

Online Resource 1 - Appendices

Individual heterogeneity in ixodid tick infestation and prevalence of *Borrelia burgdorferi* sensu lato in a northern community of small mammalian hosts

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Table S1: Sequences and adjusted primer set and probe concentrations in respective multiplex real-time quantitative PCR assays for detecting A) *B. burgdorferi* s.l. and *A. phagocytophilum* and B) *I. ricinus* and *I. trianguliceps*.

A) Infection prevalence	Sequence	Concentration
<i>A. phagocytophilum</i>		
Forward primer	ATGGAAGGTAGTGTGGTTATGGTATT	0.900 µM
Reverse primer	TTGGTCTTGAAGCGCTCGTA	0.900 µM
Probe	[HEX]TGGTGCCAGGGTTGAGCTTGAGATTG[TAMRA]	0.125 µM
<i>B. burgdorferi</i> s.l.		
Forward primer	CGAGTCTTAAAAGGGCGATTAGT	0.700 µM
Reverse primer	GCTTCAGCCTGGCCATAAATAG	0.700 µM
Probe	[6FAM]AGATGTGGTAGACCCGAAGCCGAGTG[TAMRA]	0.175 µM
B) Tick species		
<i>I. ricinus</i>		
Forward primer	TTGACTGTGTCGGATCGTGG	0.600 µM
Reverse primer	TCGCTCCGAGAACGTGAAAA	0.600 µM
Probe	[5TexRd-XN]ACGCATGTTTATGCTTTCTTGCGTTGCG[Iowa black]	0.200 µM
<i>I. trianguliceps</i>		
Forward primer	CGCGAACGTTGGAATCGTAC	0.600 µM
Reverse primer	GGCTCCAGTATTCATCGGGG	0.600 µM
Probe	[5HEX]CCGTGCGTCGTAGCCATCCGT[3IAbRQSp]	0.200 µM

Table S2: An overview of samples sizes of captured small mammals per season between 2018 and 2022 in Son, Viken county, Norway.

	2018		2019		2020		2021		2022		
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Sum
<i>A. sylvaticus</i>	2	9	20	16	27	30	23	11	11	7	156
<i>Microtus agrestis</i>	1	0	0	3	0	9	0	0	0	1	14
<i>M. glareolus</i>	3	16	4	12	10	143	10	27	10	23	258
<i>S. araneus</i>	2	27	1	21	1	36	1	14	0	3	106
<i>S. minutus</i>	0	3	0	5	3	11	0	1	0	0	23
Sum	8	55	25	57	41	229	34	53	21	34	557

Table S3: An overview of samples sizes of each tick species from captured hosts between 2018 and 2022 in Son, Viken county, Norway. The table shows the number of individuals A) larval and B) nymphal ticks per species, percentage of ticks identified as *Ixodes ricinus* (% *I. ricinus*), and percentage of species-determined ticks (% SD) by morphology per small mammal species.

	Sum	Sum		%	
A) Larvae	<i>I. ricinus</i>	<i>I. trianguliceps</i>	Total	<i>I. ricinus</i>	% SD
<i>A. sylvaticus</i>	4438	11	6142	99.75	0.72
<i>Microtus agrestis</i>	251	2	265	99.21	0.95
<i>M. glareolus</i>	5885	83	6783	98.61	0.88
<i>S. araneus</i>	1727	14	2449	99.20	0.71
<i>S. minutus</i>	128	9	168	93.43	0.82
Sum	12429	119	15807	99.05	0.79
B) Nymphs					
<i>A. sylvaticus</i>	295	7	329	97.68	0.92
<i>Microtus agrestis</i>	39	0	39	100.00	1.00
<i>M. glareolus</i>	208	18	253	92.04	0.89
<i>S. araneus</i>	19	3	24	86.36	0.92
<i>S. minutus</i>	0	0	0	NA	NA
Sum	561	28	645	95.25	0.91

Table S4: Results of model selection of body mass in small mammals captured in South-East Norway (2018-2022). The table shows only the top five models. The model used for inference is shown in bold.

