Coproparasitological evaluation of sheep treated with ivermectin and abamectin association in mineiros, Goiás

Avaliação coproparasitógica de ovinos tratados com associação ivermectina e abamectina em mineiros, Goiás

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Mayni Flávia de Souza Silva
Médica Veterinária
Instituição: Centro Universitário de Mineiros.
E-mail: mayne_flavia@hotmail.com

Raiany Borges Duarte
Médica Veterinária
Instituição: Centro Universitário de Mineiros
E-mail: raianyduartee@hotmail.com

Felipe Augusto Pereira
Acadêmico Medicina Veterinária
Instituição: Centro Universitário de Mineiros
E-mail: felipebalz123@hotmail.com

Alexsander Soares Carrijo
Acadêmico Medicina Veterinária
Instituição: Centro Universitário de Mineiros
E-mail: alexsander.22pb@gmail.com

Priscila Gomes de Oliveira
Mestre em Biociência Animal
Instituição: Universidade Federal de Jataí
E-mail: vet.priscilagomes@gmail.com

Klaus Casaro Saturnino
Docente do curso de Medicina Veterinária
Instituição: Universidade Federal de Jataí
E-mail: klaus.st@ufg.br

Roberta de Moura Assis Lima
Docente do curso de Zootecnia
Instituição: Universidade Federal de Jataí
E-mail: roberta.assis@ufg.br
ABSTRACT
Brazilian sheep farming is an agricultural activity that although it is in a growing expansion still does not have high production of lamb homogeneously from its flock. The sanity is currently in the country one of the factors that hinder the efficiency in sheep production. Animal health should be a priority, as it acts as the foundation for successful breeding. Gastrointestinal endoparasites make each day a more complex obstacle for small ruminant professionals and producers, as such parasites are easy to spread, widely distributed, and sometimes mistakenly controlled. The negative relation in the zootechnical indices of herds that present high infestation of these microorganisms is remarkable. The present work sought through quantitative research, to evaluate the parasitic profile of the sheep herd of an experimental farm in Mineiros, Goiás, in order to provide possible control measures for this problem. However, the results obtained may add to the knowledge of other producers in the region, in order to mitigate factors linked to low productivity due to high endoparasite infestations, so that sheep farming becomes more efficient, not only in the municipality of Mineiros, but all over Brazil.

Keywords: Endoparasites. Sheep farming. Flock. Sanity.

RESUMO
A ovinocultura de corte brasileira é uma atividade agropecuária que embora esteja em uma crescente expansão ainda não possui alta produção de cordeiro de forma homogênea de seu rebanho. A sanidade é atualmente no país um dos fatores que impedem a eficiência na produção ovina. A saúde animal deve ser prioridade, pois atua como base para o sucesso da criação. Os endoparasitas gastrointestinais tornam a cada dia um obstáculo mais complexo para profissionais e produtores de pequenos ruminantes, visto que tais parasitas são de fácil disseminação, ampla distribuição e por vezes controlado erroneamente. É notável a relação negativa nos índices zootécnicos de rebanhos que apresentam alta infestação desses microrganismos. O presente trabalho buscou por meio da pesquisa quantitativa, avaliar o perfil parasitário do rebando de ovinos de uma fazenda experimental em Mineiros, Goiás, a fim de aportar possíveis medidas de controle para tal problemática. Contudo, os resultados obtidos podem somar para o conhecimento dos demais produtores da região, com o intuito de amenizar fatores ligados à baixa produtividade em virtude das altas infestações de endoparasitas, de forma que a ovinocultura se torne mais sólida eficiente, não só no município de Mineiros, mas em todo território brasileiro.

