

INTRODUCTION

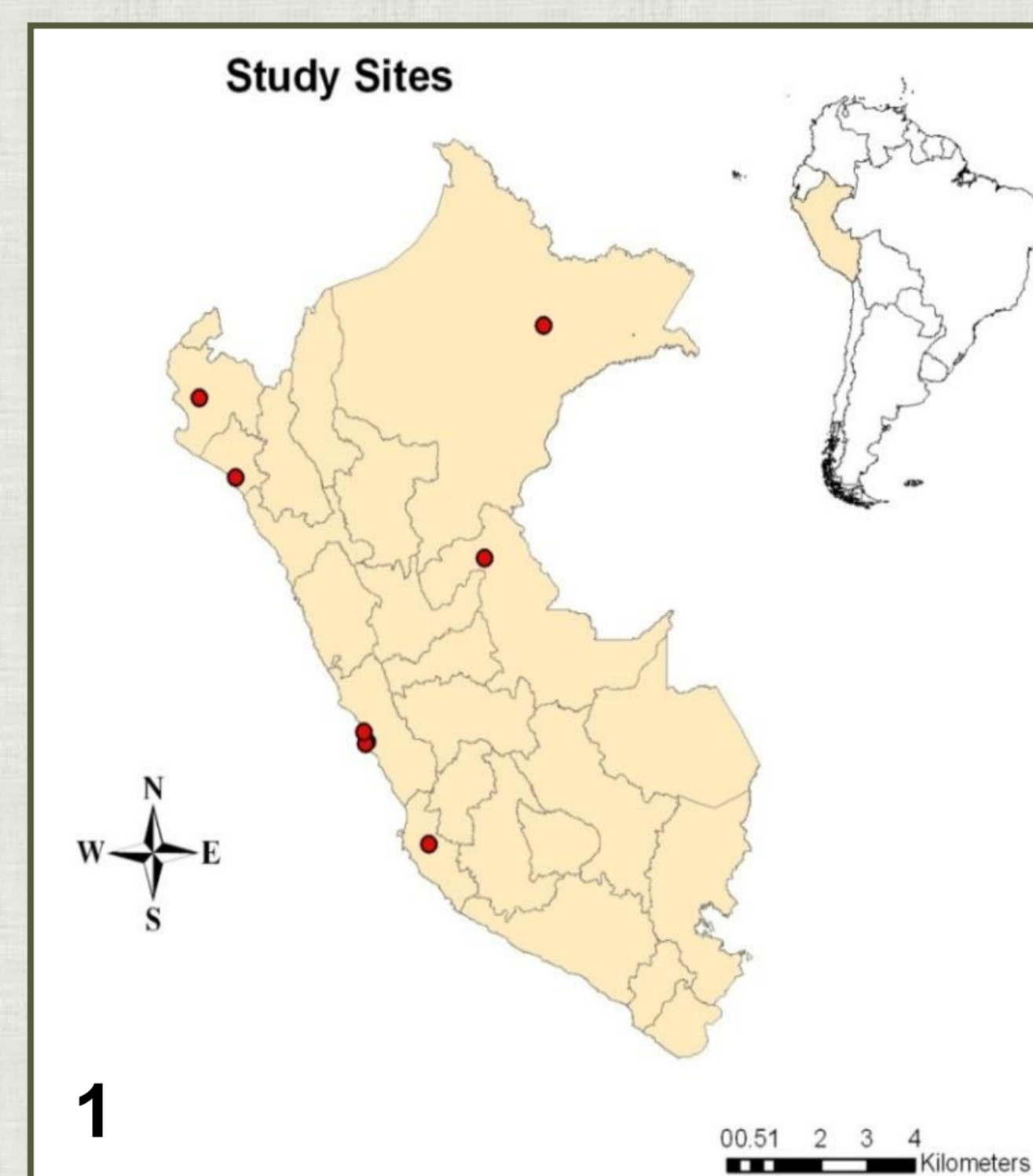
As in other developing countries, live birds markets (LBM) are common in almost every major city of Peru. In these markets, several species of birds, including wild-caught, exotic and domestic species are sold as pets or for human consumption. Additionally, in these places they are in contact with persons and other species (mammals and reptiles) before they are sold¹. The inappropriate conditions of selling including overcrowded cages and unhygienic conditions that may lead birds become more susceptible to circulating pathogens such as virus, bacteria, fungi and parasites¹. Parasites are common in birds, especially in stressful conditions. These organisms are well studied in poultry; however, there are not many studies in wild and exotic birds due to the great variety of species and poor number of individuals that can be studied². The aim of this study was to describe the frequency of gastrointestinal parasites among caged birds in LBMs of Peru using coproparasitological techniques.

