Protozoan Parasites in Dairy Small Ruminants and Potential Risk Factors for their Presence in Faecal Samples

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Table S1. Presence of protozoan parasites in faecal samples from individual animals in small ruminant farms, in which protozoa had been found in pooled faecal samples, in Greece.

Protozoan parasites	No. of farms in which protozoa were found in pooled faecal samples and faecal samples from individual animals were also examined	No. of animals present in these farms	No. of animals sampled in these farms	No. of animals in the faecal samples of which protozoa were found	Overall prevalence of recovery of protozoa in samples from individual animals	Among farms median prevalence of recovery of protozoa in samples from individual animals
			Sheep flocks			
Eimeria	65 (27.9% [1])	16,041	1,830	1,807	98.7%	100.0%
Giardia	35 (33.0%)	8,256	980	916	93.5%	93.3%
Cryptosporidium	11 (47.8%)	4,758	360	346	96.1%	96.7%
			Goats herds			
Eimeria	25 (34.7%)	6,497	760	723	95.1%	95.0%
Giardia	8 (20.0%)	1,769	230	220	95.7%	95.0%
Cryptosporidium	5 (38.5%)	2,300	190	183	96.3%	95.0%

[1] figures in brackets indicate the proportion of these farms among all those from which protozoa had been found in pooled faecal samples.

Table S2. Presence of protozoan parasites in faecal samples from individual animals in small ruminant farms, in which protozoa had not been found in pooled faecal samples, in Greece.

Protozoan parasites	No. of farms in which protozoa were not found in pooled faecal samples and faecal samples from individual animals were also examined	No. of animals present in these farms	No. of animals sampled in these farms	No. of animals in the faecal samples of which protozoa were found	Overall prevalence of recovery of protozoa in samples from individual animals	Among farms median prevalence of recovery of protozoa in samples from individual animals
			Sheep flocks			
Eimeria	22 (23.9% [1])	5,636	630	0	0.0%	0.0%
Giardia	55 (25.1%)	14,261	1,570	0	0.0%	0.0%
Cryptosporidium	80 (26.5%)	19,409	2,240	0	0.0%	0.0%
			Goats herds			
Eimeria	8 (17.0%)	1,255	200	0	0.0%	0.0%
Giardia	25 (31.6%)	5,983	730	0	0.0%	0.0%
Cryptosporidium	31 (29.2%)	6,842	880	0	0.0%	0.0%

[1] figures in brackets indicate the proportion of these farms among all those from which protozoa had not been found in pooled faecal samples.

Table S3. Variables (n = 31) evaluated for potential association with presence of protozoan parasites in faecal samples from 444 small ruminant farms in Greece.

Management system applied in the farm (description according to EFSA classification)
Years at the location (no. of years)
Month into the lactation period at sampling (month)
Availability of a main building for animals (yes / no)
Availability of a designated building for lambs / kids (yes / no)
Availability of a designated lambing / kidding area (yes / no)
Availability of a lavatory (yes / no)
Material of the floor of the barn (soil / other)
Availability of straw bedding (yes / no)
Annual frequency of removal / clean-up of the straw bedding (no. of occasions)
Grazing practiced (yes / no)
Grazing land available to animals (acres per animal)
No. of female animals in the farm (no.)
Breed of ewes /does (description)
Month of the start of the lambing / kidding season (description)
Collaboration with a veterinarian (yes / no)
Use of laboratory diagnostic examinations in faecal samples preventively (yes / no)
Means of calculating live bodyweight for the administration of pharmaceutical products (weighing / estimation)
Routine overdosing (compared to dose prescribed) of pharmaceuticals (yes / no)
Total visits made annually by veterinarians to the farm during the preceding season (no.)
Application of reproductive control practices in the farm (yes / no)
Newborn care and specific monitoring (yes / no)
Lamb / kid fostering to female animals other than their dams (yes / no)
Administration of a lamb- / kid-specific diet (yes / no)
Age of lamb / kid removal from their dams (days)
Seasonal transfer of animals to other site (yes / no)
Manure management (spread in the fields / removed otherwise)
Annual frequency of systemic disinfections in the farm (no.)
Shearing of animals (yes / no)
Provision of finished feed (concentrate) to animals throughout the year (yes / no)
Provision of finished feed (concentrate) to young animals (yes / no)

Table S4. Geographical areas of Greece (n = 4), in which administrative regions and regional units of the country were clustered, for characterizing location of 444 small ruminant farms from which faecal samples were collected.

Central
Region of Central Greece
Region of Thessaly
From the region of Epirus: regional unit of Arta and regional unit of Preveza
From the region of Western Greece: regional unit of Aetolia-Acarnania
Islands
Region of Crete
Region of Ionian islands
Region of North Aegean
Region of South Aegean
North
Region of Central Macedonia
Region of Eastern Maecedonia and Thrace
Region of Western Macedonia
From the region of Epirus: regional unit of Ioannina and regional unit of Thesprotia
South
Region of Attica
Region of Peloponnese
Region of Western Macedonia
From the region of Western Greece: regional unit of Achaea and regional unit of Elis

Figure S1. Map of Greece indicating the geographic areas of the country (n = 4), in which administrative regions and regional units of the country were clustered, for characterizing location of 444 small ruminant farms from which faecal samples were collected (blue: Central, green: Islands, yellow: North, red: South).