Palavras-chave: Endoparasitas. Ovinocultura. Rebanho. Sanidade.
1 INTRODUCTION

Brazilian sheep farming is an activity that is in constant growth all over the national territory. It has its commercial production pillars warmish in the beginning of 2019’s July when the current president sanctioned the law of stimulus to creation and market of goat and sheep farming. Facing the promising scenario that the Brazilian sheep producer lives the urge to explore the productive efficiency of these animals emerges. Here is where the animal heath takes an extremely important part to assure good results in the activity productivity. Still talking about the animals’ health as one of the factors to a constant and high production it is necessary to highlight the damages caused by the affections of gastrointestinal endoparasites, once the parasitic diseases are seen as one of the illnesses that attack mostly goats, causing significant economic loss.

The small ruminants are animals known for their docility, easy sanitary handling and the ability to coexist well in numerous herds. Usually, are intended small territorial areas for sheep to development of creation which facilitates the parasites’ proliferation entailing a challenge for professionals and producers to control these microorganisms. (SOTOMAIOR & VANETE, 1998).

Gastrointestinal parasites are an important part in the sheep productive chain, for these are many times responsible for mortality and low zootechnical indexes. The infections caused by worms and protozoa are in a cosmopolitan distribution and their control is becoming a critical point in tropical countries like Brazil. Among the most impacting endoparasites for sheep production are the ones belonging to the genera *Haemonchus, Trichostrongylus, Cooperia, Moniezia* and *Eimeria* (SILVA et al., 2019).

Even though Brazilian sheep farming is going through constant growth as in number of animal, this activity is far from the large scale production standard, when compared to other countries. Factors such as incorrect sanitary handling and lack of professionals with affinity for the activity, directly cause a production deficit.

2 MAIN GASTROINTESTINAL SHEEP PARASITES

The possibility to create sheep in smaller territorial spaces has attracted creators worldwide, although this practice is allied to inefficient sanitary handling has become an aggravating when it comes to endoparasite infections. Becoming necessary the comprehension of life cycles of some of the main parasites that attack small ruminants nowadays, so that
control measures can be executed in a conscious and efficient way. (PINTO et al., 2019).

3 TRICHOSTROGYLOIDEA

These worms are worldwide distributed which initiates their life cycles when the eggs still non embryonic are released in the feces. In the environment become embryonic, developing the first larval stage (L1), where feed on organisms in the feces. The L1 hatch and suffer two evolves, L2 and L3, ending double cuticles. The time between the egg elimination until L3 is variable having from 5 to 10 days between species depending mainly on humidity and environment temperature. The L3 will dislocate from the stool bulk until pastures initiating parasite phases. When it gets to the abomasum or intestine the L3 migrate to the mucus, and then will evolve to the fourth larval stage (L4). Complete adult phase in the organ where females and males copulate, lay eggs and initiate a new cycle. The pre-patent period (time between the infection and laying eggs) varies between 14 and 21 days (CAVALCANTE et al., 2009; BOWMAN, 2010).

According to GIRÃO (1998) the main endoparasites from Trichostrongyloidea are: Trichostrongylus spp., Haemonchus contortus, Haemonchus placei, Ostertagia spp., Cooperia spp., and Nematodirus spp.. These are responsible for aggressive injuries like irritation and gastric and intestinal mucous inflammation, severe anemia due to the habit of feeding on the host’s blood.

Usually affections by Trichostrongylus spp. are asymptomatic so in virtue to a large number of parasites (10,000 or more), the animal will present aqueous prostrate and debilitate diarrhea, especially in stressed or malnourished ruminants (CAVALCANTE et al., 2009; BOWMAN, 2010).

Haemonchus contortus are the most relevant parasite comparing to the other small ruminants’ parasites. As an abomasum hematophagous specie, the symptoms of hemonchosis are severe anemia, progressive weight loss, a low in globular volume, fur loss and submandibular edema. The hemonchosis is nowadays one of the main diseases that attack small ruminants, it brings a huge obstacle in control and treatment, because has resistance to diverse medicines used in commercial protocols available to worm treatment. (COÊLHO et al., 2017).
**4 EIMERIA SPP.**

*Eimeira* is a protozoa of coccidian subclass that the sexual reproduction will occur in the intestinal epithelium of hosts, resulting in the formation of oocysts that will develop eight sporozoites capable of infecting new cells in the epithelium. (BOWMAN, 2010).

