on salutogenic principles, in which the generation of health is consequent to the stimulation of innate self-healing abilities [9].

An ecological approach to parasitosis takes into account the complex relationship among plants, animals and the environment, in fact the parasite is only able to cause damage in the host when an imbalance in the system occurs [8]. The use of CAMs could be driven by an approach towards the system complexity [10]. Medical knowledge and practice should address not only how to treat pathology, but also how to generate health [9].

Homeopathic medicines share a holistic view of the patient-environment relationship taking into account the complexity of the natural phenomena [11].

Recent studies have highlighted the possibility of preventing the chemical treatment of the whole flock by monitoring the fecal egg count (FEC) and using indirect indicators of parasite damage: Body Condition Score (BCS) and FAffa MAlan CHArt (FAMACHA) [12].

A BCS is helpful as an indicator of the nutritional and health status of animals [13]. FAMACHA is a system that measures anemia on the basis of the color of the lower eyelid mucous membrane in small ruminants, as a morbidity marker for *Haemonchus contortus*. FAMACHA could represent a good tool in targeting selective treatments in order to reduce anthelmintic usage [14,15]. Blood parameters are also important and reliable media for assessing the physiological and health status of animals [16].

The aim of this study was to monitor the gastrointestinal parasite burden together with the anemic and nutritional status in a flock of a native Italian breed, where homeopathic medicine was used in health management, in order to evaluate the real need for anthelmintic treatment that is normally administered without previous laboratory tests.

2. Materials and methods

The study involved the native Zerasca sheep breed, named after the homonymous area (Zeri), located in north western Tuscany at 800 m a.s.l [17]. The flock consisted of 50 sheep reared in extensive natural conditions and fed on grass and shrub pasture with supplementation provided all year. Pasture area was 11 ha managed with rotation based on grass availability. During the night and under unfavorable weather conditions, the animals were kept in a barn with appropriate animal density, good ventilation and dry litter in sufficient quantities. Previous study [2] carried out in Zeri district showed the presence of various *genera* of gastrointestinal strongyles such as *Ostertagia*,*Trichostrongylus*, *Oesophagostomum*, *Haemonchus* and *Chabertia*. Chemical anthelmintic treatment had not been administered in the six months leading up to the beginning of the trial. The study lasted 12 months, from April 2012 to March 2013, and involved an unchanged sample of ten randomly-selected pluriparous ewes, considered a statistically representative sample. During the sampling period all the ewes gave birth; the incidence of twin birth was 40%. The animal care procedure followed the European Directives for the Protection of Experimental Animals (Directive 2010/63/EU).

Unicist homeopathy was applied. This method is based on the application of a single medication which includes the totality of the symptoms and characteristic of the patient.

The homeopathic examination of both farm and animals was performed at the beginning of the study in order to identify the right remedy to administer. Information on the behavior of the flock, management practices, animal–human interactions and pathological farm history was collected in order to fill the repertory schedule for the appropriate remedies, applying the "similarity principle" [18].

The homeopathic repertory consists of a database that includes the results of treatments used in homeopathic tests. The entire flock was considered as a single individual and the various pathologies encountered were interpreted as the expression of the pathological tendency of the farm. The veterinarian then chose the remedy from the repertory that showed the greatest similarities with the symptoms The farmer kept the animals inside during bad weather conditions; this situation is most frequent in winter and the animals spend considerable time in the barn, consequently becoming nervous. Some ewes were thin but in general were in good condition; the state of the fleece appeared excellent. At clinical inspection some animals revealed bronchitis or rhinitis, respiratory problems with transparent but abundant mucus, chronic cough and sporadic lameness. These symptoms were used for the repertorisation.

The *Cina* remedy was chosen from the list of the Mac Repertory programm [19]. This remedy appeared to be the most suitable for the characteristics collected [20] due its close analogy with the flock.

Cina MK (1000 Korsakovian) was diluted in natural water and administered individually by an oral syringe (5 ml/animal) every two weeks for the first two months, then twice during the remaining 10 months.

Fecal and blood samples were collected every two months. Feces were collected directly from the rectal ampoule and individually examined to estimate the fecal egg count of gastrointestinal nematodes, expressed as eggs per gram (EPG), using a modified McMaster technique [21]. Blood samples were drawn from the jugular vein and a complete blood count was measured using an automated hematology analyser (HeCo SEAC): white blood cells (WBC), red blood cells (RBC), hemoglobin (Hb), packed cell volume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH), mean corpuscular hemoglobin concentration (MCHC), and red cell distribution width (RDW).

On the same dates, BCS and FAMACHA were measured following the five-point scale method suggested by Russel [22] and Malan et al. [14], respectively. From a visual and tactile examination of the adipose tissue around and on the vertebras of the lumbar region, BCS attributes the score 1 as emaciated and 5 as obese. FAMACHA attributes the score 1 as optimum and 5 as extremely anemic, by assessing the color of the conjunctival membrane.

Statistical analysis of the gastrointestinal strongyles burden was performed by ANOVA with JMP statistical software [23]. The factor included in the model was the date of sampling. Tuckey test for LSD was performed after ANOVA to find the differences between

Table 1
EPG, BCS and FAMACHA recorded in the sampling period.

Date of sampling	EPG		BCS		FAMACHA	
	Mean	s.d.	Mean	s.d.	Mean	s.d.
April	160A	151.4	2.9	0.56	2.6	0.24
July	32B	55.9	2.9	0.21	2.9	0.57
September	36B	63.8	2.9	0.44	2.9	0.61
November	58B	53.3	2.9	0.33	2.7	0.26
January	115B	91.8	2.6	0.35	2.6	0.50
March	268A	276.5	3.0	0.33	2.8	0.42

A,B: $P < 0.01$.