Scientific Paper

Prevalence of Fasciola hepatica in grazing cows during the dry season

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ABSTRACT: A study was conducted in a dairy farm of the Jovellanos municipality, Matanzas province, Cuba, in order to evaluate the prevalence of *Fasciola hepatica* in grazing cows during the dry season. For such purpose, 100 % of the animals of the Crossbred Siboney breed belonging to the milking group, with an age between 5 and 7 years, lactation between 90 and 114 days, and average weight of 390 kg, were used. The animals were distributed in three groups depending on their body condition: BC-2,5; BC-3 and BC-3,5. After the initial diagnosis to determine the level of infestation by *F. hepatica*, the animals were dewormed with Labiozol®. Monthly samplings of feces were performed to determine the parasite rate of *F. hepatica* (FEC); in addition, the live weight, body condition and individual milk production of the animals, were determined. The prevalence of the parasite in the dairy herd was higher in February and March, with 58,3 and 62,5 % of positive animals, respectively. The highest percentages corresponded to the animals with the lowest body condition, which showed higher FEC (14,1 epg) and reached the lowest production for the period, with significant differences ($p < 0,05$) from the animals of groups BC-3 and BC-3,5. It is concluded that the prevalence of *F. hepatica* in the farm exceeded 50 % during the dry season; the group with the lowest body condition was the one with the highest parasite rate, and also had the lowest milk production.

Keywords: body condition, Fasciolosis, milk production

INTRODUCTION

Among the most relevant and frequent diseases that affect economically-important domestic animals is liver distomatosis or fasciolosis, which causes serious economic losses for the livestock production enterprise, caused by the confiscation of affected organs, death of the animals, delay in growth, decrease of live weight, affectations to body condition, and lower milk and meat yield of the species (Recalde-Reyes *et al*., 2014).

This parasite infection is caused by flatworms of the *Fasciola* genus, and the most frequent species worldwide is *Fasciola hepatica*, which is distributed in all the continents and infects a large quantity of mammals (Brockwell *et al*., 2014), including man and appears as an emerging zoonosis due to its increasing impact on public health (Monteiro Noel *et al*., 2013; Chang Wong *et al*., 2016).

The presence of a few individuals in the parenchyma and the bile ducts of the liver does not cause any important manifestation, but massive infestations cause diseases which are particularly serious in young animals, such as sudden death because of liver damage, or they leave sequels in the organ and may cause anemia, weakness, emaciation and edemas (Roque, 2014).

In that sense, Prepelitchi (2009) states the value of eco-epidemiological studies and the structuration of integrated control plans to reduce the impact of these parasite infestations in milk production systems. From such premises, a study was conducted in order to evaluate the prevalence of *F. hepatica* in grazing cows, during the dry season.

MATERIALS AND METHODS

Location. The study was conducted in a dairy farm, belonging to the Jovellanos municipality in the Matanzas province, Cuba.

Climate characteristics. Table 1 shows the climate characteristics of the research area during the dry season. The climate data were taken from the Meteorological Station Indio Hatuey, located approximately 15 km away from the experimental area.

Table 1. Climate characteristics

Month	Mean temperature of the air (°C)	Average relative humidity (%)	Cumulative rainfall (mm)	Evaporation (24 h) (mm)
January	21,2	77	0,8	4,1
February	20,3	70	19,2	5,0
March	24,4	66	18,2	7,0
April	26,1	68	186,7	7,7
May	25,7	72	24,6	8,7

Experimental procedure. The trial was conducted during the dry season (DS) corresponding to the months January-May, 2015. In it, 100 % of the animals of the Crossbred Siboney breed, belonging to the milking group, with an age between 5 and 7 years, lactation of 90-114 days and an average weight of 390 kg, were used. The animals were distributed in three groups (considered experimental treatments) depending on their body condition: BC-2,5; BC-3 and BC-3,5, respectively.

The management and feeding conditions were similar for all the groups during the experimental stage. An extensive grazing system was used, in an area of 38,46 ha, which had *Paspalum notatum* (60,31 %), *Dichantium annulatum* (8,17 %) and *Megathyrsus maximus* (24,51 %). In addition, the animals received a diet based on commercial concentrate feed for dairy cows (1 kg/animal/day), forage of *Pennisetum purpureum* (king grass), mineral salts and water *ad libitum*.