Hosts feed on sporulated oocyst, and sporozoites will infect the intestinal epithelium cells and will transform into trophozoites, using asexual reproduction responsible for the origin of the first generation of merozoites. These emerge and penetrates new cells resulting a second generation of merozoites. After all these merozoites develop into microgametocyte or microgametocyte, and the microgamete will fertilize the macrogamete, creating a new oocyst non sporulated inside the intestinal cell. Occurring a cell rupture, the oocyst is released in the environment to infect a new host (AMARANTE et al., 2014).

Problems with coccidian have been growing in an unorganized way, worrying producers and professionals in the area, knowing that the infection from *Eimeria* spp. affects directly the animals’ performance, there is consequently a significant drop in production. Symptoms such as apathy, anorexia, bloody or not diarrhea are common in eimeriosis. The lambs are more susceptible to infection than grown animals, in these animals the clinical signals may appear when these are submitted to a very stressful situation, the issue in this situation is that case can work as agent disseminators and posteriorly young animals can contract the infection. (OLIVEIRA et al., 2018).

This current work has as purpose to demonstrate the incidence and the main endoparasites found in sheep herds in the experimental farm, in Mineiros municipality, Goiás, herd which has the technical features of a regular one found in the country nowadays and treated for parasites with common association used in small farms (ivermectin and abamectin).

**5 MATERIAL AND METHODS**

The research was developed to monitor the parasitic profile of farm sheep Luís Eduardo de Oliveiras Salles (FELEOS), unit belonging to the complex of the University Center in Mineiros (UNIFIMES) in Mineiros, Goiás.

The collections were made in 19 animals, from the herd these are the ones with non-defined breeds, having Santa Inês’ bloodline. The animals were submitted to protocols of deworming, with associations of ivermectin and abamectin, orally according with dosage recommended from the producer.
With the purpose of minimizing stress, all procedures were made in the morning and at the end of the afternoon. The feces samples were collected according to standard procedure to perform coprological examination, being withdrawn from the rectal ampoule, according to Hoffman’s description (1987). After collection the samples were identified with identification number of each animal and submitted to Gordon and Witlock’s coprological exam, popularly known as eggs per grams (EPG).

The egg count by grams were realized according adapted technique by Ueno & Gonçalves (1998). The methods enable identifications of parasite eggs most recurrent in Strongylida and considering sheep parasites, specifically from superfamily Trichostrongyloidea.

6 RESULTS

From the parasite egg quantity of fecal analysis (EPG), it was possible to evidence a high incidence of *Trichostrongylus* in the herd. Pointing out that besides the animals not presenting apparent infection symptoms from endoparasites in collection days, these were highly infected and the consequence for this factor is directly associated to development in the herd generally.

When analyzing sanitary control in the herd it was noticed that the daily use of the same active principle, suggesting a possible parasite resistance to medication used in sheep routine in the institution. As demonstrated in Table 1, 10 animals presented parasite reduction after the administration of antiparasitic, however only in three the active principle was considered efficient. In the other seven the drop was inexpressive. In the other, seven did not have the infestation before deworming and two had higher EPG than before the medicine.

*Eimeria* spp. coccids’ oocysts were observed in the coprological results as described in chart 1. The incidence of this protozoa was evidenced in the results of both collections implying that the medications used as base for deworming protocol did not have any efficacy in the parasite’s control.
Table 1 - Results of the coprological sheep exam using the technique of Gordon and Witlock in 19 animals of Fazenda Experimental Luís de Oliveira Salles (FELEOS), in Mineiros, Goiás, before (09/23/2018) and after deworming (10/02/2018) associating ivermectin and abamectin (09/25/2018).