Ascaridoidea, Capillaridae and Coccidia were found in wild-caught species. Sporulated oocysts identified as *Isospora* sp. were observed in Safron finches (*Sicalis* sp.) suggesting the presence of *Atxoplasma*³; however, additional collections will be necessary to confirm this finding. Ascaridoidea, either *Ascaridia columbae* or *A. platyceri* were found in Budgerigars⁴. Tapeworm and acuariidae eggs were observed in domestic species. Specifically, Acuariidae was found in chickens suggesting the presence of *Synhimantus* (*D.*) *nasuta*. This parasite has been previously identified in parrot species and is associated with mortality⁵.

METHODS

Study Sites

A total of 19 markets in seven cities of Peru were sampled between April and December 2009 (Fig. 1). Wild-caught, exotic and domestic species were commonly found for sale in these LBMs (Fig. 2). Birds were maintained in cages or free-range (directly on the floor of the market).



Sampling Procedure

Bird sellers were asked if they would like to voluntarily participate in the study. Bird species and numbers by cage were recorded at each market stall.

Samples were collected from the bottom of the cage (Fig. 3) or from the floor where single-species groups were maintained (Fig. 4). Several fresh droppings were collected using a wooden spoon and pooled in a small plastic box for each group. Samples were maintained at 4 °C until they could be transferred to the laboratory for parasite identification.