An initial coprological diagnosis was carried out to determine the degree of infestation by *F. hepatica*. Afterwards, the animals were dewormed with Labiozol® (albendazole sulfoxide) according to the dosage recommended by the manufacturer (10-12 mg/kg live weight), taking into consideration the hygienic-sanitary measures established for these treatments by the Institute of Veterinary Medicine of Cuba.

Experimental measurements

Parasitological studies. To determine the parasite rate, expressed in eggs per gram of feces (epg) of *F. hepatica*, the samples were directly taken from the rectum of the animals, with a monthly frequency; they were placed in nylon bags without air and were transferred to the laboratory of parasitology of the Pastures and Forages Research Station Indio Hatuey, under refrigeration conditions, to be processed through the technique proposed by Girão and Ueno (1999).

Prevalence (P). For the calculation of the epidemiological index the following formula was used:

*P = positive animals / total animals * 100.*

The prevalence was calculated per month and for the period.

Live weight. A fixed mechanical scale was used. The weighing frequency was every 30 days for 100 % of the animals in the trial. The weight was estimated during the morning hours and without the animals having eaten, once the milking was concluded.

Body condition. For monitoring the body condition (scale from 1 to five points), every month, the methodology proposed by Ángel Botero (2010) was used.

Milk production. The milk production was controlled twice-a-day (5:00 a.m. and 3:00 p.m.), through individual weighing performed every 15 days on 100 % of the cows under study.

Statistical analysis. The variables parasite rate and milk production were compared (after testing the normal distribution and variance homogeneity assumptions) through a variance analysis, with a completely randomized experimental design and three treatments (depending on the body condition), by the statistical pack SPSS® version 10.0.1 for Windows. For the mean comparison Duncan's multiple range comparison test (Steel and Torrie, 1992) was used, for a significance level of $p < 0,05$.

RESULTS AND DISCUSSION

The coprological diagnosis confirmed the presence of *F. hepatica* eggs. It is important to state that the technique used in the research is efficacious compared with the sedimentation technique, because it allows the quantification of parasite eggs per gram of feces; it also reduces the inconveniencies of low sensitivity and decreases the presence of false negatives (Quiroz *et al*., 2011). According to Romero (2015) and Chryssafidis *et al*. (2015), this parasite is characterized by its low elimination of eggs during the juvenile stages, aspect that limits the diagnosis by qualitative methods.

When determining the prevalence of *F. hepatica* in the dairy herd, it was observed that in February

and March the highest values of positive animals appeared, with 58,33 and 62,50 %, respectively. Such results confirm the suspicion regarding the presence of this parasite infestation in the herd, which had as antecedents the percentage of positive animals at slaughter in slaughterhouse and the presence of biotopes in the grazing areas. The lowest values were found in April (20,83 %) and were related to the application of the chemical treatment.

Studies conducted by Ticona *et al*. (2010) in cattle and sheep herds of the Vilcashuamán region, in Peru, showed prevalence results in both species similar to the ones in this study. These authors also reported positive relations between the presence of the parasite and the variables: species, sex and age. However, the prevalence was higher than the one reported by Ojeda-Robertos *et al*. (2014), who evaluated the dynamics of the eggs of this parasite in intensive grazing systems in Tabasco, Mexico.

According to Novobilský *et al*. (2015) and Correa *et al*. (2016), the prevalence of this parasite infestation in the global livestock production causes large losses, due to the damages it provokes, directly or indirectly, on milk and meat production, reproduction and appearance of other diseases, because the liver is essential for most vital functions of the animals and maintains a close relation to the immunity mechanisms of the hosts.

For Cuba fasciolosis is a problem to be solved; statistics of cattle production showed that 35 % of the losses in adult cattle are caused by this parasite infestation; in addition to the fact that the partial or total confiscation of livers in slaughterhouses is necessary (Roque, 2014).

Table 2 shows the prevalence values of the disease with regards to the body condition of the animals. The highest percentages of positive animals were found in the group with the lowest body condition (BC-2,5), coinciding with the report by Romero (2015), who found this same performance in Crossbred Siboney cows, in the central region of the country.