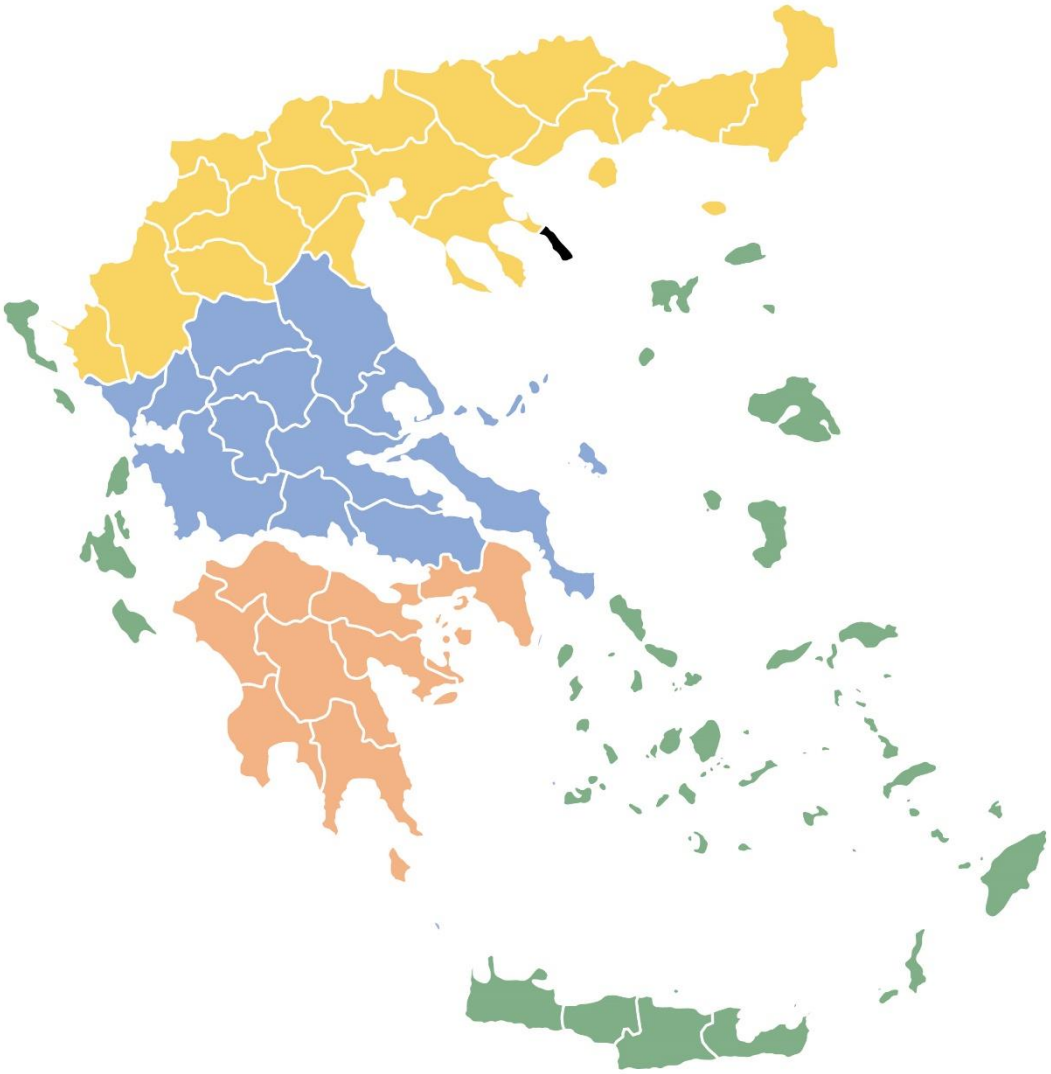

Table S5. Details of multivariable models employed for the evaluation of the presence of protozoan parasites in faecal samples from 444 small ruminant farms in Greece.

Outcome	Variables offered to the multivariable models (*n*)	Variables required in the final models
Presence of *Eimeria* in faecal samples – sheep flocks	5	(a) Availability of a designated building for lambs, (b) Collaboration with a veterinarian, (c) Means of calculating live bodyweight for the administration of pharmaceutical products
Presence of *Eimeria* in faecal samples – goat herds	9	(a) Availability of a designated building for kids, (b) Grazing practiced, (c) Collaboration with a veterinarian, (d) Means of calculating live bodyweight for the administration of pharmaceutical products, (e) Age of kid removal from their dams
Presence of *Giardia* in pooled faecal samples – sheep flocks	5	(a) Years at the location, (b) Grazing practiced, (c) Application of reproductive control practices in the farm
Presence of *Giardia* in pooled faecal samples – goat herds	3	(a) Availability of a main building for animals, (b) Application of reproductive control practices in the farm
Presence of *Cryptosporidium* in faecal samples – sheep flocks	13	(a) Management system applied in the farm, (b) Years at the present location, (c) Availability of a designated building for lambs, (d) Grazing practiced, (e) Breed of ewes, (f) Routine overdosing of pharmaceuticals, (g) Lamb fostering to female animals other than their dams, (h) Annual frequency of systemic disinfections in the farm
Presence of *Cryptosporidium* in faecal samples – goat herds	13	(a) Management system applied in the farm, (b) Availability of straw bedding, (c) Annual frequency of removal / clean-up of the straw bedding, (d) Grazing practiced, (e) Means of calculating live bodyweight for the administration of pharmaceutical products, (f) Application of reproductive control practices in the farm, (g) Kid fostering to female animals other than their dams

Table S6. Associations of presence of *Eimeria* in faecal samples from 325 sheep flocks in Greece, as found in univariable analysis.