| Animal | Pre deworming | Post deworming |
|--------|---------------|----------------|
|        | EPG*          | Eimeria sp.    | EPG*          | Eimeria sp.    |
| 1      | 2600          | -              | 0             | -              |
| 2      | 0             | -              | 0             | -              |
| 3      | 0             | -              | 0             | -              |
| 4      | 3400          | -              | 0             | +              |
| 5      | 0             | -              | 0             | -              |
| 6      | 5100          | +              | 5000          | +              |
| 7      | 5900          | -              | 3100          | -              |
| 8      | 0             | -              | 0             | -              |
| 9      | 1000          | -              | 0             | -              |
| 10     | 500           | -              | 1100          | -              |
| 11     | 100           | +              | 0             | +              |
| 12     | 1100          | -              | 800           | -              |
| 13     | 0             | -              | 0             | -              |
| 14     | 2200          | -              | 800           | -              |
| 15     | 4500          | -              | 2400          | -              |
| 16     | 0             | -              | 0             | -              |
| 17     | 0             | -              | 0             | -              |
| 18     | 800           | +              | 500           | +              |
| 19     | 2800          | -              | 8800          | -              |

*Eggs per gram of feces
Figure 1 show the comparison of parasitic levels in pre and post deworming. Given these suggestive of antiparasitic resistance used daily in the farm, once they will not present reductions over than 80% in the number of eggs per gram of feces, usually they are related with the class of drugs of worse performance in the effective control of endoparasites in studies that discuss about resistance to medication.

Figure 1 - Eggs per gram of feces (EPG) in sheep of Fazenda Experimental Luís Oliveira Salles from Centro Universitário de Mineiros, Goiás, before (09/23/2018) and after deworming (10/02/2018) associating ivermectin and abamectin (09/25/2018).

7 DISCUSSION

According to Ataíde and Cansi (2013), between the gastrointestinal infections by nematodes and protozoa present as a main sanitary issue in sheep farming. Such actors found a high incidence of these parasites with the proportion of 62% of positive results for nematodes and 41.16% for coccids in studies performed in Brasilia. The multiple parasitism in small ruminants is also reported in Mato Grosso do Sul and in Minas Gerais by (COELHO et al.,2012).

With the intention of minimizing loss that endoparasites bring to sheep farming, actions of prophylaxis and control must be executed efficiently and responsibly, with the intention to obtain positive results with the production and animal sanity.
Activities that burden costs for the production must be taken in consideration by the technician to define the way that sanitary handling will be used in each propriety, because the success of control measures is usually connected to precision that techniques are executed and not to values of medicine offered in the market. The sanitary handling involves many factors, such as: avoid overcrowded animals in areas designated for creation, environment disinfection, feeding, installation hygiene for food and water, strategical control among others. When sanitary handling is inefficient these factors provide high parasite infestation in the herd. (VIEIRA, 2007).

Strategic control measures such as alternating grazing between species or even consortium between two species, for example, the sheep and cows, described by (VIEIRA, 2005) present it like a propitious strategy to species submitted to this regime. With planning the interaction between species can be used in FELEOS once the parasitic charge between species can suffer reduction because even though the same parasites in cows the *H. contortus* for example it does not cause severe infection like in sheep. Thus, the technique’s benefit cost becomes favorable for its implantation. Knowing the main parasites’ life cycle that attack efficient factors in strategic control that is based in control methods in the phase where the parasite is attacking the animal and, in the phase, that it is found in the environment. Rainy periods are propitious to having an elevated parasite population in the environment suggesting that control tactics are focused to installation and pasture. In times where there is rain prevalence, the parasites usually are found in free life resulting in a higher incidence of parasitism in animals, knowing life cycles it is possible to intensify parasite control in pasture of FELEOS in pre-stipulated times directing treatment not only to animals but to the environment as well. (EISKER et al., 2005).

The sanitary control must be adopted as a permanent way of control and prevention against parasite diseases in a property, having an anti-worm drug treatment makes a support for low incidence of the parasites in a herd. These measures involve the need to reduce the infecting larvae number, which may be executed in different ways, respecting the free life period of the parasite. Among them are rotated pasture, sealing and using biological agents. Thus, actions can be planned in pre-determinate year seasons. In response to this type of treatment the results obtained are: low of up to 2% in mortality, higher efficiency in weight gain, reduced cost with anti-parasitic protocols and healing treatments helping in the implantation of a self-sustained creation system. (CEZAR et al., 2008).
When you mix any medication is necessary to know its dosage as well as its action mechanisms it is, although sometimes ignored, the use of anti-helminths it is not different than general medication, and must have its protocols respected such as application routes, periods of shortage and indicated doses to each animal category (HASSUM, 2008).