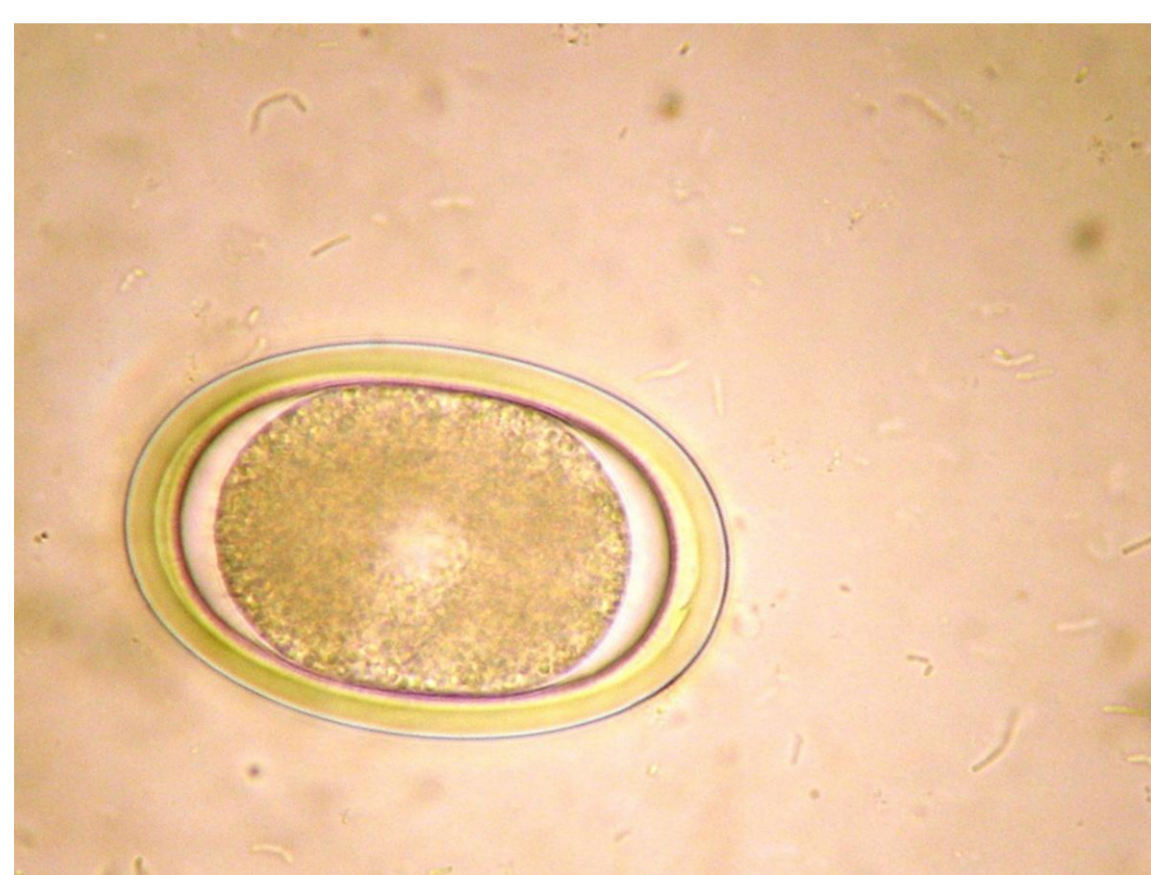


Coproparasitological Techniques

Feces were separated from the urate portion of the sample for the correct examination and preserved in formalin 10% until testing. A modified Sheater's sugar flotation and sedimentation techniques were used for parasite and ova identification at the Laboratory of Microbiology and Parasitology, School of Veterinary Medicine, Universidad Nacional Mayor de San Marcos.

CONCLUSIONS

The presence of coccidia and helminthes in 22 of the 40 species studied suggests that LBMs are a potential source of parasite transmission between bird species. It should be recommended that parasitological evaluation and treatment should be implemented before introducing these birds to private or zoological collections. Furthermore, the release of wild-caught birds confiscated from these markets would represent a potential risk of introduction of parasites to natural populations.



Egg of the order Ascaridoidea. Note the thickened shell and the ellipsoidal form. 400x.



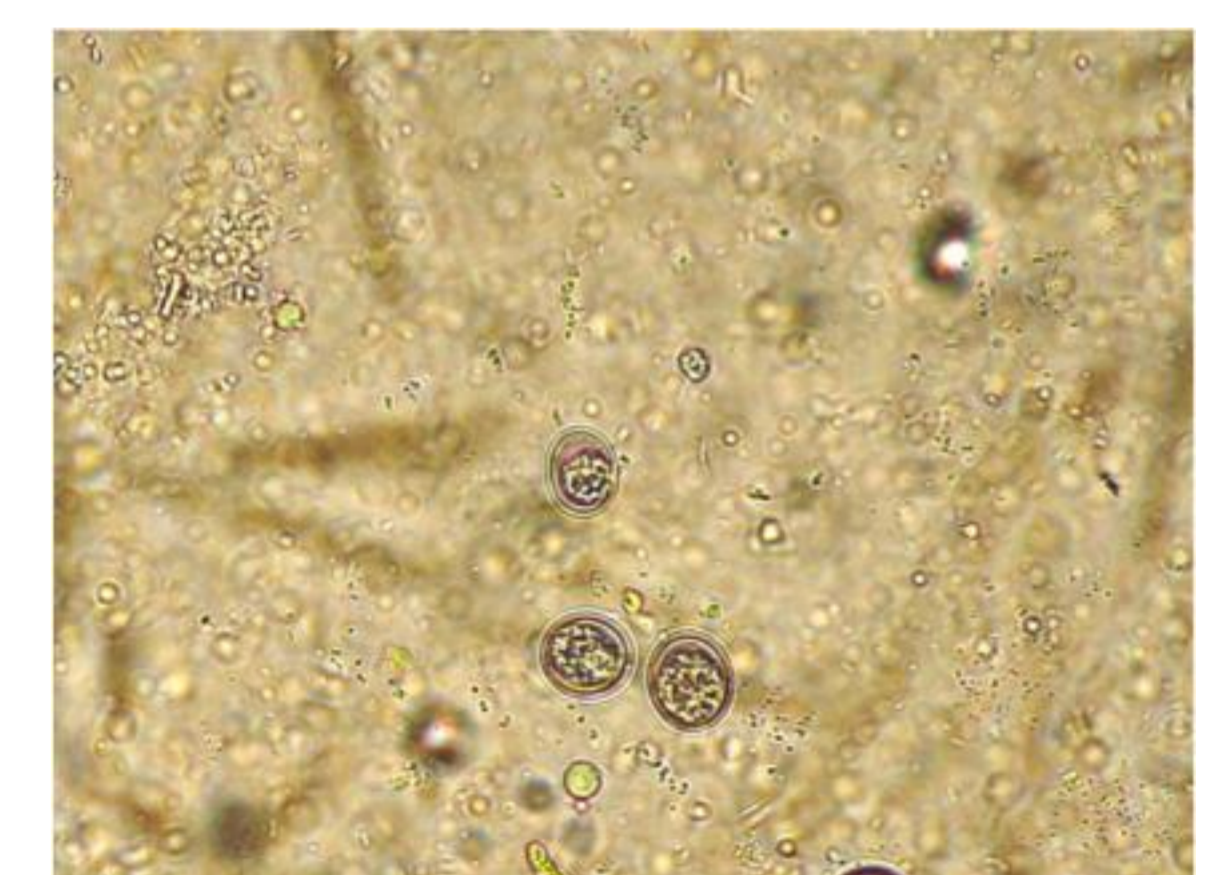
Capillaridae egg. Note the characteristic bipolar plugs and pitted wall. 1000x.