A similar trend was observed when evaluating the parasite rate (epg) in the animals; there were significant differences ($p < 0,05$) in favor of the group of body condition 3,5 which showed the lowest fecal egg count (table 3).

According to Prepelitchi (2009), those animals with better body conditions express immunological mechanisms in the host-parasite relationship, which are translated into lower parasite rates and higher productive responses, depending on their genetic potential.

When evaluating the milk production related to the presence of *F. hepatica* and the body condition, it could be observed that the animals belonging to group BC-2,5 reached the lowest production for the period, with significant differences ($p < 0,05$) with regards to those from groups BC-3 and BC-3,5, which showed less positive animals to this parasite infestation (fig. 1).

Also Valderrama Pomé (2016), when evaluating the prevalence of fasciolosis in ruminants in Peru, stated that this disease affects more than

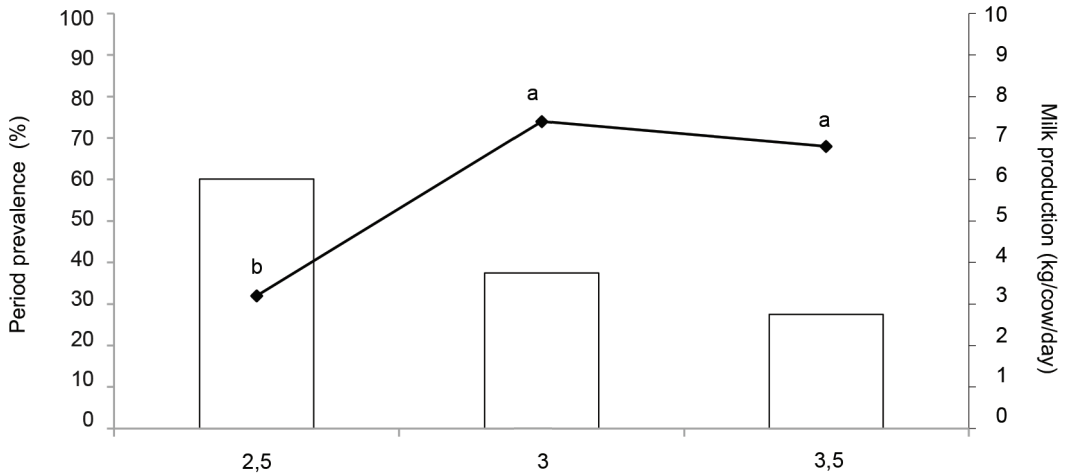
Table 2. Prevalence of *F. hepatica* related to the body condition of the animals

Body condition	Prevalence by month (%)				
	January	February	March	April	May
2,5	62,5	75,0	87,5	37,5	37,5
3,0	50,0	50,0	62,5	25,0	0
3,5	50,0	50,0	37,5	0	0

Table 3. Performance of the parasite rate with regards to the body condition of the animals

Body condition	Parasite rate (epg)
2,5	$14,1^{b}$
3,0	$9,8^{ab}$
3,5	$4,6^{a}$
SE ±	1,293**

Values with different superscripts differ at $p < 0,05$.



Values with different superscripts differ at p < 0,01.

Fig. 1. Performance of milk production in the period.

50 % of the cattle stock, generating significant losses due to the decrease of the milk and beef production.

On the other hand, the evaluation of the body condition has been proposed as a tool, not only for the nutritional and reproductive management of the herd, but also as an expression of the health of cattle herds (Ángel Botero, 2010).

Studies conducted by Quiroz *et al*. (2011) show the relation between the occurrence of *F. hepatica* and the body condition and its negative influence on the expression of the milk production potential in the tropic, where this disease reaches its highest exponent because of the edaphoclimatic conditions and the marked differences between the productive periods (Correa *et al*., 2016); in spite of the fact that in the rainy season biotopes are increased, during the dry season the reduction of the pasture availability forces the herds to consume feedstuffs in risk areas. Hence the importance of the eco-epidemiological studies of the parasite for the establishment of integrated control plans (Ojeda-Robertos *et al*., 2014; Howell *et al*., 2015).

It is concluded that the prevalence of *F. hepatica* in the farm exceeded 50 % during the dry season and the group with the lowest body condition was the one with the highest parasite rate, as well as that with the lowest milk production.

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