Prevalent Parasitosis in Beef and Dairy Cattle Farms in Vidzeme Region

Dace Keidāne, Anna Krūklīte, Alina Derbakova*

Latvia University of Agriculture, K. Helmaņa str. 4, Jelgava, LV-3004, Latvia

Abstract. The aim of the study was to investigate the beef and dairy cow parasitosis epizootic situation in Vidzeme region. Research was done throughout Vidzeme territory during the period of the years 2013-2014. The total number of animals examined was: 273 dairy and 90 young beef cattle aged from 6 months to two years and 248 dairy and 29 beef cows older than two years. For the diagnosis of helminthes standardized ovoscopic and larvoscopic methods were used. For the diagnosis of protozoa flotation and modified Ziehl-Neelsen methods were used. The main species in the samples were *Cryptosporidium* spp., *Eimeria* spp. and *Strongylus* spp. In the young dairy and beef cattle aged from 6 months to two years and cattle older than two years *Cryptosporidium* spp. invasion accordingly was 32.6% and 19% (dairy cattle) and 62.2% and 65.5% (beef cattle); the invasion of *Eimeria* spp. 30% and 7.3% (dairy cattle) and 55.6% and 10.3% (beef cattle); and the invasion of *Strongylus* spp. was 17.6% and 13.7% (dairy cattle) and 43.3% and 27.6% (beef cattle). Both dairy and beef cattle were infected with *Moniezia* spp., *Paramphistomum* spp., *Strongyloides* spp. Dairy cows aged from 6 months to two years had *Trichuris* spp., *Dictyocaulus* spp. and *Neoscaris* spp. invasion.

Key words: cryptosporidium, eimeria, strongylus, parasitosis, cattle, Latvia.

Introduction

In Latvia, there have been no requirements for farmers to carry out any coprological examination of cattle in the last 20 years. Only few researches have been carried out in the last 5-10 years (Keidāne, Krūklīte, & Medne, 2012; Lassen, 2011). Thereby, the situation regarding the most common cattle parasitosis in this country has still not been fully described.

In addition to climate change and the import of cattle, there is a great opportunity to introduce the parasite species which are not registered in the republic (Demiaszkiewicz, 2014).

Overall, worldwide cattle show a very high prevalence (95.5%) of parasite infections. Out of this percentage, 75.1% had multiple parasites while 20.4% had a single parasite infection. Prevalence of *Strongyles* spp. (63.1%) was the highest, followed by *Fasciola* spp. (51.1%), *Eimeria* spp. (29.4%), *Paramphistomum* spp. (25.9%), *Schistosoma* spp. (21.7%), *Ascaris* spp. (6.1%) and then *Moniezia* spp. (2.3%) (Squire, Amafu-Dey & Beyuo, 2013; Ypkxapr, 2000). The prevention of parasitic diseases is based on the study of the epizootic situation and planning of preventive measures (Jasmer, Lahmers, & Brown, 2007; Heinrichs *et al.*, 2003; Forbes *et al.*, 2000; Ypkxapr *et al.*, 2000).

The aim of this study was to find out prevalent parasitosis in dairy and beef cattle herds in Vidzeme region.

Materials and Methods

The research was done in Vidzeme region in the period from 2013-2014. The dairy and beef cattle were investigated. Animals were divided into the following four groups: dairy cattle aged from six months to two years (n = 273) and older than two years (n = 248); beef cattle aged from six months to two years (n = 90) and older than 2 years (n = 29). Samples were obtained from 62 cattle farms: 50 dairy cattle farms and 12 beef cattle farms. Laboratory tests were made in the laboratory of the department of Food and Environmental Hygiene, Faculty of Veterinary Medicine, Latvia University of Agriculture.

Rectal fecal samples collected into plastic bags were kept in a refrigerator at 4°C prior to examination. For the diagnosis of helminthes standardized ovoscopic and larvoscopic methods were used (Roepstorff & Nansen, 1998). For the diagnosis of protozoa flotation and modified Ziehl-Neelsen methods (Henriksen & Pohlenz, 1981) were used.

Parasitosis invasion extensive margin or prevalence (IE) was computed by dividing the number of infected animals by the total number of animals in a group. The correlation between the age of the animals and the validity of invasion was calculated using the t-test function in Microsoft Excel 2013 programme.

* Corresponding Author's email:
alina.derbakova@gmail.com

Results and Discussion

The present study showed that in Vidzeme parasitosis were found in both age groups of dairy (Figure 1) and beef cattle (Figure 2).