Knowing that the exaggerated use of anti-parasitic generally has become a permanent problem in sheep farming. The consequence that exists is a resistant herd to anti-parasitic molecules available in medication. Its resistance has become a target of studies and strategies attempts to ease the impact that this problem brings to sheep production. Besides from being damaging to animal health the non-conscience use of chemical products can be harmful to human health as well once chemical residue in animal products has become a discussion theme in many countries making necessary studies and sustainable policies in parasite control (MINHO, 2014).

The parasites’ ability to adapt to unlikely conditions for its survival even after the application of anti-parasitic doses has been a study object for decades. The resistance can present itself in two ways, laterally, when the parasite becomes resistant to only one class of medication and crossed when two or more drugs are used in association. Authors such as Vieira (2008) and Molento (2009) approach resistance to anti-parasitic as a factor of high relevance in endoparasites control.

It is worth mentioning that according to Fortes and Molento (2013) some pharmacological classes occupy places of importance when talking about resistance, they are: macrocyclic imidazothiazoles and lactonas (avermectins and milbemycins). The efficacy of the available products for endoparasites control can be evaluated by reduction of incidence in the results of EPG, must be over 80% of the previous application number. Besides from being a way to collaborate with anti-parasitic resistant agents’ dissemination causes significant drops in property revenue.

Among diverse methods to reduce casuistry that involves endoparasites, trial measures bring information that can be used as base for decision making, like the use of individual anti-parasitic, when only one animal that needs the use of drugs in question. These measures can be obtained with low cost technology, Famacha® that even though is a simple procedure when realizing it, it allows an observation about eye mucous coloration that can vary between 1 and 5, where 1 stands for animals without anemia and 5 for severe anemia. The Famacha® emerged in the necessity to regularize the resistance to drugs that is becoming each day a
bigger challenge to producers and acting professionals in the rural zone, it has been shown efficient to what it proposes (FERNADES et al., 2019).

Knowing the sanitary profile in each herd to be worked with is something crucial to adopt sanitary handling according to needs. The trial technique association like Famacha® and coproparasitological exam (egg per gram of feces count, present excellent results with parasite control. The EPG is about the quantity of endoparasite eggs in certain fields of microscopic observation, this one brings parameters, where is possible to set protocols of deworming that will really act over the incidence of parasites found in certain herds. With that resistance is avoided as well as unnecessary costs with active principles not effective to the found endoparasite class in the herd. Obtaining success in the control of microorganisms that affect sheep farming so badly.

8 CONCLUSION

The research data with the property history leaves in evidence a high infestation of endoparasite in the herd, as well as deworming protocol parasite resistance. Once the utilized drugs in the routine of the farm belong to a low efficiency against parasite type of drugs and the EPG reduction was not higher than 80%, becoming necessary the adoption of new control measures and prophylaxis.

The use of strategic control can be implanted in the property, as well as the adoption of new protocols using other active principles and specially deworming the highest number of animals possible. Simple measures like installation sanitation, feeder and water drinker, Famacha® method, and periodic realization of coprological exams like EPG, will result in effective control of parasites that today threat sheep sanity in FELEOS.

Even though endoparasites have been research objects for years, the endoparasites present themselves as one of the main obstacles for sheep farming, it is up to veterinarians the responsibility to adopt strategies that can act to the problem in a way the rural producer can encumber their costs without compromising their final revenue of protocols based in drugs that will not always bring expected results.

It is very important that the adhesion of policies that can approach professionals and producers using information and biology service, sanitary handling and parasitic agent control, the partnership between professionals and producers is trying to solve problems that microorganisms bring to production.
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