Intercept	season	sex	species	season:sex	season:species	sex:species	df	AICc	ΔAIC	Weight
2.953	+	+	+		+	+	12	2950.0	0.00	0.380
2.926	+	+	+		+		10	2950.2	0.15	0.352
2.951	+	+	+	+	+	+	13	2952.0	1.97	0.142
2.927	+	+	+	+	+		11	2952.3	2.24	0.124
2.885	+		+		+		9	2959.8	9.83	0.003
2.979	+	+	+			+	10	2968.2	18.18	0.000

Table S5: Results of model selection of A) number of *Ixodes* larvae, B) presence of *Ixodes* nymphs, and C) prevalence of *B. burgdorferi* s.l. in small mammals captured in South-East Norway (2018-2022). The table shows only the top five models. Respective top models used for inference are shown in bold.

Intercept	mass	season	sex	species	mass:sex	mass:species	sex:species	df	AICc	ΔAIC	Weight
<u>A) Larval tick infestation</u>											
1.526	0.5597	+	+	+	+		+	12	4279.7	0	0.241
1.274	0.6522		+	+	+	+	+	13	4280.2	0.48	0.189
1.401	0.6021	+	+	+	+	+	+	14	4280.2	0.51	0.187
1.397	0.6118		+	+	+		+	11	4280.5	0.84	0.158
0.953	0.7434	+	+	+	+			10	4282	2.31	0.076
<u>B) Nymphal tick presence</u>											
-7.66	2.387	+	+	+	+			9	560.9	0	0.247
-5.988	1.867	+	+	+	+		+	11	561.2	0.31	0.212
-7.149	2.182		+	+	+			8	561.6	0.74	0.171
-5.525	1.676		+	+	+		+	10	562	1.1	0.142
-8.29	2.595	+	+	+	+	+		11	564.3	3.43	0.044
<u>C) Infection prevalence</u>											
-11.87	3.949	+	+	+	+	+		11	554.4	0	0.392
-11.14	3.675		+	+	+	+		10	555.2	0.72	0.274
-10.48	3.497	+	+	+	+	+	+	13	555.7	1.3	0.205
-9.839	3.247		+	+	+	+	+	12	556.8	2.34	0.122
-13.69	4.547	+	+	+		+	+	12	563.9	9.5	0.003

Table S6: Results of model selection of A) *Ixodes* nymph intensity, and B) prevalence of *B. burgdorferi* s.l. in bank vole (*M. glareolus*) and wood mouse (*A. sylvaticus*) captured in South-East Norway (2018-2022). The table shows only the top five models. Respective top models used for inference are shown in bold.

Intercept	mass	nymph	season	sex	sp	mass:sex	mass:sp	sex:sp	df	AICc	ΔAIC	Weight
<u>A) Nymphal tick intensity</u>												
-3.285	0.9991			+	+	+		+	9	643.9	0	0.27
-3.538	1.208			+		+			7	644.8	0.88	0.174
-3.234	0.9768		+	+	+	+		+	10	646.1	2.13	0.093
-3.61	1.102			+	+	+	+	+	10	646.1	2.17	0.091
-3.402	1.13		+	+		+			8	646.2	2.27	0.087
<u>B) Infection prevalence</u>												
-10.07	3.273	+	+	+	+	+			9	404.6	0	0.154
-9.435	3.017	+		+	+	+			8	404.9	0.27	0.134
-9.846	3.172	+	+	+	+	+		+	10	405.6	0.92	0.097
-9.2	2.912	+		+	+	+		+	9	405.9	1.29	0.081
-9.665	3.137	+	+	+	+	+	+		10	406.5	1.81	0.062

