Coprology and morphology of *Fasciola hepatica* eggs from infected mules in Andean locations from Argentina

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Background. Fascioliasis is a zoonotic disease caused in the Americas by *Fasciola hepatica*. This disease is characterized by a low specificity at animal host level. Among the domestic species involved as reservoirs, the role of donkeys and horses has been highlighted in human endemic areas. However, little is known about the epidemiological importance of mules as fascioliasis reservoirs.

Material and Methods. Faeces from 208 mules were obtained from two Andean locations in Mendoza (Argentina) (Aconcagua 81; Uspallata 127). Samples were stored at 4°C, and then analysed using the Lumbreras sedimentation technique (10 g of the sample to quantify the eggs per gram (epg)). *Fasciola hepatica* eggs obtained from mule faeces were measured under a calibrated microscope. Measures included minimum and maximum values, mean and standard deviation of egg length (EL), egg width (EW), egg shape (EL/EW ratio) and egg size (EL*EW).

Figure 1. (A) Argentina and neighbouring countries in South America; (B) the Argentinian province of Mendoza showing mule displacements to overwintering sites; (C) Aconcagua Provincial Park in the Mendoza province close to the Chile border, showing tracks followed by the mules, the base camps of Puente del Inca and Punta de Vacas, and the base station of Uspallata.
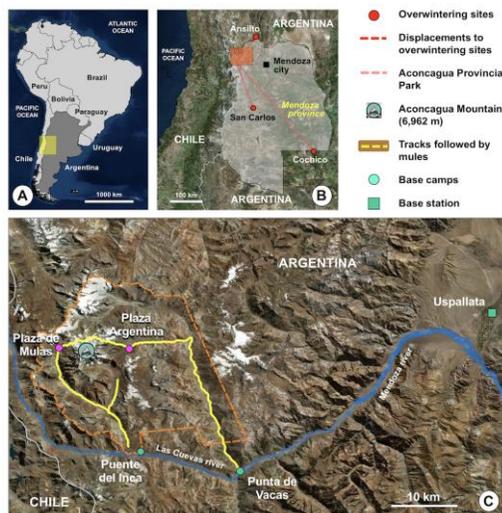
Results. Of the 81 mules from Aconcagua, 32 (39.5%) were positive for *F. hepatica* (mean epg of 3.6 ± 2.5); while 31 out of 127 mules (24.4%) from Uspallata were positive (mean epg of 4.7 ± 8.7). The prevalence difference in both sites was significant (Fisher's test, p=0.0298). According to the amount of faeces produced by an adult equine (22.7kg/day), a mule may be releasing 2270–794,500 (mean 101,242) fasciolid eggs to the environment on a daily basis.

A total of 179 eggs from 63 infected mules were measured (mean EL of 136 ± 10.5 µm, mean EW of 78.2 ± 6.7 µm).

Egg measurements	Total studied	Aconcagua	Uspallata	Fisher´s test (*p*-value)
	63 infected mules	32 infected mules	31 infected mules	
	179 eggs measured	110 eggs measured	69 eggs measured	
Length (in µm)	136.0 ± 10.5	134.0 ± 11.3	139.4 ± 8.1	0.0023
Width (in µm)	78.2 ± 6.7	77.8 ± 7.8	78.8 ± 4.3	0.0712
Size (in µm²)	10665.2 ± 1393.0	10465.2 ± 1597.8	10984.0 ± 905.2	0.0036
Shape	1.8 ± 0.2	1.7 ± 0.2	1.8 ± 0.1	0.1759

Table 1. Measurements of fasciolid eggs found in mule faeces (mean ± standard deviation). Adapted from Mera y Sierra *et al.* (2021) J. Helminthol. 94: e189.

Conclusion. *Fasciola hepatica* egg measurements found in the Argentinian mules fits well with the egg size from donkeys in Bolivia and Egypt. The high prevalence rates of 24.4% and 39.5% found in the two mule groups and the estimated amounts of 2270–794,500 eggs/mule/day (mean 101,242 eggs/mule/day) highlight the crucial epidemiological importance of these equids.

Keywords: fascioliasis; epidemiology; equines

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