Number of farms								*p*
Farms with presence of *Eimeria* in faecal samples (*n* = 233)				**Farms with no presence of *Eimeria* in faecal samples (*n* = 92)**				
Management system applied in the farm								
Intensive	Semi-intensive	Semi-extensive	Extensive	Intensive	Semi-intensive	Semi-extensive	Extensive	
35/43	104/151	76/107	18/24	8/43	47/151	31/107	6/24	0.43
Years at the present location								
0 – 2		3 – 5	> 5	0 – 2		3 – 5	> 5	
4/5		29/40	200/280	1/5		11/40	80/280	0.91
Month into the lactation period at sampling								
0–1st	2nd–5th	6th–9th	After 9th	0–1st	2nd–5th	6th–9th	After 9th	
16/23	93/138	109/147	15/17	7/23	45/138	38/147	2/17	0.26
Availability of a main building for animals								
Yes		No		Yes		No		
229/318		4/7		89/318		3/7		0.39
Availability of a designated building for lambs								
Yes		No		Yes		No		
165/243		68/82		78/243		14/82		0.009
Availability of a designated lambing area								
Yes		No		Yes		No		
123/173		110/152		50/173		42/152		0.80
Availability of a lavatory								
Yes		No		Yes		No		
97/143		136/182		46/143		46/182		0.17
Material of the floor of the barn								
Soil		Other		Soil		Other		
208/292		25/33		84/292		8/33		0.58
Availability of straw bedding								
Yes		No		Yes		No		
189/268		44/57		79/268		13/57		0.31
Annual frequency of removal / clean-up of the straw bedding								
1 – 2		> 2		1 – 2		> 2		
114/166		75/102		52/166		27/102		0.40
Grazing practiced								
Yes		No		Yes		No		
199/281		34/44		82/281		10/44		0.38
Grazing land available to animals								
0 – 0.5 acre per animals		> 0.5 acre per animal		0 – 0.5 acre per animals		> 0.5 acre per animal		
48/74		151/207		26/74		56/207		0.19

No. of female animals in the farm								
0 – 165	166 – 330	331 – 500	> 500	0 – 165	166 – 330	331 – 500	> 500	
70/88	78/120	49/66	36/51	18/88	42/120	17/66	15/51	0.13
Breed of ewes								
Cross-breeds	Greek breeds		Imported breeds	Cross-breeds	Greek breeds		Imported breeds	
29/43	105/143		99/139	14/43	38/143		40/139	0.74
Month of the start of the lambing season								
All year	Autumn	Winter	Spring-Summer	All year	Autumn	Winter	Spring-Summer	
15/18	170/245	43/55	5/7	3/18	75/245	12/55	2/7	0.39
Collaboration with a veterinarian								
Yes		No		Yes		No		
203/277		30/48		74/277		18/48		0.13
Use of laboratory diagnostic examinations in faecal samples preventively								
Yes		No		Yes		No		
25/34		208/291		9/34		83/291		0.80
Means of calculating live bodyweight for the administration of pharmaceutical products								
Weighing		Estimation		Weighing		Estimation		
46/73		187/252		27/73		65/252		0.06
Routine overdosing (compared to dose prescribed) of pharmaceuticals								
Yes		No		Yes		No		
45/61		188/264		16/61		76/264		0.69
Total visits made annually by veterinarians to the farm during the preceding season								
0 – 4	5 – 7	> 7		0 – 4	5 – 7	> 7		
99/139	61/86	73/100		40/139	25/86	27/100		0.94
Application of reproductive control practices in the farm								
Yes		No		Yes		No		
73/101		160/224		28/101		64/224		0.88
Newborn care and specific monitoring								
Yes		No		Yes		No		
209/293		24/32		84/293		8/32		0.66
Lamb fostering to female animals other than their dams								
Yes		No		Yes		No		
157/221		76/104		64/221		28/104		0.70
Administration of a lamb-specific diet								
Yes		No		Yes		No		
161/226		72/99		65/226		27/99		0.78

Age of lamb removal from their dams						
< 45 days	45 – 60 days	> 60 days	< 45 days	45 – 60 days	> 60 days	
85/119	121/170	27/36	34/119	49/170	9/36	0.90
Seasonal transfer of animals to other site						
Yes		No	Yes		No	
33/49		200/276	16/49		76/276	0.46
Manure management						
Spread in the fields		Removed otherwise	Spread in the fields		Removed otherwise	
230/320		3/5	90/320		2/5	0.56
Annual frequency of systemic disinfections in the farm						
0 – 9		> 9	0 – 9		> 9	
209/293		24/32	84/293		8/32	0.66
Shearing of animals						
Yes		No	Yes		No	
228/319		5/6	91/319		1/6	0.52
Provision of finished feed (concentrate) to animals throughout the year						
Yes		No	Yes		No	
216/304		17/21	88/304		4/21	0.33
Provision of finished feed (concentrate) to young animals						
Yes		No	Yes		No	
185/255		48/70	70/255		22/70	0.51

Table S7. Associations of presence of *Eimeria* in faecal samples from 119 goat herds in Greece, as found in univariable analysis.

