INVESTIGATION OF THE SUBCLINICAL PARASITIC INFECTION OF ALPACAS IN POLISH HERDS

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Abstract

In recent years, alpaca breeding has been gaining greater interest. One of the threats to the health of alpaca herds are parasitic infections, but so far this problem has not been studied thoroughly in Poland. Therefore, the aim of this study was to identify the level of infection and the parasitic species composition affecting alpacas on the basis of coproscopic (supported by larvoscopic) examinations. The research was conducted on 13 herds of 7 to 35 animals located in Poland. Fresh faecal samples (n = 257) for the flotation concentration McMaster quantitative technique were collected in 2020, once from each herd before the start or at the end of the grazing season, to obtain information on the need to apply antiparasitic agents. In the course of the research, we found infections with the coccidia of the genus Eimeria (E. punoensis, E. alpacae, E. lamae and E. macusaniensis), and gastrointestinal nematodes of the order Strongylida, as well as the non-strongyle genera Aonchotheca, Trichuris, and Strongyloides. Although the overall level of infection was relatively low (prevalence P = 54.1%, mean intensity of egg output per gram of host faeces I = 106 (20–2060) EPG in the case of nematodes, and P = 31.9% and oocyst output I = 213 (20–5840) OPG for coccidia), the presence of highly pathogenic parasite species in some of the studied herds, i.e. Eimeria macusaniensis and E. lamae from the coccidia, and Nematodirus battus from the nematodes were found, which *may pose a serious threat especially to the health of young alpacas. There was no evidence of Haemonchus contortus in any of the herds. Breeders were advised to include targeted, selective treatment of their animals, and the need to continue quantitative coproscopic examinations, also to assess the efficacy of antiparasitic agents used.*

Key words: Vicugna pacos, parasites, coccidia, nematodes

Introduction

The alpaca *Vicugna pacos* (Artiodactyla, Tylopoda: Camelidae) is a domesticated form of wild vicuña, which in nature is found only at high altitudes (3600–5400 m asl) in the Andes. Its domestication probably took place in the Andean highlands of Peru at approximately 4000

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BC. Through its long history with humans, *V. pacos* has provided people with wool, meat, milk, leather, transport, and its faeces were used for fuel and fertilizer (Fowler, 1996; Diaz et al., 2016; Dubey, 2018). Currently, alpacas are reared for recreation and as farm animals in many countries of the world, and they can even be maintained as guard animals to protect flocks of sheep from predators (Matthews et al., 2020). As of 2004, they have also been bred in Poland as companion animals and maintained for agro-tourism, alpacotherapy, as well as for their fine fibre (Morales Villavicencio, 2020). Considered not so long ago to be exotics, alpacas have now received in Poland the status of farm animal (Act of 10 December 2020 on the organization of farm animal breeding and reproduction – Journal of Laws 2021, item 36), which could additionally increase the interest of farmers in these camelids. Although alpacas – with the present countrywide population estimated at approx. 5,500 animals – are gaining in popularity, and some authors (Kapustka and Garbiec, 2022) point to the need to recognize the invasiological situation of the herds, knowledge about the parasitic diseases affecting them in Poland is very limited (Pyziel-Serafin et al., 2022).

Parasitism, meanwhile, is a major health concern for alpacas, affecting their production throughout the world (Windsor et al., 1992; Duncanson, 2012; Cebra, 2014; Vaughan et al., 2018). As reported in studies conducted in other countries of Europe, North America and Australia, the digestive tract is the most common organ system affected, with parasitic gastroenteritis disease being especially prevalent. Parasitic gastroenteritis can lead to diarrhoea, anaemia, ill-thrift, loss of production measured in reduced body gain, wool yield, and fertility, as well as the death of alpacas (Windsor et al., 1992; Cebra, 2014; Diaz et al., 2016; Dubey, 2018; Vaughan et al., 2018). In terms of nematodes, gastroenteritis is caused by a variety of parasitic species. Some of them appear to be fairly specific to South American camelid (SAC) hosts (i.e., *Graphinema aucheniae*, *Mazamastrongylus* (=*Spiculopteragia*) *peruvianus*, *Camelostrongylus mentulatus*, *Nematodirus lamae*, *Lamanema chavezi*, *Trichuris tenuis*), whereas others are shared with domestic and wild ruminants (i.e., *Ostertagia* spp., *Teladorsagia* spp., *Haemonchus* spp., *Trichostrongylus* spp., *Cooperia* spp., *Oesophagostomum* spp., *Strongyloides* spp.) (Cafrune et al., 2001; Franz et al., 2015; Kutschler et al., 2019). Both groups of the nematodes may contribute to production losses (Windsor et al., 1992), however, the most pathogenic is considered to be *L. chavezi* from the host-specific group, whereas *Haemonchus contortus* and *Nematodirus battus* are especially detrimental from the shared group (Duncanson, 2012; Cebra, 2014).

