Predicting body mass in Ruminantia using post-cranial measurements: Supplementary Information

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R scripts and data files have been deposited on Data Dryad (https://doi.org/10.5061/dryad.8sf7m0ctf).

Table S1: Comparison of Akaike weights across all models. AIC score, AIC weight, slope, intercept, residual standard error (RSE), lambda, mean percent prediction error (%PE), and minimum and maximum %PE are reported. All %PE values are log-transformed. Organized by bone.

Bone	Model	AIC	ΔAIC	AIC_w	Slope	Int.	RSE
Scapula	S1 (full length)	34.02	30.77	0	2.4546	-8.7732	0.28
	S2 (greatest cranio-caudal length)	71.6	68.35	0	2.5114	-7.7834	0.39
	S3 (shortest length of scapular neck)	33.73	30.48	0	2.1576	-2.7965	0.29
	S4 (anteroposterior glenoid fossa)	15.2	11.95	0	2.5346	-4.5624	0.29
	S5 (mediolateral glenoid fossa)	40.1	36.85	0	2.4035	-3.8276	0.34
	all S pca	23.34	20.09	0	-0.5864	3.9657	0.27
	S stepwise (S2 + S3 + S4)	11.74	8.49	0.01	-0.4904	-3.1732	0.27
	glenoid S pca (S4 + S5)	23.99	20.74	0	-0.9069	4.0280	0.31
Humerus	H1 (full length)	42.75	39.5	0	2.9979	-11.7403	0.35
	H2 (functional length)	50.55	47.3	0	2.9904	-11.4763	0.39
	H3 (midshaft circumference)	23.1	19.85	0	2.3817	-5.9599	0.27
	H4 (largest medial height of trochlea)	29.9	26.65	0	2.4286	-3.7354	0.33
	H5 (smallest height of trochlea)	25.39	22.14	0	2.5302	-3.2332	0.34
	H6 (largest lateral height of trochlea)	25.79	22.54	0	2.4688	-3.4551	0.33
	H7 (proximal width)	10.21	6.96	0.01	2.3681	-4.8952	0.32
	H8 (mediolateral humeral head width)	19.02	15.77	0	2.5046	-4.9300	0.29
	H9 (distal width)	17.86	14.61	0	2.4729	-5.1365	0.32
	all H pca	11.99	8.74	0	-0.4400	3.9861	0.27
	H stepwise (H7 + H9)	3.25	0	0.36	1.3714	-5.0850	0.25
	prox H pca (H7 + H8)	9.27	6.02	0.02	-0.9386	4.0780	0.29
	dist H pca (H4 + H5 + H6 + H9)	18.46	15.21	0	-0.6419	3.9776	0.29
Radioulna	U1 (ulna length)	67.1	63.85	0	2.5342	-9.8713	0.45
	U2 (olecranon process length)	40.48	37.23	0	2.4166	-5.1271	0.34
	R1 (radius length)	83.84	80.59	0	2.4551	-8.9488	0.53
	R2 (full proximal width)	7	3.75	0.05	2.3209	-4.2206	0.29
	R3 (width of humeral articular surface)	6.12	2.87	0.08	2.3887	-4.2960	0.27
	R4 (distal width)	15.27	12.02	0	2.3359	-4.1501	0.28
	all RU pca	26.73	23.48	0	-0.5460	4.0179	0.32
	RU stepwise (U1 + R1 + R3)	4.41	1.16	0.2	2.1738	-4.9885	0.26
	R stepwise (R1 + R3)	7.39	4.14	0.04	-0.3387	-3.5415	0.26
	U stepwise (U1 + U2)	38.29	35.04	0	0.6577	-6.4902	0.33
	all R pca (R1-R4)	22.21	18.96	0	-0.6755	4.0081	0.31
	all U pca (U1 + U2)	42.05	38.8	0	-0.9178	4.0278	0.35
	prox RU pca (U2 + R2 + R3)	10.44	7.19	0.01	-0.7800	4.0704	0.28
Metacarpus	MC1 (length)	157.67	154.42	0	1.9231	-5.9394	0.88
	MC2 (anteroposterior midshaft)	74.04	70.79	0	2.2239	-1.6902	0.42
	MC3 (mediolateral midshaft)	67.63	64.38	0	2.3595	-2.7488	0.37
	MC4 (distal width)	38.1	34.85	0	2.3748	-3.9398	0.32
	MC5 (proximal width)	17.73	14.48	0	2.4799	-4.1646	0.30
	all MC pca	47.11	43.82	0	-0.5961	4.0112	0.36
	MC stepwise (MC5)	17.73	14.48	0	2.4799	-4.1646	0.30
Femur	F1 (full length)	40.89	37.64	0	3.0747	-12.6508	0.33
	F2 (functional length)	43.04	39.79	0	3.0891	-12.6333	0.34
	F3 (midshaft circumference)	38.45	35.2	0	2.6992	-7.3724	0.30
	F4 (proximal width)	14.11	10.86	0	2.4145	-5.7072	0.29