Number of farms								*p*
Farms with presence of *Eimeria* in faecal samples (*n* = 72)				**Farms with no presence of *Eimeria* in faecal samples (*n* = 47)**				
Management system applied in the farm								
Intensive	Semi-intensive	Semi-extensive	Extensive	Intensive	Semi-intensive	Semi-extensive	Extensive	
3/9	16/29	39/61	14/20	6/9	13/29	22/61	6/20	0.24
Years at the present location								
0 – 2	3 – 5	> 5		0 – 2	3 – 5	> 5		
1/1	9/15	62/103		0/1	6/15	41/103		0.72
Month into the lactation period at sampling								
0–1st	2nd–5th	6th–9th	After 9th	0–1st	2nd–5th	6th–9th	After 9th	
4/8	43/60	22/43	3/8	4/8	17/60	21/43	5/8	0.08
Availability of a main building for animals								
Yes		No		Yes		No		
71/117		1/2		46/117		1/2		0.76
Availability of a designated building for kids								
Yes		No		Yes		No		
47/86		25/33		39/86		8/33		0.035
Availability of a designated kidding area								
Yes		No		Yes		No		
34/58		38/61		24/58		23/61		0.68
Availability of a lavatory								
Yes		No		Yes		No		
20/38		52/81		18/38		29/81		0.23
Material of the floor of the barn								
Soil		Other		Soil		Other		
65/105		7/14		40/105		7/14		0.39
Availability of straw bedding								
Yes		No		Yes		No		
43/76		29/43		33/76		14/43		0.24
Annual frequency of removal / clean-up of the straw bedding								
1 – 2		> 2		1 – 2		> 2		
25/42		18/34		17/42		16/34		0.56
Grazing practiced								
Yes		No		Yes		No		
71/113		1/6		42/113		5/6		0.024

Grazing land available to animals								
0 – 0.5 acre per animals		> 0.5 acre per animal		0 – 0.5 acre per animals		> 0.5 acre per animal		
7/11		64/102		4/11		38/102		0.95
No. of female animals in the farm								
0 – 165	166 – 330	331 – 500	> 500	0 – 165	166 – 330	331 – 500	> 500	
32/56	22/37	8/13	10/13	24/56	15/37	5/13	3/13	0.62
Breed of does								
Cross-breeds	Greek breeds		Imported breeds	Cross-breeds	Greek breeds		Imported breeds	
8/18	36/56		28/45	10/18	20/56		17/45	0.31
Month of the start of the kidding season								
All year	Autumn	Winter	Spring-Summer	All year	Autumn	Winter	Spring-Summer	
4/8	37/63	29/44	2/4	4/8	26/63	15/44	2/4	0.76
Collaboration with a veterinarian								
Yes		No		Yes		No		
66/101		6/18		35/101		12/18		0.010
Use of laboratory diagnostic examinations in faecal samples preventively								
Yes		No		Yes		No		
8/16		64/103		8/16		39/103		0.036
Means of calculating live bodyweight for the administration of pharmaceutical products								
Weighing		Estimation		Weighing		Estimation		
13/27		59/92		14/27		33/92		0.14
Routine overdosing (compared to dose prescribed) of pharmaceuticals								
Yes		No		Yes		No		
14/26		58/93		12/26		35/93		0.43
Total visits made annually by veterinarians to the farm during the preceding season								
0 – 4	5 – 7	> 7		0 – 4	5 – 7	> 7		
25/51	18/25	29/43		26/51	7/25	14/43		0.08
Application of reproductive control practices in the farm								
Yes		No		Yes		No		
9/17		63/102		8/17		39/102		0.49
Newborn care and specific monitoring								
Yes		No		Yes		No		
66/109		6/10		43/109		4/10		0.97
Kid fostering to female animals other than their dams								
Yes		No		Yes		No		
49/86		23/33		37/86		10/33		0.21

Administration of a kid-specific diet						
Yes		No	Yes		No	
51/79		21/40	28/79		19/40	0.21
Age of kid removal from their dams						
< 45 days	45 – 60 days	> 60 days	< 45 days	45 – 60 days	> 60 days	
11/26	25/44	36/49	15/26	19/44	13/49	0.026
Seasonal transfer of animals to other site						
Yes		No	Yes		No	
16/28		56/91	12/28		35/91	0.68
Manure management						
Spread in the fields		Removed otherwise	Spread in the fields		Removed otherwise	
66/109		6/10	43/109		4/10	0.97
Annual frequency of systemic disinfections in the farm						
0 – 9		> 9	0 – 9		> 9	
62/100		10/19	38/100		9/19	0.44
Shearing of animals						
Yes		No	Yes		No	
65/102		7/17	37/102		10/17	0.08
Provision of finished feed (concentrate) to animals throughout the year						
Yes		No	Yes		No	
61/103		11/16	42/103		5/16	0.47
Provision of finished feed (concentrate) to young animals						
Yes		No	Yes		No	
48/79		24/40	31/79		16/40	0.94

Table S8. Associations of presence of *Giardia* in faecal samples from 325 sheep flocks in Greece, as found in univariable analysis.