Coccidia are considered to be quite host specific, since all SACs share the same species of *Eimeria*. They do not infect ruminants, and also those of the ruminants will not infect camelids (Fowler, 1996). Of the five most prevalent species (i.e., *Eimeria macusaniensis*, *E. lamae*, *E. alpacae*, *E. punoensis*, and *E. ivitaensis*), *E. macusaniensis* is believed the most pathogenic (Duncanson, 2012; Dubey, 2018), although *E. lamae* also poses a significant threat (Cebra, 2014). Findings suggest that *E. macusaniensis* may be an important gastrointestinal tract pathogen in camelids of all ages (Cebra et al., 2007; Johnson et al., 2009), and may induce a potentially fatal infection, especially if this is the first time the parasite has been identified in the herd. Lethargy, diarrhea, abdominal distention, anorexia, weight loss, constipation, and colic have been reported in animals with uncomplicated coccidiosis; additionally, several camelids suffering from coccidiosis died suddenly (Cebra, 2014; Dubey, 2018). Leguia (1991) stated that such outbreaks seemed to be mainly caused by co-infections of *E. lamae* associated with *E. macusaniensis*, in which the first species destroyed the intestinal epithelium, and the second damaged the crypt glands and inhibited the regeneration of the epithelium. This resulted in the complete stripping of the intestinal mucosa and its total loss of function, leaving the intestinal wall exposed to secondary viral or bacterial infection.

Ballweber (2009) says that although clinical disease has been noted as causing severe economic losses, subclinical issues have yet to be addressed. Likewise, Gomez-Puerta et al. (2021) note that there are limited reports on coccidia in clinically asymptomatic animals. Subclinical infections are most common and particularly important in the case of parasitic diseases, hence the aim of this study was to provide insight into their occurrence in alpaca herds living in Poland for the purpose of obtaining data to make the right therapeutic decisions.

Material and methods

Parasitological monitoring of alpaca herds was performed in 2020 of 13 herds located throughout Poland (4 herds from the Silesia Province, 2 herds each from the Lesser Poland, Mazovia, and Pomerania Provinces, and 1 herd each from the Lower Silesia, Podlasie and Subcarpathia Provinces). All the alpacas included in the study were of the Huacaya breed, originated from animals purchased from Polish farms. They were not kept with any other animal species.

The animals were housed in separate groups depending on age, sex and physiological state, and no antiparasitic treatment was applied in any of the herds for at least the previous 6 months. The alpacas were fed unlimited hay all year round, with the addition of oat grain, dried beet pulp, dried alfalfa and carrot; in the grazing season their nutrition was based on pasture grass. Alpacas grazing was carried out on the entire pastures in 65% of the farms, or they were grazed in quarters (in 35%), but the period of staying on the plot was always over one week. Clean water was available *ad libitum* to the animals.

The animals were mainly kept for the purpose of obtaining fibre (60%) or for alpacotherapy (40%), and were mated by hand (75%), or in harems (25%). The livestock facilities were most often built of wood (70%) or brick (30%), and alpacas had access to them throughout the year. There was an average of 2.5 m^2 of building space per animal. The floor of the buildings consisted of clay (75%), sand (5%) or concrete (20%). In the housing, alpacas were kept on straw bedding, and faeces were removed daily in 55% of the farms, 2–3 times per week in 20%, once a week in 20%, and once a month in 5%. On the pastures, faeces were removed once or twice a year, in 65% and 35% of the farms respectively.