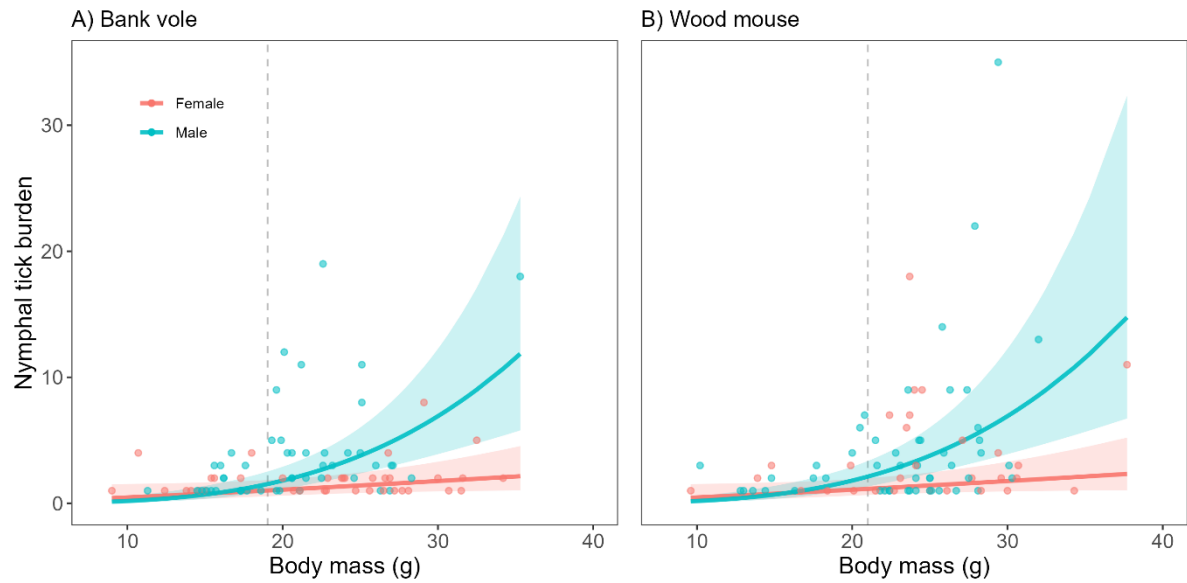


Figure S1: Predicted *Ixodes* nymph intensity as a function of sex and body mass in A) Bank vole (*M. glareolus*) and B) Wood mouse (*A. sylvaticus*) captured in South-East Norway (2018-2022). Shaded areas denote respective 95 % confidence intervals, points denote raw data observations, and dashed lines denote mean body mass.

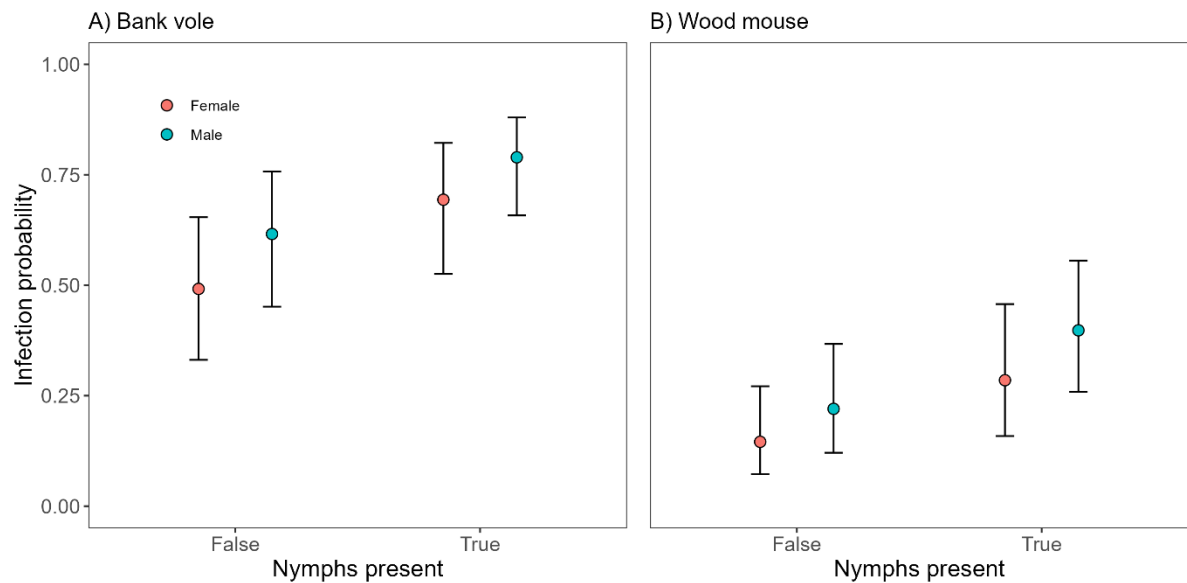


Figure S2: Predicted prevalence of *B. burgdorferi* s.l. as a function of sex and nymphal tick presence in A) Bank vole (*M. glareolus*) and B) Wood mouse (*A. sylvaticus*) captured in South-East Norway (2018-2022). Predicted values are shown for body mass = 20 g. Error bars denote respective 95 % confidence intervals.