Bone	Model	AIC	ΔAIC	AIC_w	Slope	Int.	RSE
	F5 (mediolateral femoral head)	39.53	36.28	0	2.6095	-4.9696	0.32
	F6 (anteroposterior femoral head)	16.42	13.17	0	2.7745	-4.8227	0.26
	F7 (distal width)	13.7	10.45	0	2.6386	-6.1794	0.26
	F8 (medial condyle and patellar lip)	20.84	17.59	0	2.4788	-6.2724	0.33
	F9 (lateral condyle and patellar lip)	22.82	19.57	0	2.7434	-6.9284	0.30
	all F pca	17.06	13.81	0	-0.4333	3.9744	0.27
	F stepwise (F6 + F7 +F8 + F9)	7.8	4.55	0.04	1.4515	-5.0806	0.26
	prox F pca (F4 + F5 + F6)	17.21	13.96	0	-0.7553	4.0215	0.27
	dist F pca (F7 + F8 + F9)	16.24	12.99	0	0.7437	3.9301	0.29
Tibia	T1 (full length)	94.82	91.57	0	3.0571	-12.8498	0.51
	T2 (midshaft circumference)	46.23	42.98	0	2.6276	-6.9836	0.33
	T3 (proximal width)	11.23	7.98	0.01	2.6894	-6.5571	0.26
	T4 (distal width)	17.02	13.77	0	2.6375	-5.2520	0.29
	all T pca	35.78	32.53	0	-0.6430	3.9638	0.32
	T stepwise (T1 + T2 + T3 + T4)	8.79	5.54	0.02	-0.4794	-4.6628	0.26
Metatarsus	MT1 (length)	152.96	149.71	0	2.2542	-7.9543	0.88
	MT2 (anteroposterior midshaft)	77.22	73.97	0	2.3165	-2.4481	0.46
	MT3 (mediolateral midshaft)	58.62	55.37	0	2.5514	-3.1520	0.36
	MT4 (distal width)	46.91	43.66	0	2.5987	-4.8137	0.35
	MT5 (proximal width)	25.01	21.76	0	2.6441	-4.5858	0.30
	all MT pca	55.28	52.03	0	-0.5744	3.9267	0.39
	MT stepwise (MT1 + MT5)	25.4	22.15	0	-0.3092	-3.8489	0.28
Calcaneus	C1 (greatest length)	36.37	33.12	0	2.7830	-8.1023	0.33
	C2 (length of body)	48.1	44.85	0	2.7117	-6.6429	0.36
	C3 (midbody height)	37	33.75	0	2.6717	-4.0707	0.33
	C4 (midbody transverse width)	69.37	66.12	0	2.4557	-1.9653	0.47
	C5 (fibular facet length)	66.98	63.73	0	2.5211	-2.7774	0.41
	C6 (cubonavicular facet length)	76.02	72.77	0	2.4511	-3.2503	0.39
	C7 (height of sustentacular facet)	31.5	28.25	0	2.7799	-3.6807	0.31
	C8 (height of sustentaculum tali)	9.03	5.78	0.02	2.6956	-4.4624	0.24
	all C pca	28.61	25.36	0	-0.4578	3.9510	0.29
	C stepwise (C3 + C6 + C7 + C8)	5.49	2.24	0.12	0.7664	-4.5422	0.23
Astragalus	A1 (maximum lateral length)	32.6	29.35	0	2.7716	-5.9998	0.30
	A2 (maximum medial length)	32.99	29.74	0	2.8541	-6.0379	0.30
	A3 (minimal length)	38.55	35.3	0	2.8503	-5.5897	0.30
	A4 (width at tarsus)	19.33	16.08	0	2.6348	-4.1788	0.27
	A5 (width at trochlea)	26.25	23	0	2.6335	-4.0214	0.30
	all A pca	27.72	24.47	0	-0.5877	3.9857	0.28
	A stepwise (A4)	19.33	16.08	0	2.6348	-4.1788	0.27

Table S2: Table of the best regression at the subclade level, determined by mean %PE. The preferred regression and its mean %PE (log-transformed) is presented. The the minimum and maximum %PE (log-transformed) for the family, subfamily, and tribe level across all models is also shown.

