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Original Article

Point prevalence of gastrointestinal parasites in double purpose cattle of Rio de Oro and Aguachica municipalities, Cesar state, Colombia

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ABSTRACT

Gastrointestinal parasites are one of the most important health problems in cattle worldwide, as they cause economic losses in the herds. Twenty - seven double purpose herds were visited to determine the prevalence of gastrointestinal parasites in cattle at the Rio de Oro and Aguachica municipalities. Overall, 862 fecal samples were collected in three age groups: < 12 months, 12–24 months and > 24 months. Stool samples were taken directly from the rectum and refrigerated until processing. For parasite determination, fecal samples were processed using coprological techniques. The parasitic genera were identified by egg or infective larval morphology. The global prevalence of gastrointestinal parasites was 83.2%, being the highest values for *Eimeria* sp. (77.9%), *Strongyloides* sp. (10.8%) and *Haemonchus* sp. (8.5%). Regarding the prevalence by municipalities, there was no statistical association ($P > 0.05$) indicating that the prevalence was similar in the two municipalities. Regarding the results for *Eimeria* sp., different degrees of positivity were observed, reflecting that there was statistical association ($P < 0.05$) with respect to the age group, suggesting that adult animals may act as infection source for calves. Likewise, there was statistical association ($P < 0.05$) between the prevalence for *Strongyloides* sp., *Haemonchus* sp. and *Trichostrongylus* sp. with respect to the age group. It is concluded that there is a high prevalence of gastrointestinal parasites in dual-purpose cattle in the municipalities under study, and that it could be controlled by improving the hygienic conditions of the herds, and informing the farmer about parasite control programs.

1. Introduction

Gastrointestinal parasitism (GIP) is one of the most important health problems in cattle all over the world, since it affects health and cause economic losses in the herds (Mederos and Banchero, 2013). In general, GIP in cattle are caused by protozoa and helminths. As for protozoos, *Eimeria* sp. is an enterococcidia which causes bovine coccidiosis, an infection characterized by diarrea, dehydration and death in animals under one year of age (Díaz de Ramírez et al., 2001). Días de Ramírez et al. (1998) found 53% prevalence and 813.17 oocysts per gram of feces (opg) in coccidia infección in cattle from Trujillo state, Venezuela; whilst in Yucatan state, Domínguez et al. (1993) and Rodríguez-Vivas et al. (2001) reported 86.01% and 71.57% prevalence in bovine, respectively. In Colombia, Sierra et al. (2016) reported prevalence of 74.27% for *Eimeria* sp. in cattle from Cesar state.

Nematodes and cestods, are parasites that cause problems of verminous gastroenteritis (Mawatari et al., 2014). The most important and prevalent genera world wide are those belonging to the *Trichuridae*, *Trichostrongylidae*, *Ancylostomidae*, *Ascarididae* and *Strongyloididae* families (Regassa et al., 2006; Colina et al., 2013), specially in tropical zones. Orjuela et al. (1991) conducted a study in the North coast of Colombia and reported prevalences of 70.1% for Strongylida, 26.8% for *Eimeria* sp., 12% for *Strongyloides* sp. and 3.1% for *Moniezia* sp. In a Mexican study, Rodríguez-Vivas et al. (2001) found 60.6% prevalence for the Strongylida order, 9.8% for *Strongyloides* sp., 8.2% for *Trichuris* sp. and 3.8% for *Moniezia* sp. In Venezuela, Urdaneta et al. (2011) reported a general GIP prevalence of 34.2% and a mean egg per gram (epg) count of 53.4. Colina et al. (2013) registered a GIP prevalence of 67.5%, being *Cooperia* sp. (32.8%) and *Oesophagostomun* sp. (40.2%) the most prevalent in the Pacanga district, Perú; nematode egg counts, as suggestive of infection level, were 24 epg. In Colombia, Sierra et al. (2016) found 8.16% prevalence for *Haemonchus* sp., 3.82% for

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Trichostrongylus sp. and 2.37% for *Ostertagia* sp. *Fasciola hepatica*, is a world wide distributed trematode parasite affecting cattle, sheep and occasionally man, with adult stages located in bile ducts of mammals and herbivorous, requiring *Lymnaea* snails as intermediate hosts for their transmission (Cordero del Campillo et al., 1999). Rojas and Cartín (2016) recorded a 1.83% prevalence in cattle from different regions of Costa Rica, whilst Soca-Pérez et al. (2016) reported prevalences between 58.3% and 62.5% in farms of Cuba. In Colombia, Recalde-Reyes et al. (2014) and Estupiñán et al. (2016) found 3.74% and 3.4% prevalences, respectively, in cattle from Quindio and Cesar state.

Cesar state, Colombia is an agricultural and fish raising region, being the cattle husbandry one of the most important components of the local economy, with a participation of 6% in the cattle national inventory. This region is notorious for its dairy industry; however, 60% of the cattle farms are dedicated to dual purpose (beef and milk). According to the National Agricultural Institute (ICA, 2015), the state has a population of 1,357,512 heads of cattle, being 10% located in the municipalities of Aguachica and Rio de Oro. In Colombia there is very little epidemiological information on GIP in cattle, mainly in the North East región of the country; for this reason, the present research work had as objective, to determine the prevalence of GIP in dual purpose cattle in the municipalities of Rio de Oro y Aguachica, Cesar, Colombia.

2. Methods

The study was conducted in the municipalities of Aguachica (8°18′24″N 73°36′55″O) and Rio de Oro (8°17′30″N 73°23′14″O) in the state of Cesar, Colombia. Bioclimatic characteristics of the region are a mean anual temperatura of 28 °C, and a weather variation with well defined dry and wet periods. Altitude is 800 masl and anual rainfall is 1,835 mm, with two rainy periods/year (Gobernación del Cesar, 2016).