Individual faecal samples from a total of 257 animals were collected *per rectum* once, at the beginning or at the end of the grazing season (i.e., in the periods of recommended prophylactic use of antiparasitic agents for grazing animals), and the sampling was related to the implementation of targeted selective treatment of animals in the herds. All of the alpacas from each herd were sampled, and all were clinically healthy at the time of sample collection. Assessed according to the body condition score (BCS) system (scale from 1 to 5 points, with 1 point for emaciation and 5 for obesity), the condition of the examined alpacas ranged from 2.5 to 4.0 points.

In coproscopy, the concentration McMaster quantitative technique with the Roepstorff and Nansen modification (Roepstorff and Nansen, 1998; Vadlejch et al., 2011) was applied, using a sucrose-saline saturated flotation solution with a specific gravity of 1.28 g/ml. The presence of parasitic oocysts and eggs was investigated under the Motic light microscope at 100×, and 400× magnification. The prevalence of infection (P, %), and the mean intensity of faecal egg/oocyst output (I, EPG/OPG) – i.e., the number of nematodal eggs per 1 g of infected host faeces, EPG, or coccidial oocysts per 1 g of infected host faeces, OPG – were assessed in accordance with Bush et al. (1997), and subjected to statistical comparisons using the Quantitative Parasitology 3.0 software (Reiczigel et al., 2019) designed to analyse a highly aggregated, right-skewed frequency distributions exhibited by parasites. The associations between the variables of parasitic infections and alpaca sex and age-group, as

well as season of the year, were analysed: the Fisher's exact test was performed to compare the prevalences, and the Bootstrap 2-sampled t-test employed to evaluate and compare the EPG/OPG counts.

The nematode eggs that looked alike were treated as strongyle-type eggs. The eggs of *Strongyloides*, *Aonchotheca*, *Trichuris* and *Nematodirus* were determined to genus level, with the morphometrically distinctive eggs of *Nematodirus battus* determined to species level (Taylor et al., 2007).

Based on the oocyst identification keys provided by several authors (Bauer, 2012; Cafrune et al., 2014; Cebra, 2014; Dubey, 2018; Gomez-Puerta et al., 2021), the *Eimeria* species infecting alpacas were morphometrically distinguished from each other without the need of sporulation, using the Motic Images Plus 3.0 software. The coproculture was established from the positive bulk faecal samples of each herd, in accordance with Henriksen and Korsholm (1983), and incubated at room temperature for 10 days. Thereafter, the infective nematode larvae obtained by baermanization were identified based on van Wyk and Mayhew (2013) keys.

Results

Although no clinical signs of parasitic infections were observed, the animals did contract gastrointestinal parasites. While the level of infection differed, depending on the herd and the age of the animals, or the season (autumn or spring), it was relatively low, and the only differences found to be statistically significant ($P \leq 0.05$) concerned *Nematodirus* sp., and its higher prevalences of infection in cria – compared to older age-groups, and in autumn – compared to spring (Table 1). Nevertheless, the presence of highly pathogenic species from the coccidia and nematodes indicated that several of the herds needed treatment.

Overall, coccidia occurred in 31.9% of the alpacas, with the mean intensity of infection equal to 213 (20–5840) OPG (Table 1). Of the protozoan parasites, oocysts of *Eimeria punoensis* were most prevalent (P = 23.7%), over *E. alpacae* (P = 7.4%). The most pathogenic *E. macusaniensis* and *E. lamae* infected 3.1% and 1.9% of the animals, respectively, and affected a total of 5.0% of the alpacas. Nematodes affected 54.1% of the animals, with a mean intensity of 106 (20–2060) EPG, whereas the highly pathogenic *N. battus* occurred in 4.7% of the alpacas. Unidentified strongyle-type eggs were observed in 40.1% of the animals. As regards them, *Trichostrongylus vitrinus* was the prevailing trichostrongylid species found by larvoscopy, and there was no *Haemonchus contortus* presence.