In both age groups of dairy cattle, the highest infestation extensive margin (IE) was showed by *Cryptosporidium* spp. IE 32.6% and 19% ($p < 0.05$), *Eimeria* spp. IE 30% and 7.3% ($p < 0.01$) and *Strongylus* spp. IE 17.6% and 13.7% ($p < 0.05$) correspondingly. The prevalence of *Eimeria* spp. and *Strongylus* spp. in both groups is quite similar to studies in other countries (Kounty *et al.*, 2012; Knubben-Schweizer *et al.*, 2010; Lassen & Talvik, 2009; Forbes *et al.*, 2000).

In group of young cattle from six months to two years in addition to the above mentioned invasions, we diagnosed *Moniezia* spp. IE 6.2%, *Neoscaris* spp. (ascarids) IE 2.6%, *Trichuris* spp. IE 1.5%, *Fasciola* spp. IE 1.7%, *Paramphistomum* spp. IE 1.7%, *Strongyloides* spp. IE 1.1% and *Dictyocaulus* spp. IE 1.7%.

In cattle older than two years, we diagnosed *Moniezia* spp. IE 3%, *Trichuris* spp. IE 0.4%, *Fasciola* spp. IE 1.2%, *Paramphistomum* spp. IE 0.8% and *Dictyocaulus* spp. IE 0.4%.

Neoscaris vitulorum or calf ascarids was diagnosed in young cattle aged six months to two years IE 2.6%. As we know, adult cattle do not suffer from ascarids (Davila, Irsic, & Greiner, 2010; Zajac & Conboy, 2006).

Dictyocaulus spp. invasion in cattle from six months to two years was IE 1.7%, in cows older than two years IE 0.4% ($p > 0.05$). It is noted that the invasion of *Dictyocaulus* spp. is more often diagnosed in young animals. (Elsheikla, 2011; Holzhauer *et al.*, 2011; Hoglund, Ganheim, & Alenius, 2003). The diagnosed invasion of *Dictyocaulus* spp. in the cattle

older than two years could be explained by the import of cattle from different regions of the world.

Describing the invasion of *Fasciola* spp. IE 1.7% and 1.2%, *Paramphistomum* spp. IE 1.7% and 0.8%, it can be concluded that the situation in Vidzeme region is similar to that of the previous studies about Latvia (Keidāne, Krūklīte, & Medne, 2012), but comparing with the research conducted in other countries, the prevalence of parasites in Latvia is lower. Similarly, a study in Austria found that cattle *Fasciola* spp. IE was 16% (Knubben-Schweizer *et al.*, 2010). Regarding *Paramphistomum* spp., in Turkey the average IE throughout the year was 10.4% (Ozdal *et al.*, 2010).

In beef cattle, like in dairy cattle, the highest IE both for young cattle from six months to two years and cattle older than two years has been observed in *Cryptosporidium* spp. IE 62.2% and 65.5% ($p < 0.01$), *Eimeria* spp. 55.6% and 10.3% ($p < 0.01$) and *Strongylus* spp. IE 43.3% and 27.6% ($p < 0.01$) invasions (Figure 2). Completely different results were obtained from researchers in Alberta, Canada – the prevalence of *Cryptosporidium* spp. in beef cattle calves is 5% (Ralston, McAllister, & Olson, 2003; Gow & Waldner, 2006). Compared with other countries, *Eimeria* spp. IE in Latvia is slightly higher: studies in Turkey found *Eimeria* spp. IE for calves in beef cattle herds 27.2% (Cieek *et al.*, 2007), 33.3% in Hungary (Farkas, Szeidemann & Majors, 2007), 22.6% in Brazil (Almeda *et al.*, 2011). *Strongylus* spp. IE in Latvia is lower than in other countries, for example, in Thailand IE is 100% (Lwin, 2011).

Along with the invasions mentioned above, young cattle were infected with *Moniezia* spp. IE 8.9% and *Strongyloides* spp. IE 1.1%, whereas in cattle older than two years *Paramphistomum* spp. IE 3.4% was diagnosed. In comparison with other countries, the invasion of these parasitosis in our country is

Figure 1. Prevalence (%) of parasite invasion in dairy cattle.

Figure 2. Prevalence (%) of parasite invasion in beef cattle.

much lower. The research in Spain reported about *Paramphistomum* spp. IE was 29% (Gonzales-Warleta *et al.*, 2013), in Thailand IE was 6.4% in beef cattle under 1 year old, and IE was 23.3% of cattle from one to two years old (Lwin, 2011). Similar IE has been mentioned regarding *Moniezia* spp.: in Thailand *Moniezia* spp. IE in cattle under one year was 12.9%, from one to two years old it was 23.3% (Lwin, 2011). Relatively higher *Strongyloides* spp. IE was found in the Czech Republic - 4.3% (Kvač & Vitovec, 2007).