Tapeworm egg from domestic geese. (Arrow) Oncospheral hooks. 1000x.



Synhimantus (*Dispharynx*) *nasuta* in chickens. Note thickened and ellipsoidal shell with internalized larva. 1000x.



Unsporulated oocysts of coccidia in scrub blackbirds (*Dives warszewiczii*). 400x.



Mixed finding of a capillarid egg and an unsporulated oocyst in rock pigeons. 400x.

RESULTS

A total of 340 samples, representing 40 species, were tested. 110 samples (32.4%) were positive for at least one parasite. Domestic species, followed by exotic and wild-caught species, were the most commonly infected animals, 25%, 4.7% and 2.6%, respectively (Table 1). Coccidia and helminthes were identified in 16.8% and 21.5%, of the total of samples, respectively. More than one parasite species were found in 6.8% of the samples tested, although we can not conclude that mixed infections occurs in the animals. Species of Ascaridoidea (43), Capillaridae (33), Acuariidae (3) and Cestoda (3) were also identified (Table 2).

Table 1. Number of positive samples in wild-caught, exotic and domestic bird species.

	Wild-caught	Exotic	Domestic	Total
Psittacidae	6	6		12
Mimidae	1			1
Icteridae	1			1
Emberizidae	1			1
Estrildidae		1		1
Columbidae		6	28	34
Phasianidae		3	46	49
Numinidae			3	3
Anatidae			8	8
Total	9	16	85	110

Table 2. Number of positive samples and frequency of parasites for type of eggs by family of birds.

Family	#s (+)	Ascaridoidea	Capillaridae	Acuariidae	Cestoda	Coccidia	Mix
Psittacidae	12	2.1%	0.9%	0%	0%	0.9%	0.3%
Columbidae	34	2.6%	3.8%	0%	0%	7.1%	3.2%
Phasianidae	49	6.5%	3.8%	0.9%	0.6%	7.1%	2.9%
Numinidae	3	0.9%	0%	0%	0%	0.3%	0.3%
Anatidae	8	0.6%	0.9%	0%	0.3%	0.6%	0%
Estrildidae	1	0%	0.3%	0%	0%	0%	0%
Icteridae	1	0%	0%	0%	0%	0.3%	0%
Mimidae	1	0%	0%	0%	0%	0.3%	0%
Emberizidae	1	0%	0%	0%	0%	0.3%	0%
Total	110	12.7%	9.7%	0.9%	0.9%	16.8%	6.7%

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