The group most at risk of coccidiosis were cria (Table 1), of which 54.5% were infected with an intensity of 213 (20–760) OPG. Nematodes of the order Strongylida mainly threatened adults – especially lactating females, in which the infection was observed at a level of P = 50.0%, and I = 57 (20–140) EPG. The eggs of *Trichuris* sp. and *Nematodirus* sp. were observed in all age groups, as were the strongyle-type eggs, except that *N. battus* was found only in older animals – from 0.5 years upwards, and *Aonchotheca* sp. occurred only in adults. There were no significant differences in parasitic infections between males and females (Table 1), although males had higher *Nematodirus* sp. (including *N. battus*) infections. Only one female in advanced pregnancy was confirmed to be infected with *Strongyloides* sp.

As for nematodes, seasonal differences were statistically significant in the case of *Nematodirus* infections (($P \leq 0.05$; Table 1), with *N. battus* being found almost 10 times more frequently in the autumn (P = 8.2%) compared to spring (P = 0.9%). As regards coccidia, the infection intensity was much higher in spring than in autumn (Table 1).

Table 1. The level of parasitic infection of n = 257 alpacas from 13 Polish herds examined, in relations to the age and sex of animals, and the season of the year

Item	n	Parameter	*Eimeria* sp.	Strongylida	*Strongyloides* sp.	*Nematodirus* sp.	*Aonchotheca* sp.	*Trichuris* sp.
In total								
	257	P*	31.9[1, 2]	40.1	0.4	14.8[3]	5.4	6.2
		I**	213 (20–5840)	110 (20–2020)	20 (20)	65 (20–340)	23 (20–40)	36 (20–140)
Age***								
cria	21	P	54.5[2]	18.2	0.0	54.4 a	0.0	9.1
		I	213 (20–760)	30 (20–40)	0	113 (20–300)	0	20 (20)
yearlings	24	P	37.5	33.3	0.0	16.7[3] b	0.0	16.7
		I	191 (20–920)	70 (20–120)	0	40 (20–60)	0	40 (20–100)
adults	89	P	29.2[1]	46.1	1.1	6.7[3] b	4.5	5.6
		I	68 (20–460)	66 (20–320)	20 (20)	43 (20–80)	20 (20)	44 (20–140)
Sex***								
male	53	P	34.0[1, 2]	39.6	0.0	20.8[3]	3.8	7.5
		I	320 (20–2740)	76 (20–320)	0	78 (20–300)	20 (20)	20 (20)
female	81	P	30.9[1, 2]	44.4	1.2	8.6[3]	2.5	8.6
		I	350 (20–5840)	66 (20–340)	20 (20)	46 (20–80)	20 (20)	20 (20)
Season								
spring	125	P	26.4[1, 2]	45.3	0.0	5.7[3] a	4.7	5.7
		I	326 (20–5840)	100 (20–560)	0	37 (20–80)	20 (20)	30 (20–80)
autumn	132	P	38.5[1, 2]	45.1	0.8	20.5[3] b	7.4	8.2
		I	170 (20–2740)	118 (20–2020)	20 (20)	82 (20–340)	24 (20–40)	40 (20–140)

* P – prevalence of infection, in %.
** I – mean intensity of egg/oocyst output, given as mean (range) EPG/OPG (the number of nematodal eggs/coccidial oocysts per 1 g of faeces).
*** Age and sex were determined for n = 134 out of n = 257 alpacas; cria aged <6 months, yearlings 6–24 months, adults >24 months.
[1, 2, 3] highly pathogenic parasites distinguished, respectively: [1]*E. macusaniensis*, [2]*E. lamae*, and [3]*N. battus*.
a, b – within items, means with different letters in same column differ significantly at $P \leq 0.05$

No relationship was noted between herd size and infection level. The most pathogenic parasites were present in both the small and larger herds. Overall, *E. macusaniensis* and *N. battus* were found in five herds examined, co-occurring in four, and *E. lamae* was observed in another two flocks. The level of alpaca infection was similar in all the herds regardless of the Polish region in which they were located.