In general, younger animals are most likely to show signs of parasitism, while mature cows acquire a degree of immunity to parasites that reside in the gastrointestinal tract. Dairy cattle in a dry lot are less likely to have heavy worm infection than beef cattle on pastures (Gadberry & Powell, 2011).

The results show that we should pay more attention to studies of cryptosporidiosis in Latvia because this disease has not been thoroughly investigated. Our research showed a high *Cryptosporidium* spp. invasion both in dairy and beef cattle herds. According to the sources of scientific literature, cryptosporidiosis is a serious invasion that is registered not only in the tropical zone countries (Kouny *et al.*, 2012; Ypkxapr *et al.*, 2000), but also in Europe and it is shown by the recent research conducted in Latvia (Keidāne, Krūklīte, & Medne, 2012; Lassen, 2011). We didn't include calves aged from the first to the tenth day of life in this study, which are in a high-risk group. Therefore, we will continue studies of the *Cryptosporidium* spp. invasion, treatment and prevention.

Conclusions

- In dairy cattle herds in the age group of six months to two years were diagnosed with low invasion of ascarides, *Dictyocaulus* spp. and *Trichuris* spp.
- Dairy cattle aged from six months to two years and cattle older than two years were more frequently infected with *Cryptosporidium* spp. IE 32.6% and 19%, *Eimeria* spp. IE 30% and 7.3% and strongylatoses of digestive system IE 17.6% and 3.7%.
- Beef cattle aged from six months to two years and cattle older than two years, were more frequently infected with *Cryptosporidium* spp. IE 62.2% and 65.5%, *Eimeria* spp. IE 55.6% and 10.3% and *Strongylus* spp. 43.3% and 27.6%.
- Both dairy and beef cattle herds were infected with *Moniezia* spp., *Paramphistomum* spp. and *Strongyloides* spp.

References

1. Almeda, V. D. A., Magalhaes, V. C. S., Muniz-Neta, E. S., Munhoz, A. D. (2011). Frequency of species of the genus *Eimeria* in naturally infected cattle in Southern Bahia, Northeast Brazil. *Brazilian Journal of Veterinary Parasitology* 20, 78-81 pp.
2. Cieek, H., Sevimli, F., Kozan, E., Kose, M., Eser, M., Dogan, N. (2007). Prevalence of coccidia in beef cattle in western Turkey. *Parasitology Research*. 101: 1239- 1243 pp.
3. Davila, G., Irsic, M., Greiner, E.C. (2010). *Toxocara vitulorum* in beef calves in North Central Florida. *Veterinary Parasitology* 168, 261-263 pp.