Family	Subfamily	Tribe	Best Regression	Mean PPE	Min. PPE	Max. PPE
Antilocapridae			T2	-0.19	-12.12	9.67
Bovidae			F7	0.06	-6.41	9.40
	Antilopinae		all C pca	0.01	-8.38	4.74
		Aepycerotini	H1	-0.03	-16.08	10.36
		Alcelaphini	F6, H stepwise	-0.04, 0.04	-8.06	12.67
		Antilopini	MT3	0.03	-24.33	5.78
		Caprini	S2	-0.15	-6.81	36.30
		Cephalophini	H9	0.64	-14.57	4.33
		Hippotragini	H7, F6	-0.03, 0.03	-1.94	20.54
		Neotragini	prox. RU pca	-0.16	-18.41	25.32
		Oreotragini	RU stepwise	-0.1	-14.07	16.69
		Reduncini	MC4	-0.2	-7.96	6.30
	Bovinae		C8	1.8	1.80	31.87
		Boselaphini	all H pca	0.13	-16.17	8.74
		Bovini	H7	4.43	4.43	57.47
		Tragelaphini	F6	-0.01	-3.03	10.55
Cervidae			R stepwise	0.01	-5.18	9.46
	Capreolinae		S4	-0.05	-6.98	9.79
		Alceini	C stepwise	0	-7.23	15.92
		Capreolini	U2	-0.63	-20.17	1.94
		Odocoileini	H stepwise	-0.03	-4.44	13.02
	Cervinae		A stepwise	0.06	-3.62	9.85
		Cervini	distal F pca	-0.01	-4.45	10.10
		Muntiacini	F1	0.08	-4.40	14.03
Giraffidae			glenoid S pca	-0.05	-7.25	12.72
Moschidae			C8	0.18	-23.04	4.91
Tragulidae			H3	-0.1	-26.02	44.25

Table S3: Linear measurements were taken on ten post-cranial bones. This is a table describing how each individual measurement was taken, organized by bone.