Discussion

The results of this research revealed that alpacas raised in Poland have gastrointestinal parasitic fauna basically similar to that described by other authors from abroad (Hyuga and Matsumoto, 2016; Kultscher et al., 2018, 2019; Rashid et al., 2019). Our findings are also consistent with those obtained by Pyziel-Serafin et al. (2022) under Polish conditions. In their methodological work aimed to compare two flotation coproscopic techniques (qualitative Willis, supported by quantitative Stoll's method), the authors revealed in alpacas of unknown age and sex the presence of trichostrongyle-type eggs prevailing over *Nematodirus* sp. (with distinctive *N. battus* eggs), *Aonchotheca* sp., and *Trichuris* sp., as well as the oocysts of *Eimeria* sp. (with distinguished *E. macusaniensis*), and the eggs of *Moniezia* sp. tapeworms – which were the rarest, and detected only by the Willis method (Pyziel-Serafin et al., 2022). In our studies we have not seen any *Moniezia* sp. eggs, but as Duncanson (2012) noted, the adult cestodes of *Moniezia* genus occur in SACs if they are grazing with ruminants, and the parasites are also considered to be rather harmless, of no clinical significance, in addition well controlled with albendazole, although when present in large numbers they may cause animal ill-thrift.

Of the nematodes, we revealed the occurrence of the Trichostrongylidae family, the *Aonchotheca*, *Trichuris* and *Strongyloides* genera, as well as *Nematodirus* sp. – including *N. battus*, and our studies also showed the presence of different *Eimeria* species. Of the five *Eimeria* species considered to be common in alpacas, i.e., *E. punoensis*, *E. alpacae*, *E. lamae*, *E. macusaniensis*, and *E. ivitaensis*, we confirmed the first four. Similar findings were obtained by Hyuga and Matsumoto (2016) in their investigation performed in Japan. Since co-infection with the camelid-specific *E. ivitaensis* and *E. macusaniensis* is highly pathogenic to the animals (Palacios et al., 2006), newly imported (or introduced to any herd) alpacas should be carefully tested for their presence. In the Andean region native to alpacas, coccidiosis is a widespread problem due to the high environmental contamination with *Eimeria* oocysts, and even clinically asymptomatic crias were found to be infected at a prevalence of 87.2%, and mean oocyst output reaching 43,920 OPG (Gomez-Puerta et al., 2021). According to the authors, *E. lamae* (85.9%) prevails in Andean flocks over *E. punoensis* (62.8%), *E. alpacae* (53.9%), and *E. macusaniensis* (41.0%), whereas *E. ivitaensis* is the rarest species (5.1%).

Bauer (2012) writes that in addition to *E. macusaniensis* and *E. lamae*, *E. punoensis* – observed most frequently in our present investigation – is also of clinical importance. The clinical course (hemorrhagic enteritis) was observed at a high intensity of infection (favoured by poor hygiene or a high stocking rate on pastures), or under stress (crowding, disease, transport, creating new herds) (Bauer, 2012). In our studies, the OPG values usually (in over 85% of cases) did not exceed 200, and according to Cebra (2014), up to a few hundred coccidial oocysts per gram can be considered normal. Counts much higher than 200 OPG are unusual in adults unless the camelid is otherwise debilitated or in an overcrowded environment. This was not the case in the herds we studied, although – after Dubey (2018) – prophylactic treatment with anticoccidial drugs should be considered during winter when outbreaks of coccidiosis might appear due to the presence of highly pathogenic species.