4. Demiaszkiewicz, A. W. (2014). Migration and the introduction of wild ruminants as a cause of parasite exchange and emergence of new parasites. *Annals of Parasitology* 60 (1), 25-30 pp.
5. Elsheikla, H. (2011). Employing integrated approach to lungworm control in cattle. *Veterinary Times* No 04, 16 p.
6. Farkas, R., Szeidemann, Z., Majors, G. (2007). Studies on coccidiosis of calves in Hungarian dairy farms. *Parasitology Research* 101, 113 – 120 pp.
7. Forbes, A. B., Huckle, C. A., Gibb, M. J., Rook, A. J., Nuthall, R. (2000). Evaluation of the effects of nematode parasitism on grazing behavior, herbage intake and growth in young grazing cattle. *Veterinary parasitology*. Netherland. Jun 10; 90 (1-2): 111-118 pp.
8. Gadberry, S., Powell, J. (2011). Internal parasites in beef and dairy cattle. Retrieved 23 October, 2015, from <https://www.extension.org:443/pages/11022/internal-parasites-in-beef-and-dairy-cattle>.
9. Gonzalez-Warleta, M., Lladosa, S., Castro-Hermida, J. A., Martinez-Ibeas, A. M., Conesa, D., Munoz, F., Lopez-Quilez, A., Manga-Gonzales, Y., Mezo, M. (2013). Bovine paramphistomosis in Galicia (Spain): prevalence, intensity, etiology and geospatial distribution of the infection. *Thesis*. 32, 11-14 pp.
10. Gow, S., Waldner, C. (2006). An examination of the prevalence of and risk factors for shedding of *Cryptosporidium* spp. and *Giardia* spp. in cows and calves from western Canadian cow-calf farms. *Veterinary parasitology* 137, 50-61 pp.
11. Heinrichs, A. J., Holden, L., Ishler, V., Jones, C. M., Muller, L., Varga, G., Wu, Z. (2003). Penn State, Dairy and Animal Science, cattle nutrition, cited 6/17/03. Retrieved 15 September, 2015, from das.psu.edu/dairynutrition//dairynutrition/calves/rumen/index.cfm.
12. Henriksen, S. A., Pohlenz, J. F. L. (1981). Staining of cryptosporidia by a modified Ziehl-Neelsen. *Acta Veterinaria Scandinavica* 22:594-596 pp.
13. Hoglund, I., Ganheim, C., Alenius, S. (2003). The effect of treatment with eprinomectin on lungworm at casly potency on the development of immunity in young cattle. *Veterinary Parasitology* 114:205-214 pp.
14. Holzhauer, M., van Schaik, G., Saatkamp, H. W., Ploeger, H. W. (2011). Lungworm outbreaks in adult dairy cows: estimating economic losses and lessons to be learned. *Vet Rec*. Nov 5, 169(19); 494 p.
15. Jasmer, D. P., Lahmers, K. K., Brown, W. C. (2007) *Parasite Immunology*. Department of Veterinary microbiology and pathology, USA; 29(3): 139-151 pp.
16. Keidāne, D., Krūklīte, A., Medne, R. (2012). Prevalent parasitosis of cows in Latvia. *International Scientific Conference Animals. Health. Food Quality Proceedings of Conference on "Current events in veterinary research and practice" 22nd – 23rd November 2012*, Jelgava, Latvia; 68-71 pp.
17. Knubben-Schweizer et al. (2010). Efficiency of control of bovine fasciolosis. Proceeding of the XXVI World Buiatrics Congress. Santiago, Chile, Nov 14-18. Reprinted in IVIS with the permission of the Congress organizers, 25-27 pp.
18. Koutny, H., Joachim, A., Tichy, A., Baumgartner, W. (2012). Bovine *Eimeria* species in Austria. *Parasitol Res*. May; 110(5): 1893-901 pp.
19. Kvač, M., Vitovec, J. (2007). Occurrence of *Strongyloides papillosus* associated with extensive pulmonary lesions and sudden deaths in calves on a beef farm in a highland area of South Bohemia (Czech Republic). *Helmintologia*, 44, 1:10-13 pp.
20. Lassen, B. (2011). The prevalence of *Eimeria* and *Cryptosporidium* in large Latvian cattle herds. *Veterinaria ir zootechnika*, T54 (76). 47-52 pp.
21. Lassen, B., Talvik, H. (2009). Parasitic protozoans in livestock and pets in Estonia. Review. *Veterinarija ir zootechnika* (Vet Med Zoot). ISSN 1392-2130; 46 (68): 30-36 pp.
22. Lwin, K. S. (2011). *Prevalence of Cryptosporidium, Giardia and other internal parasites in dairy and beef cattle of Mae on District, Chiang Mai Thailand*. Thesis, Chiang Mai University and Freie Universität Berlin, Chiang Mai, Thailand, 65-77 pp.
23. Ozdal, N., Gul, A., Ilhan, F., Deger, S. (2010). Prevalence of Paramphistomum infections in cattle and sheep in Van Province, Turkey. *Helmintologia*, 47, 1:20-24 pp.
24. Ralston, B. J., McAllister, T. A., Olson, M. E. (2003). Prevalence and infection pattern of naturally acquired giardiasis and cryptosporidiosis in range beef calves and their dams. *Veterinary Parasitology*. 114, 113-122 pp.
25. Roepstorff, A., Nansen, P. (1998). Epidemiology, diagnosis and control of helminth parasites of swine. *FAO Animal Health Manual*. Rome, 51-56 pp.
26. Squire, S. A., Amafu-Dey, H., Beyuo, J. (2013). Epidemiology of gastrointestinal parasites of

- cattle from selected locations in Southern Ghana. *Livestock Research for Rural Development* 25 (7). 14-18 pp.
27. Zajac, A. M., Conboy, G. A. (2006). *Veterinary Clinical parasitology*. Blackwell Publishing Ausen, IA 82 p.
28. Уркхарт Г. и др. (2000). Ветеринарная паразитология (Veterinary parasitology) Москва: Аквариум, 17-26 стр. (in Russian).