Number of farms								*p*
Farms with presence of *Giardia* in faecal samples (*n* = 106)				**Farms with no presence of *Giardia* in faecal samples (*n* = 219)**				
Management system applied in the farm								
Intensive	Semi-intensive	Semi-extensive	Extensive	Intensive	Semi-intensive	Semi-extensive	Extensive	
8/43	59/151	32/107	7/24	35/43	92/151	75/107	17/24	0.07
Years at the present location								
0 – 2		3 – 5	> 5	0 – 2		3 – 5	> 5	
2/5		18/40	86/280	3/5		22/40	194/280	0.18
Month into the lactation period at sampling								
0–1st	2nd–5th	6th–9th	After 9th	0–1st	2nd–5th	6th–9th	After 9th	
6/23	41/138	53/147	6/17	17/23	97/138	94/147	11/17	0.61
Availability of a main building for animals								
Yes		No		Yes		No		
104/318		2/7		214/318		5/7		0.82
Availability of a designated building for lambs								
Yes		No		Yes		No		
74/243		32/82		169/243		50/82		0.15
Availability of a designated lambing area								
Yes		No		Yes		No		
61/173		45/152		112/173		107/152		0.28
Availability of a lavatory								
Yes		No		Yes		No		
46/143		60/182		97/143		122/182		0.88
Material of the floor of the barn								
Soil		Other		Soil		Other		
96/292		10/33		196/292		23/33		0.76
Availability of straw bedding								
Yes		No		Yes		No		
85/268		21/57		183/268		36/57		0.45
Annual frequency of removal / clean-up of the straw bedding								
1 – 2		> 2		1 – 2		> 2		
48/166		37/102		118/166		65/102		0.21
Grazing practiced								
Yes		No		Yes		No		
97/281		9/44		184/281		35/44		0.06

Grazing land available to animals								
0 – 0.5 acre per animals		> 0.5 acre per animal		0 – 0.5 acre per animals		> 0.5 acre per animal		
39/118		67/207		79/118		140/207		0.90
No. of female animals in the farm								
0 – 165	166 – 330	331 – 500	> 500	0 – 165	166 – 330	331 – 500	> 500	
36/87	37/121	19/66	14/51	51/87	84/121	47/66	37/51	0.23
Breed of ewes								
Cross-breeds	Greek breeds		Imported breeds	Cross-breeds	Greek breeds		Imported breeds	
14/43	49/143		43/139	29/43	94/143		96/139	0.84
Month of the start of the lambing season								
All year	Autumn	Winter	Spring-Summer	All year	Autumn	Winter	Spring-Summer	
4/18	83/245	17/55	2/7	14/18	162/245	38/55	5/7	0.76
Collaboration with a veterinarian								
Yes		No		Yes		No		
94/277		12/48		183/277		36/48		0.22
Use of laboratory diagnostic examinations in faecal samples preventively								
Yes		No		Yes		No		
11/34		95/291		23/34		196/291		0.97
Means of calculating live bodyweight for the administration of pharmaceutical products								
Weighing		Estimation		Weighing		Estimation		
19/73		87/252		54/73		165/252		0.17
Routine overdosing (compared to dose prescribed) of pharmaceuticals								
Yes		No		Yes		No		
21/61		85/264		40/61		179/264		0.74
Total visits made annually by veterinarians to the farm during the preceding season								
0 – 4	5 – 7	> 7		0 – 4	5 – 7	> 7		
47/139	27/86	32/100		92/139	59/86	68/100		0.92
Application of reproductive control practices in the farm								
Yes		No		Yes		No		
39/101		67/224		62/101		157/224		0.12
Newborn care and specific monitoring								
Yes		No		Yes		No		
96/293		10/32		197/293		22/32		0.86
Lamb fostering to female animals other than their dams								
Yes		No		Yes		No		
73/221		33/104		148/221		71/104		0.82

Administration of a lamb-specific diet						
Yes		No	Yes		No	
75/226		31/99	151/226		68/99	0.74
Age of lamb removal from their dams						
< 45 days	45 – 60 days	> 60 days	< 45 days	45 – 60 days	> 60 days	
35/119	61/170	10/36	84/119	109/170	26/36	0.41
Seasonal transfer of animals to other site						
Yes		No	Yes		No	
13/49		93/276	36/49		183/276	0.32
Manure management						
Spread in the fields		Removed otherwise	Spread in the fields		Removed otherwise	
105/320		1/5	215/320		4/5	0.54
Annual frequency of systemic disinfections in the farm						
0 – 9		> 9	0 – 9		> 9	
93/293		13/32	200/293		19/32	0.31
Shearing of animals						
Yes		No	Yes		No	
105/319		1/6	214/319		5/6	0.40
Provision of finished feed (concentrate) to animals throughout the year						
Yes		No	Yes		No	
99/304		7/21	205/304		14/21	0.94
Provision of finished feed (concentrate) to young animals						
Yes		No	Yes		No	
83/255		23/70	172/255		47/70	0.96

Table S9. Associations of presence of *Giardia* in faecal samples from 119 goat herds in Greece, as found in univariable analysis.