Unlike the coccidia, the helminths recorded in the present research may have been transmitted to the alpacas from domestic ruminants after the camelids had already been

imported to Poland. SACs share many parasites with domestic sheep, goats and cattle (Ballweber, 2009; Franz et al., 2015). According to Duncanson (2012), an indication of clinical disease would be 2000 nematode eggs/g, although even a result above 500 EPG may indicate this. Other authors believe that the limit of pathogenicity is faecal egg count (FEC) above 3000 EPG, and below 900 EPG is rarely associated with ill-thrift of looking healthy SACs (Williamson, 2013, 2014). The clinical signs of infection with worms are a mix of those caused by various worm species contributing to the infection. The most serious is probably *Haemonchus contortus,* which is a blood sucking parasite. It will cause severe life-threatening anaemia in SACs of all ages. *Nematodirus battus* is also a very serious nematode causing life-threatening disease, which manifests by scouring in lambs and crias (Duncanson, 2012; Cebra, 2014). It may well be associated with viral, bacterial or coccidial infection, and a heavy infection will cause profuse watery yellow-green diarrhoea, leading to severe dehydration and death even before eggs are seen in the faeces.

All the helminths observed in the examined alpacas, including dominating *Trichostrongylus vitrinus* revealed in the larvoscopy, are relatively common among ruminants in Poland, and also *N. battus*, previously considered to be a rare alien species, now may be spreading thorough small ruminant herds (Nosal et al., 2015). Both *N. battus* and *Trichostrongylus* are associated with severe disease, and infection with the latter could also be fatal for alpacas (Welchman et al., 2008; Cebra, 2014). *Trichuris* as well appears to be clinically important, causing especially diarrhea, straining and moderate anemia (Cebra, 2014). Likely, there was no evidence of *H. contortus* occurrence in the examined herds, which may suggest that the alpacas have had no contact with native ruminants in the country. Also, the relatively low trichostrongylid infection of alpacas (compared to infected sheep and goats) observed in coproscopic examination would indicate the lack of *H. contorus* with its very high egg output in any infected host (Williamson, 2014; Emery et al., 2016). However, the faecal excretion and feeding behaviour of alpacas may help to reduce the risk of infection, since the animals generally confine their faeces to "latrines" from which no grass is eaten (Welchman et al., 2008). Studies of such authors as Green et al. (1996), Cebra (2014), Kultscher et al. (2019) or Vaughan et al. (2018) additionally show that SACs constantly excrete fewer eggs in their faeces, which also indicates that more research is required to determine the cut-off values for EPGs when treatment with anthelmintic is recommended. Because of this, the results should be treated with caution, and any herd should be carefully monitored at all times, since *Haemonchus contortus* is a parasite distributed worldwide. In Australia, it is the most prevalent nematode in alpacas (81%) (Rashid et al., 2019). According to the recent works of Kultscher et al. (2018, 2019) performed in Austria and Germany, *H. contortus* is also commonly found in the alpacas of those European countries. Other countries with the presence of the threatening, 3rd compartment nematode include the USA (Galvan et al., 2012), or – in Europe – the UK (Tait et al., 2002), Belgium (Sarre et al., 2012) and Sweden (Björklund et al., 2019).

Grazing animals are unevenly exposed to various parasites throughout the year. Being kept outdoors predisposes them to helminths, especially when small pastures are used, where often the same areas are continuously grazed by animals, with a high stocking rate, and without rotating or resting the pasture, or even the timely removal of faeces. All these situations may favour the infection of animals mainly with nematodes (Ballweber, 2014). Management practices aimed at breaking life cycles of such parasites remain essential here, and careful attention should be paid when designing control strategies for domestic ruminants co-grazing with alpacas. On the other hand, maintaining animals indoors, especially during winter months, predisposes them to infection with coccidia. Thus, retaining hygienic facilities for young animals should be considered one of the most important factors in preventing coccidiosis. Although the level of infection is usually highest at 3–4 months of age, and

species-specific immunity plays a role in the elimination process, this immunity develops much more slowly to the highly pathogenic *E. macusaniensis* than to other species (Bauer, 2012). Johnson et al. (2009) and Duncanson (2012) note that although animals under two years of age are usually more affected both clinically and subclinically, young adult or geriatric animals also seem to be highly affected.

