Oikos

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Appendix 1.

Table A1. Distribution of data across age and population categories in red deer and moose.

Age (yrs)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Female red deer																							
P1	177	109	93	79	54	58	29	26	24	19	8	10	14	7	4	2	5	3	2	2			
P2	393	157	137	137	95	80	62	49	43	32	34	18	19	16	12	13	8	4	4	2			1
P3	190	71	80	66	52	35	37	28	22	20	18	19	6	9	9	2	5		1		1		
P5	79	35	36	26	23	14	18	12	7	12	3	3	5	5	3	2	1	1	3	2			
Male red dee																							
P1	308	148	77	52	28	22	14	9	7	4	3	3	1			1							
P2	516	193	82	54	33	20	4	3	5	2	1		2		1								
P3	298	133	67	29	24	7	3	4	4		1		1	1									
P5	150	94	42	26	11	3	8	4	5		5	2	1				1						
Female moose																							
R1	30	22	11	13	7	6	5	7	8	9	3	6	2	8	1	2	1						
R2	18	8	7	12	8	6	2	4	2	1	3	2	4	1	2	1	1						
R3	27	25	10	5	8	5	6	4	4	4	6	4	3	2	1			1		1			
R4	33	21	17	13	5	12	14	5	6	6	3	2	3	5	5	2		1					
R6	47	33	20	24	19	12	22	11	22	16	17	11	7	2	4	4	1						
R7	25	20	18	5	11	11	5	9	11	8	6	7	6	3	3	2	1						
Male moose																							
R2	4	3	6	2	3			1															
R4	11	6	5		2	1	1																
R6	28	16	15	9	13	7	7	1	3	3	1												

Table A2. The models best explaining variation in molar tooth height in female and male red deer after excluding animals older than 13 years (n = 286) and 12 years (n = 30) respectively. The cut off point depended on the presence of data in the different age and population categories (Table A1). The aim of this analyses were to see if the few old individuals affected the results strongly and in particular if imbalance in age structure among populations affected the population differences in wear rates (i.e. the interaction Age × Population). Compared to the models including all data the following changes occurred: In females the interactions Age × Jaw length and Age × Density disappeared. The wear rates in populations P2 and P3 became significantly slower than in the reference population P1 (i.e. the interactions Age × Population (P2-P1) and Age × Population (P3-P1)). In males no notable changes occurred compared to the model using all available data.

	Parameter estimate	SE	95% CI
Female red deer			
Intercept	2.31	0.00404	2.30, 2.32
Population (P2-P1)	0.0342	0.00519	0.0240, 0.0443
Population (P3-P1)	0.0288	0.00584	0.0173, 0.0402
Population (P5-P1)	–0.0040	0.00794	–0.0196, 0.0116
Jaw length	0.0213	0.00230	0.0168, 0.0258
Density	–0.0184	0.00223	–0.0228, –0.0141
Age	–0.1266	0.00422	–0.135, –0.118
Age × Population (P2-P1)	0.0126	0.00507	0.00266, 0.0225
Age × Population (P3-P1)	0.0137	0.00580	0.00236, 0.0251
Age × Population (P5-P1)	–0.0163	0.00737	–0.0308, –0.00189
Male red deer			
Intercept	2.42	0.00380	2.41, 2.42
Population (P2-P1)	0.0372	0.00496	0.0275, 0.0469
Population (P3-P1)	0.0283	0.00529	0.0179, 0.0386
Population (P5-P1)	0.0103	0.00684	–0.00314, 0.0237
Jaw length	0.0295	0.00218	0.0252, 0.0338
Density	–0.0217	0.00223	–0.0261, –0.0172
Age	–0.0862	0.00417	–0.0944, –0.0780
Age × Density	–0.0046	0.00230	–0.0091, –0.0001
Age × Jaw length	–0.0030	0.00195	–0.0069, 0.0008
Age × Population (P2-P1)	0.0061	0.00529	–0.00425, 0.0165
Age × Population (P3-P1)	0.0223	0.00521	0.0121, 0.0325
Age × Population (P5-P1)	–0.0227	0.00697	–0.0363, –0.00899

Table A3. The model best explaining variation in molar height in female moose after removing individuals 19 years or older (n = 7). Compared to the model including all data the only change that occurred was that density entered the model and negatively affected molar height. In males the best model included only age also for subsets of the data (not presented).