Number of farms								*p*
Farms with presence of *Giardia* in faecal samples (*n* = 40)				**Farms with no presence of *Giardia* in faecal samples (*n* = 79)**				
Management system applied in the farm								
Intensive	Semi-intensive	Semi-extensive	Extensive	Intensive	Semi-intensive	Semi-extensive	Extensive	
3/9	10/29	20/61	7/20	6/9	19/29	41/61	13/20	0.99
Years at the present location								
0 – 2		3 – 5	> 5	0 – 2		3 – 5	> 5	
0/1		5/15	35/103	1/1		10/15	68/103	0.77
Month into the lactation period at sampling								
0–1st	2nd–5th	6th–9th	After 9th	0–1st	2nd–5th	6th–9th	After 9th	
3/8	19/60	15/43	3/8	5/8	41/60	28/43	5/8	0.97
Availability of a main building for animals								
Yes		No		Yes		No		
38/117		2/2		79/117		0/2		0.045
Availability of a designated building for kids								
Yes		No		Yes		No		
29/86		11/33		57/86		22/33		0.89
Availability of a designated kidding area								
Yes		No		Yes		No		
22/58		18/61		36/58		43/61		0.33
Availability of a lavatory								
Yes		No		Yes		No		
15/38		25/81		23/38		56/81		0.35
Material of the floor of the barn								
Soil		Other		Soil		Other		
36/105		4/14		69/105		10/14		0.67
Availability of straw bedding								
Yes		No		Yes		No		
26/76		14/43		50/76		29/43		0.85
Annual frequency of removal / clean-up of the straw bedding								
1 – 2		> 2		1 – 2		> 2		
16/42		10/34		26/44		24/34		0.43
Grazing practiced								
Yes		No		Yes		No		
38/113		2/6		75/113		4/6		0.99

Grazing land available to animals								
0 – 0.5 acre per animals		> 0.5 acre per animal		0 – 0.5 acre per animals		> 0.5 acre per animal		
5/17		35/102		12/17		67/102		0.69
No. of female animals in the farm								
0 – 165	166 – 330	331 – 500	> 500	0 – 165	166 – 330	331 – 500	> 500	
21/57	7/36	7/13	5/13	36/57	29/36	6/13	8/13	0.11
Breed of does								
Cross-breeds	Greek breeds		Imported breeds	Cross-breeds	Greek breeds		Imported breeds	
6/18	17/56		17/45	12/18	39/56		28/45	0.73
Month of the start of the kidding season								
All year	Autumn	Winter	Spring-Summer	All year	Autumn	Winter	Spring-Summer	
3/8	20/63	16/44	1/4	5/8	43/63	28/44	3/4	0.93
Collaboration with a veterinarian								
Yes		No		Yes		No		
35/101		5/18		66/101		13/18		0.57
Use of laboratory diagnostic examinations in faecal samples preventively								
Yes		No		Yes		No		
6/16		34/103		10/16		69/103		0.72
Means of calculating live bodyweight for the administration of pharmaceutical products								
Weighing		Estimation		Weighing		Estimation		
11/27		29/92		16/27		63/92		0.37
Routine overdosing (compared to dose prescribed) of pharmaceuticals								
Yes		No		Yes		No		
11/26		29/93		15/26		64/93		0.29
Total visits made annually by veterinarians to the farm during the preceding season								
0 – 4	5 – 7	> 7		0 – 4	5 – 7	> 7		
17/51	9/25	14/43		34/51	16/25	29/43		0.96
Application of reproductive control practices in the farm								
Yes		No		Yes		No		
8/17		32/102		9/17		70/102		0.20
Newborn care and specific monitoring								
Yes		No		Yes		No		
37/109		3/10		72/109		7/10		0.80
Kid fostering to female animals other than their dams								
Yes		No		Yes		No		
31/86		9/33		55/86		24/137		0.36

Administration of a kid- specific diet						
Yes		No	Yes		No	
27/79		13/40	52/79		27/40	0.85
Age of kid removal from their dams						
< 45 days	45 – 60 days	> 60 days	< 45 days	45 – 60 days	> 60 days	
8/26	13/44	19/49	18/26	31/44	30/49	0.60
Seasonal transfer of animals to other site						
Yes		No	Yes		No	
8/28		32/91	20/28		59/91	0.52
Manure management						
Spread in the fields		Removed otherwise	Spread in the fields		Removed otherwise	
37/109		3/10	72/109		7/10	0.80
Annual frequency of systemic disinfections in the farm						
0 – 9		> 9	0 – 9		> 9	
36/100		4/19	64/100		15/19	0.21
Shearing of animals						
Yes		No	Yes		No	
35/102		5/17	67/12		12/17	0.69
Provision of finished feed (concentrate) to animals throughout the year						
Yes		No	Yes		No	
34/103		6/16	69/103		10/16	0.72
Provision of finished feed (concentrate) to young animals						
Yes		No	Yes		No	
27/79		13/40	52/79		27/40	0.85

Table S10. Associations of presence of *Cryptosporidium* in faecal samples from 325 sheep flocks in Greece, as found in univariable analysis.