Bone	Meas.	Description
Scapula	S1	Full length of the scapula from the lateral border of the glenoid fossa along the scapular spine to the proximal-most point of the blade. Does not include scapular cartilage.
	S2	Longest length across the dorsal end of the blade from the cranial-most point to the caudal-most point.
	S3	Shortest cranial-caudal length of the scapular neck.
	S4	Anteroposterior length of the glenoid fossa.
	S5	Mediolateral length of the glenoid fossa.
Humerus	H1	Full length of the humerus. From the proximal-most point on the major (lateral) tuberosity to the distal-most point on the trochlea.
	H2	Functional length of the humerus. From the proximal-most surface of the humeral head to the distal-most point on the trochlea.
	H3	Humerus midshaft circumference. Taken at 50% of full bone length.
	H4	Largest medial height of the humeral trochlea.
	H5	Smallest height of the humeral trochlea.
	H6	Largest lateral height of the humeral trochlea.
	H7	Full proximal width of the humerus from the widest parts of the lateral tuberosity and medial tuberosity.
	H8	Mediolateral width of the humeral head. Taken at the borders of the articular surface.
	H9	Largest distal width of the humerus in anterior view.
Radioulna	U1	Full length of the ulna. From the proximal-most point on the olecranon process to the distal-most end of the styloid process.
	U2	Length of the olecranon process of the ulna. Taken from the inside of the semilunar notch to the proximal-most point of the olecranon process.
	R1	Full length of the radius. Taken on the medial side from the glenoid cavity of the radius to the distal-most point of the radius.
	R2	Full proximal width of the radius taken from the widest points including the lateral tuberosity.
	R3	Width of the humeral articular surface. Taken from the widest mediolateral points.
	R4	Distal width of the radius. Taken from the widest mediolateral points excluding the ulna.
Metacarpus	MC1	Full length of the metacarpus taken from the medial side from the carpal articular surface proximally to the distal-most point at the head of the third metacarpal bone excluding the trochlea.
	MC2	Anteroposterior length of the metacarpus midshaft. Taken at 50% of full metacarpus length.
	MC3	Mediolateral width of the metacarpus midshaft. Taken at 50% of full metacarpus length.
	MC4	Distal width of the metacarpus taken at the widest part just proximal to the trochlear morphology.
	MC5	Full proximal width of the metacarpus taken at the widest mediolateral points.
Femur	F1	Full length of the femur. From the proximal-most point on the major trochanter to the distal-most point on the femoral trochlea.
	F2	Functional length of the femur. From the proximal-most point on the femoral head to the distal-most point on the femoral trochlea.
	F3	Femur midshaft circumference. Taken at 50% of full bone length.
	F4	Full width of the proximal femur. From the medial-most point of the femoral head across to the lateral-most point on the major trochanter.
	F5	Mediolateral width of the femoral head. Taken at the mediolateral borders of the articular surface.
	F6	Anteroposterior length of the femoral head. Taken from proximal view at the widest points.
	F7	Distal width of the humerus. Taken at the widest points in distal view.
	F8	Full length of medial condyle and patellar lip of the distal femur. Taken in medial view with the femoral shaft horizontal and at the widest points of the medial patellar lip and medial femoral condyle.
	F9	Full length of lateral condyle and patellar lip of the distal femur. Taken in lateral view with the femoral shaft horizontal and at the widest points of the lateral patellar lip and lateral femoral condyle.
Tibia	T1	Full length of the tibia. Taken on the medial side from the medial condyle to the inside of the notch below the medial malleolus.
	T2	Tibia midshaft circumference. Taken at 50% of full bone length.
	T3	Full proximal width of the tibia. Taken from the widest mediolateral points.
	T4	Distal width of the tibia. Taken from the widest mediolateral points
Metatarsus	MT1	Full length of the metatarsus taken from the medial side from the carpal articular surface proximally to the distal-most point at the head of the third metacarpal bone excluding the trochlea.
	MT2	Anteroposterior length of the metatarsus midshaft. Taken at 50% of full metatarsus length.
	MT3	Mediolateral width of the metatarsus midshaft. Taken at 50% of full metatarsus length.
	MT4	Distal width of the metatarsus taken at the widest part just proximal to the trochlear morphology.
	MT5	Full proximal width of the metatarsus taken at the widest mediolateral points.
Calcaneus	C1	Greatest length of the calcaneus (2).
	C2	Length of the body/tuber of the calcaneus (2).
	C3	Midbody height of the calcaneus (2).
	C4	Midbody transverse width (2).
	C5	Length of the fibular facet (2).
	C6	Length of the cubonavicular facet (2).
	C7	Height of the sustentacular facet (2).
	C8	Height of the sustentaculum tali (2).
Astragalus	A1	Maximum lateral length (1).
	A2	Maximum medial length (1).
	A3	Minimal length (1).
	A4	Width at the tarsus of the astragalus (1).
	A5	Width at the trochlea of the astragalus, excluding flange (1).

Table S4: List of postcranial specimens used for each species (A). N is the total number of specimens measured for that species. FMNH is Field Museum of Natural History in Chicago, IL. USNM is the Smithsonian National Museum of Natural History in Washington, D.C.