Since the health risk, mainly to young alpacas, is the mere presence of the recorded pathogenic parasites regardless of the level of infection, the obtained results indicate the need for taking antiparasitic measures for the most threatened groups in the examined herds. Monitoring the current status of parasitic infections through faecal examinations is definitely a highly advisable practice aimed to apply selective, specific treatment of animals in the herds, as well as to identify the source of the contamination in the herd's environment (Ballweber, 2014). This is also important so that through unnecessary and frequent administration of treatment measures on a whole-herd basis, in the absence of such diagnostics, not to lead to the development of drug resistance of the parasites in the alpaca herd. There are increasing reports on resistance to levamisole, benzimidazoles, and macrocyclic lactones, especially in some trichostrongyles, such as *Haemonchus contortus* and *Trichostrongylus colubriformis* (Gillespie et al., 2010; Galvan et al., 2012; Sarre et al., 2012; Williamson, 2014; Rashid et al., 2018). Thus if treatment failures are suspected, the effectiveness of deworming should be monitored as well, and possible anthelmintic-resistant nematode populations detected by the faecal egg count reduction test (FECRT) (Ballweber, 2014; Williamson, 2013, 2014).

The present investigation is one of the first reports on the parasitic infection of alpacas being raised in Poland. Breeders were advised to include targeted, selective treatment of their animals, as well as to evaluate the efficacy of the antiparasitic drugs being applied, based on data obtained from quantitative coproscopic examinations, which are also used in tests assessing the FECR. Continuing such comprehensive monitoring in each herd will provide actual, ever more detailed data indicating the best prophylaxis and treatment action to undertake, allowing any new threat to the welfare of the animals being kept to be averted, and through this, the timely prevention of potential production losses.

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BADANIA NAD WYSTĘPOWANIEM SUBKLINICZNEGO ZARAŻENIA PASOŻYTAMI U ALPAK W STADACH KRAJOWYCH

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STRESZCZENIE

W ostatnich latach coraz większym zainteresowaniem cieszy się hodowla alpak. Jednym z zagrożeń dla zdrowia stad alpak są inwazje pasożytnicze, lecz dotychczas problem ten nie został w Polsce dokładnie zbadany. W związku z powyższym, celem niniejszej pracy było określenie stanu zarażenia alpak oraz składu gatunkowego pasożytów na podstawie badań koproskopowych (uzupełnionych larwoskopią). Badania przeprowadzono w 13 stadach liczących od 7 do 35 zwierząt, zlokalizowanych na terenie Polski. Świeże próbki kału (n = 257) do badań flotacyjnych ilościową metodą McMastera pobrano w 2020 r., jednokrotnie z każdego stada, przed rozpoczęciem lub po zakończeniu sezonu pastwiskowego, w celu uzyskania informacji o potrzebie zastosowania środków przeciwpasożytniczych. W trakcie badań stwierdzono zarażenia kokcydiami z rodzaju *Eimeria* (*E. punoensis, E. alpacae, E. lamae* i *E. macusaniensis*) oraz nicieniami żołądkowo-jelitowymi z rzędu Strongylida i rodzajów *Aonchotheca, Trichuris* i *Strongyloides*. Chociaż ogólny poziom zarażenia był stosunkowo niski (prewalencja P = 54,1%, średnia intensywność wydalania jaj/1g kału żywiciela I = 106 (20–2060) EPG w przypadku nicieni oraz P = 31,9% i I = 213 (20–5840) OPG (oocyst/1 g kału) dla kokcydiów), w niektórych z badanych stad stwierdzono obecność wysoce chorobotwórczych gatunków pasożytów, tj. *Eimeria macusaniensis* i *E. lamae* z kokcydiów oraz *Nematodirus battus* z nicieni, które mogą stanowić poważne zagrożenie, zwłaszcza dla zdrowia młodych alpak. Nie stwierdzono występowania *Haemonchus contortus* w żadnym ze stad. Hodowcom zalecono włączenie ukierunkowanego, indywidualnego leczenia swoich zwierząt oraz potrzebę kontynuowania ilościowych badań koproskopowych, także w celu oceny skuteczności stosowanych środków przeciwpasożytniczych.

Słowa kluczowe: *Vicugna pacos*, pasożyty, kokcydia, nicienie