A random cluster sampling, descriptive and transversal, was designed. Twenty-seven farms, located in the Marquez “vereda” of the municipality of Rio de Oro and the Patiño y Las Piñas “veredas” of the municipality of Aguachica, were visited between October 2015 and January 2016 (dry period). According to ICA's vaccination records, (ICA, 2015) the cattle population census for the two municipalities was 12,593 heads: using the formula for known populations (Herrera, 2011), with an expected prevalence of 5% and a confidence level of 95%, a “n” of 862 fecal samples was determined; total samples were proportionally distributed according to the total number of bovine present in each farm examined. Included animals belonged to the dual purpose type, with ages between four months and 13 years. The following three age groups were conformed: < 12 months; 12–24 months and > 24 months. Collection of fecal samples was made from the rectum or from recently dropped stools, in the morning, using previously labeled polyethylene bags; approximately 10 g of feces were collected from each bovine. Samples were refrigerated and transported the laboratory for processing. All samples were processced by three copro-parasitological techniques. First, the stool samples were cultivated at room temperature in Petri dishes using 20 mL of 2.5% potassium dichromate solution for 24 h for sporulation of the coccidian oocysts and later processed by the McMaster technique to determine the oocysts per gram of feces (opg) employing a sugar – salt (1 L of saturated NaCl plus 500 g of sugar) flotation solution (Sandoval et al., 2011). For nematode eggs (epg), three grams of feces were mixed with 14 mL of the flotation solution in a 50 mL Falcon tube, and vigorously agitated until complete homogenization and left undisturbed. After 6–8 min, a 0.5 mL sample of the supernant was taken and placed in the McMaster chamber for reading. The numbers of opg and epg were calculated with a detection level of 50 (two chamber) which is the standarized factor for this technique (Sandoval et al., 2011). The Modified Dennis technique (Correa et al., 2016) was employed to detect the heavy *F. hepatica* and *Paramphistomum* sp. eggs. A coproculture was performed on the positive samples for Strongylida eggs and infective larvae were recovered through the larval migration technique. The genera observed were identified by the morphoHenriksen and Christensen, 1992logy of their eggs or infective larvae as indicated by García et al. (2000), Van Wyk et al. (2004) and Fiel et al. (2011), using a light optical microscope with magnification of 10 and 40 ×.

2.1. Statistical analysis

Prevalence was determined by dividing the number of positive animals between the total animal population of the sampled population. The results obtained were analyzed by descriptive statistics and the Chi square test (X^2) to determine the analyze variables. Calculations were made using the Statistixs 8.0 program (Analytical Software, 2008).

3. Results

Overall prevalence of GIP in the Aguachica and Rio de Oro municipalities was 83.2%. No statistical association was found ($X^2 = 2.92$; $P > 0.05$) between prevalence values in the two municipalities: 84.6% (511/604) in Aguachica and 79.8% (206/258) in Río de Oro. According to these results, the prevalence is present in similar proportions in the two municipalities of the Cesar state, Colombia.

Table 1 shows the 13 parasite genera found in the study, being *Eimeria* sp. (77.9%), *Strongyloides* sp. (10.8%) and *Haemonchus* sp. (8.5%) the most prevalent. In general, protozoa oocysts (*Eimeria* sp.), trematode eggs (*F. hepatica* and *Paramphistomum* sp.), as well as eggs and larvae of nematodes and cestodes (*Moniezia* sp.). As for the intensity of infection, *Trichuris* sp. showed the highest level (417 epg), followed by *Trichostrongylus* sp. (300 epg). *Strongyloides* sp., *F. hepatica* and *Moniezia* sp. were not counted. In most (76.1%) of the samples examined, only one parasite genus was evidenced, whilst in 23.9% of the cases two or more parasite genera were found. These results were analyzed by the Chi square test and an statistical association ($X^2 = 57.39$; $P < 0.05$) between prevalence and monoparasitism in the cattle examined. The genera of nematodes and trematodes were identified by the morphology and size of their eggs and larvae (García et al., 2000; Van Wyk et al., 2004; Fiel et al., 2011).

Table 2 shows the comparison (Chi Square Test) between positive percentages of *Eimeria* sp. parasitism and age of the animals. Different degrees of parasitism were observed, suggesting a statistical association ($P < 0.05$) with respect to the age group. Although all group showed infection by coccidiae, animals from < 12 months showed lower prevalence (65.3%), than those above 24 months (79.8%). Table 3 shows the *Eimeria* sp. mean infection intensity values in the four age groups. These values were analyzed by Chi Square Test, and according with the results obtained, there was no statistical association ($P > 0.05$)

Table 1
Prevalence and intensity of infection with parasite diagnosed in bovine from Rio de Oro and Aguachica municipalities, Cesar state, Colombia.

Parasite Genera	Positive (n = 862)	Prevalence (%)	Intensity of infection (opg-epg)
Eimeria sp.	672	77.9	530.2
Strongyloides sp.	93	10.8	–
Haemonchus sp.	73	8.5	145.6
Fasciola hepatica	30	3.4	–
Trichostrongylus sp.	26	3.1	300
Ostertagia sp.	20	2.3	226.1
Moniezia sp.	10	1.2	–
Toxocara sp.	9	1.1	76.9
Nematodirus sp.		0.8	87.5
Paramphistomum sp.	6	0.7	88.5
Capillaria sp.	3	0.3	83.3
Trichuris sp.	3	0.3	417
Cooperia sp.	2	0.2	75

Strongyloides sp., F. hepatica and Moniezia sp. were not counted; opg: oocysts per gram of feces; epg: eggs per gram of feces.