Number of farms								*p*
Farms with presence of *Giardia* in faecal samples (*n* = 23)				**Farms with no presence of *Giardia* in faecal samples (*n* = 302)**				
Management system applied in the farm								
Intensive	Semi-intensive	Semi-extensive	Extensive	Intensive	Semi-intensive	Semi-extensive	Extensive	
14/43	8/151	1/107	0/24	29/43	143/151	106/107	24/24	< 0.0001
Years at the present location								
0 – 2		3 – 5	> 5	0 – 2		3 – 5	> 5	
2/5		2/40	19/280	3/5		38/40	261/280	0.014
Month into the lactation period at sampling								
0–1st	2nd–5th	6th–9th	After 9th	0–1st	2nd–5th	6th–9th	After 9th	
2/23	7/138	12/147	2/17	21/23	131/138	135/147	15/17	0.62
Availability of a main building for animals								
Yes		No		Yes		No		
23/318		0/7		295/318		7/7		0.46
Availability of a designated building for lambs								
Yes		No		Yes		No		
21/243		2/82		222/243		80/82		0.06
Availability of a designated lambing area								
Yes		No		Yes		No		
12/173		11/152		161/173		141/152		0.92
Availability of a lavatory								
Yes		No		Yes		No		
14/143		9/182		129/143		173/182		0.09
Material of the floor of the barn								
Soil		Other		Soil		Other		
19/292		4/33		273/292		29/33		0.23
Availability of straw bedding								
Yes		No		Yes		No		
21/268		2/57		247/268		55/57		0.25
Annual frequency of removal / clean-up of the straw bedding								
1 – 2		> 2		1 – 2		> 2		
10/164		11/102		156/164		91/102		0.16
Grazing practiced								
Yes		No		Yes		No		
10/281		13/44		271/281		31/44		< 0.0001

Grazing land available to animals								
0 – 0.5 acre per animals		> 0.5 acre per animal		0 – 0.5 acre per animals		> 0.5 acre per animal		
19/118		4/207		99/118		203/207		< 0.0001
No. of female animals in the farm								
0 – 165	166 – 330	331 – 500	> 500	0 – 165	166 – 330	331 – 500	> 500	
4/87	6/121	7/66	6/51	83/87	115/121	59/66	45/51	0.21
Breed of ewes								
Cross-breeds		Greek breeds	Imported breeds	Cross-breeds		Greek breeds	Imported breeds	
0/43		8/143	15/139	43/43		135/143	144/139	0.07
Month of the start of the lambing season								
All year	Autumn	Winter	Spring-Summer	All year	Autumn	Winter	Spring-Summer	
4/18	11/245	6/55	2/7	14/18	234/245	49/55	5/7	0.002
Collaboration with a veterinarian								
Yes		No		Yes		No		
21/277		2/48		256/277		46/48		0.39
Use of laboratory diagnostic examinations in faecal samples preventively								
Yes		No		Yes		No		
4/34		19/291		30/34		272/291		0.26
Means of calculating live bodyweight for the administration of pharmaceutical products								
Weighing		Estimation		Weighing		Estimation		
3/73		20/252		70/73		232/252		0.26
Routine overdosing (compared to dose prescribed) of pharmaceuticals								
Yes		No		Yes		No		
7/61		16/264		54/61		248/264		0.14
Total visits made annually by veterinarians to the farm during the preceding season								
0 – 4	5 – 7	> 7		0 – 4	5 – 7	> 7		
11/139	4/86	8/100		128/139	82/86	92/100		0.59
Application of reproductive control practices in the farm								
Yes		No		Yes		No		
9/101		14/224		92/101		210/224		0.39
Newborn care and specific monitoring								
Yes		No		Yes		No		
22/293		1/32		271/293		31/32		0.36
Lamb fostering to female animals other than their dams								
Yes		No		Yes		No		
11/221		12/104		210/221		92/104		0.031

Administration of a lamb-specific diet						
Yes		No	Yes		No	
15/226		8/99	211/226		91/99	0.64
Age of lamb removal from their dams						
< 45 days	45 – 60 days	> 60 days	< 45 days	45 – 60 days	> 60 days	
9/119	12/170	2/36	110/119	158/170	34/36	0.92
Seasonal transfer of animals to other site						
Yes		No	Yes		No	
2/49		21/276	47/49		255/276	0.37
Manure management						
Spread in the fields		Removed otherwise	Spread in the fields		Removed otherwise	
23/320		0/5	297/320		5/5	0.53
Annual frequency of systemic disinfections in the farm						
0 – 9		> 9	0 – 9		> 9	
18/293		5/32	275/293		27/32	0.047
Shearing of animals						
Yes		No	Yes		No	
23/319		0/6	296/319		6/6	0.50
Provision of finished feed (concentrate) to animals throughout the year						
Yes		No	Yes		No	
23/304		0/21	281/304		21/21	0.19
Provision of finished feed (concentrate) to young animals						
Yes		No	Yes		No	
18/255		5/70	237/255		65/70	0.98

Table S11. Associations of presence of *Cryptosporidium* in faecal samples from 119 goat herds in Greece, as found in univariable analysis.