	Parameter estimate	SE	95% CI
Intercept	2.5761	0.0110	2.55, 2.60
Age	–0.0942	0.0073	–0.109, –0.0799
Population (R2-R1)	0.0300	0.0128	0.00487, 0.0550
Population (R3-R1)	0.0698	0.0148	0.0408, 0.0988
Population (R4-R1)	0.0854	0.0116	0.0626, 0.108
Population (R6-R1)	0.0791	0.0176	0.0446, 0.114
Population (R7-R1)	0.0748	0.0142	0.0471, 0.103
ln (Body mass)	0.0060	0.0034	–0.000636, 0.0125
Density	–0.0110	0.0065	–0.0237, 0.00171
Age × Population (R2-R1)	0.0197	0.0125	–0.00475, 0.0441
Age × Population (R3-R1)	0.0037	0.0114	–0.0187, 0.0261
Age × Population (R4-R1)	0.0104	0.0103	–0.00967, 0.0305
Age × Population (R6-R1)	–0.0075	0.0092	–0.0255, 0.0105
Age × Population (R7-R1)	0.0206	0.0102	0.000598, 0.0406

Table A4. The models that best explain the variation in incisor (I_2) height in female and male red deer after excluding females older than 13 years (n = 286) and males older than 12 years (n = 30) respectively. The cut off point depended on the presence of data in the different age and population categories (Table S1). The aim of this analyses were to see if the few old individuals affected the results strongly and in particular if imbalance in age structure among populations affected the population differences in wear rates (i.e., the interaction Age × Population). Compared to the models including all data the following changes occurred: In females the interactions Age × Density disappeared and Age × Jaw length became insignificant. In males no notable changes occurred compared to the model using all available data (Table 3).

	Parameter estimate	SE	95% CI
Females (<14 years old)			
Intercept	2.43	0.00418	2.42, 2.44
Population (P2-P1)	0.0241	0.00509	0.0141, 0.0341
Population (P3-P1)	0.0448	0.00590	0.0333, 0.0564
Population (P5-P1)	0.0464	0.00774	0.0312, 0.0616
Jaw length	0.0104	0.00234	0.00582, 0.0150
Age	–0.0651	0.00446	–0.0739, –0.0563
Age × Jaw length	–0.00394	0.00209	–0.00804, 0.000164
Age × Population (P2-P1)	–0.0164	0.00522	–0.0267, –0.00618
Age × Population (P3-P1)	–0.0253	0.00595	–0.0370, –0.0136
Age × Population (P5-P1)	–0.0176	0.00789	–0.0330, –0.00210
Males (<13 years old)			
Intercept	2.49	0.00361	2.49, 2.50
Population (P2-P1)	0.0280	0.00482	0.0185, 0.0374
Population (P3-P1)	0.0509	0.00513	0.0408, 0.0609
Population (P5-P1)	0.0767	0.00655	0.0639, 0.0896
Jaw length	0.0080	0.00209	0.00387, 0.0121
Density	–0.00579	0.00215	–0.0100, –0.00157
Age	–0.0292	0.00386	–0.0368, –0.0216
Age × Density	–0.0050	0.00218	–0.00923, –0.000694
Age × Population (P2-P1)	–0.0141	0.00511	–0.0241, –0.00409
Age × Population (P3-P1)	–0.0225	0.00505	–0.0324, –0.0126
Age × Population (P5-P1)	0.0112	0.00654	–0.00162, 0.0240

Table A5. The best model for incisor wear in moose when removing the oldest individuals (females older than 18 years old and males older than seven years [n = 7 from population R6]). Compared to the model including all data (Table 4) the following changes occurred: Females in population R7 now wear incisors significantly faster than the reference population (the interaction Age × Population (R7-R1)). In males, the wear rates do not differ among populations when removing the seven oldest individuals. Instead body mass (positive effect) and the interaction between body mass and age (relatively slower wear with increasing body mass) enters the best model. The male model is unstable (with respect to what variables that enters the best model), likely due to limited sample size.

	Parameter estimate	SE	95% CI
Females (< 19 years old)			
Intercept	2.94	0.0149	2.91, 2.97
Population (R2-R1)	–0.000765	0.0181	–0.0363, 0.0348
Population (R3-R1)	0.0144	0.0205	–0.0259, 0.0547
Population (R4-R1)	0.00302	0.0156	–0.0275, 0.0336
Population (R6-R1)	0.0536	0.0247	0.00506, 0.102
Population (R7-R1)	–0.0145	0.0199	–0.0535, 0.0244
Density	–0.0331	0.00928	–0.0514, –0.0149
Age	–0.0359	0.0103	–0.0560, –0.0157
Age × Population (R2-R1)	0.0203	0.0182	–0.0155, 0.0561
Age × Population (R3-R1)	–0.0494	0.0162	–0.0811, –0.0176
Age × Population (R4-R1)	–0.0229	0.0145	–0.0513, 0.00548
Age × Population (R6-R1)	–0.00631	0.0131	–0.0321, 0.0194
Age × Population (R7-R1)	–0.0302	0.0146	–0.0589, –0.00150
Males (< 8 years old)			
Intercept	3.00	0.00439	2.99, 3.01
ln (Body mass)	0.00733	0.00444	–0.00147, 0.0161
Age	–0.0141	0.00444	–0.0229, –0.00533
Age × ln (Body mass)	0.00933	0.00433	0.000754, 0.0180