Number of farms								*p*
Farms with presence of *Cryptosporidium* in faecal samples (*n* = 13)				**Farms with no presence of *Cryptosporidium* in faecal samples (*n* = 106)**				
Management system applied in the farm								
Intensive	Semi-intensive	Semi-extensive	Extensive	Intensive	Semi-intensive	Semi-extensive	Extensive	
6/9	7/29	0/61	0/20	3/9	22/29	61/61	20/20	< 0.0001
Years at the present location								
0 – 2		3 – 5	> 5	0 – 2		3 – 5	> 5	
0/1		2/15	11/103	1/1		13/15	92/103	0.90
Month into the lactation period at sampling								
0–1st	2nd–5th	6th–9th	After 9th	0–1st	2nd–5th	6th–9th	After 9th	
1/8	5/60	5/43	2/8	7/8	55/60	38/43	6/8	0.55
Availability of a main building for animals								
Yes		No		Yes		No		
13/117		0/2		104/117		2/2		0.62
Availability of a designated building for lambs / kids								
Yes		No		Yes		No		
10/86		3/33		83/86		30/33		0.79
Availability of a dedicated lambing / kidding area								
Yes		No		Yes		No		
5/58		8/61		53/58		53/61		0.43
Availability of a lavatory								
Yes		No		Yes		No		
6/38		7/81		32/38		74/81		0.24
Material of the floor of the barn								
Soil		Other		Soil		Other		
12/105		1/14		93/105		13/14		0.63
Availability of straw bedding								
Yes		No		Yes		No		
11/76		2/43		65/76		41/43		0.10
Annual frequency of removal / clean-up of the straw bedding								
1 – 2		> 2		1 – 2		> 2		
3/42		8/34		39/42		26/34		0.044
Grazing practiced								
Yes		No		Yes		No		
9/113		4/6		104/113		2/6		< 0.0001

Grazing land available to animals								
0 – 0.5 acre per animals		> 0.5 acre per animal		0 – 0.5 acre per animals		> 0.5 acre per animal		
7/17		6/102		10/17		96/102		< 0.0001
No. of female animals in the farm								
0 – 165	166 – 330	331 – 500	> 500	0 – 165	166 – 330	331 – 500	> 500	
4/57	3/36	5/13	1/13	53/57	33/36	8/13	12/13	0.010
Breed of ewes / does								
Cross-breeds	Greek breeds		Imported breeds	Cross-breeds	Greek breeds		Imported breeds	
1/18	2/56		10/45	17/18	54/56		35/45	0.008
Month of the start of the lambing / kidding season								
All year	Autumn	Winter	Spring-Summer	All year	Autumn	Winter	Spring-Summer	
4/8	3/62	6/44	0/5	4/8	59/62	38/44	5/5	0.001
Collaboration with a veterinarian								
Yes		No		Yes		No		
11/101		2/18		90/101		16/18		0.98
Use of laboratory diagnostic examinations in faecal samples preventively								
Yes		No		Yes		No		
4/16		9/103		12/16		94/103		0.05
Means of calculating live bodyweight for the administration of pharmaceutical products								
Weighing		Estimation		Weighing		Estimation		
4/87		9/32		83/87		23/32		0.0003
Routine overdosing (compared to dose prescribed) of pharmaceuticals								
Yes		No		Yes		No		
2/26		11/93		24/26		82/93		0.55
Total visits made annually by veterinarians to the farm during the preceding season								
0 – 4	5 – 7	> 7		0 – 4	5 – 7	> 7		
6/51	3/25	4/43		45/51	22/25	39/43		0.91
Application of reproductive control practices in the farm								
Yes		No		Yes		No		
4/17		9/102		13/17		93/102		0.07
Newborn care and specific monitoring								
Yes		No		Yes		No		
13/109		0/10		96/109		10/10		0.25
Kid fostering to female animals other than their dams								
Yes		No		Yes		No		
6/86		7/33		80/86		26/33		0.026

Administration of a kid-specific diet						
Yes		No	Yes		No	
9/88		4/31	79/88		27/31	0.68
Age of kid removal from their dams						
< 45 days	45 – 60 days	> 60 days	< 45 days	45 – 60 days	> 60 days	
5/26	5/44	3/49	21/26	39/44	46/49	0.22
Seasonal transfer of animals to other site						
Yes		No	Yes		No	
2/28		11/91	26/28		80/91	0.46
Manure management						
Spread in the fields		Removed otherwise	Spread in the fields		Removed otherwise	
11/109		2/10	98/109		8/10	0.34
Annual frequency of systemic disinfections in the farm						
0 – 9		> 9	0 – 9		> 9	
10/100		3/19	90/100		16/19	0.46
Shearing of animals						
Yes		No	Yes		No	
10/102		3/17	92/102		14/17	0.34
Provision of finished feed (concentrate) to animals throughout the year						
Yes		No	Yes		No	
13/103		0/16	90/103		16/16	0.13
Provision of finished feed (concentrate) to young animals						
Yes		No	Yes		No	
9/79		4/40	70/79		36/40	0.82