Species	Family	N	Specimens
Antilocapra americana	Antilocapridae	9	FMNH 51438, FMNH 57215, FMNH 57217, FMNH 60471, FMNH 60605, FMNH 74239, USNM 251104, USNM 266542, USNM A22387
Addax nasomaculatus	Bovidae	3	FMNH 137417, FMNH 160011, FMNH 66888
Aepyceros melampus	Bovidae	2	USNM 163200, USNM 261111
Ammotragus lervia	Bovidae	3	FMNH 52423, USNM 13069, USNM A49996
Antidorcas marsupialis	Bovidae	3	FMNH 34488, FMNH 34498, USNM 173040
Antilope cervicapra	Bovidae	4	FMNH 104904, FMNH 123969, USNM 124653, USNM 259836
Bison bison	Bovidae	5	FMNH 18849, FMNH 18850, FMNH 44708, USNM 249894, USNM A22375
Bison bonasus	Bovidae	3	FMNH 31704, FMNH 87711, USNM 310690
Bos javanicus	Bovidae	1	FMNH 31709
Bos sauveli	Bovidae	2	USNM 361392, USNM 399379
Bubalus depressicornis	Bovidae	2	FMNH 98971, USNM 219297
Bubalus mindorensis	Bovidae	2	FMNH 18817, USNM 219049
Budorcas taxicolor	Bovidae	2	FMNH 39509, USNM 259079
Capra falconeri	Bovidae	1	FMNH 134553
Capra sibirica	Bovidae	5	USNM 015457, USNM 062093, USNM 257969, USNM 267940, USNM A12318
Capricornis crispus	Bovidae	1	USNM 013829
Capricornis sumatraensis	Bovidae	6	FMNH 114389, FMNH 36783, FMNH 39515, USNM 152165, USNM 258670, USNM 259025
Cephalophus silvicultor	Bovidae	3	FMNH 174410, USNM 537289, USNM 542447
Connochaetes gnou	Bovidae	1	FMNH 57510
Connochaetes taurinus	Bovidae	3	USNM 163011, USNM 163012, USNM 163019
Damaliscus lunatus	Bovidae	5	FMNH 127915, FMNH 127917, FMNH 29531, USNM 163004, USNM 21640
Damaliscus pygargus	Bovidae	6	USNM 218725, USNM 240404, USNM 252810, USNM 537649, USNM 544981, USNM 545849
Eudorcas rufifrons	Bovidae	2	USNM 252685, USNM 252686
Eudorcas thomsonii	Bovidae	6	FMNH 127934, FMNH 127936, FMNH 29618, FMNH 49883, USNM 163050, USNM 163067
Gazella bennettii	Bovidae	4	FMNH 27465, FMNH 57942, USNM 328578, USNM 329355
Gazella dorcas	Bovidae	6	FMNH 1335, FMNH 49335, USNM 241500, USNM 325878, USNM 575152, USNM 588448
Gazella gazella	Bovidae	4	FMNH 1333, FMNH 44380, FMNH 97895, FMNH 97897
Gazella spekei	Bovidae	6	FMNH 1344, FMNH 1348, FMNH 137075, FMNH 51519, USNM 582089, USNM 582090
Gazella subgutturosa	Bovidae	6	FMNH 42718, FMNH 42719, FMNH 92914, FMNH 97898, FMNH 97899, FMNH 97905
Hemitragus jemlahicus	Bovidae	2	USNM 251850, USNM 269284
Hippotragus niger	Bovidae	2	USNM 252518, USNM 396597
Kobus ellipsiprymnus	Bovidae	8	FMNH 127949, FMNH 127950, FMNH 127953, FMNH 54200, USNM 161989, USNM 163185, USNM 164689, USNM 164737
Kobus megaceros	Bovidae	2	FMNH 134555, USNM 164777
Kobus vardonii	Bovidae	3	FMNH 26913, FMNH 34465, USNM 337255
Litocranius walleri	Bovidae	7	FMNH 127955, FMNH 127957, FMNH 127959, FMNH 127960, FMNH 127961, FMNH 26903, USNM 164035
Madoqua guentheri	Bovidae	2	FMNH 32922, USNM 396306
Madoqua kirkii	Bovidae	4	FMNH 156114, USNM 538104, USNM 538106, USNM 541419
Madoqua saltiana	Bovidae	4	FMNH 1316, FMNH 168100, FMNH 27000, FMNH 27004
Naemorhedus goral	Bovidae	6	FMNH 36786, FMNH 36788, USNM 259023, USNM 259396, USNM 259397, USNM 259399
Nanger dama	Bovidae	4	FMNH 125415, USNM 543093, USNM 578578, USNM 599686
Nanger granti	Bovidae	6	FMNH 127930, FMNH 152044, FMNH 29600, FMNH 29603, FMNH 29605, FMNH 32908
Nanger soemmerringii	Bovidae	2	FMNH 122718, USNM 582229
Nesotragus moschatus	Bovidae	2	FMNH 18972, FMNH 129363

Table S5: List of postcranial specimens used for each species (B). N is the total number of specimens measured for that species. FMNH is Field Museum of Natural History in Chicago, IL. USNM is the Smithsonian National Museum of Natural History in Washington, D.C.

Species	Family	N	Specimens
Oreotragus oreotragus	Bovidae	4	FMNH 160010, FMNH 19580, USNM 163024, USNM 314958, USNM 589129
Oryx dammah	Bovidae	3	USNM 449934, USNM 575162, USNM A35256
Oryx gazella	Bovidae	5	FMNH 127966, FMNH 22255, FMNH 34436, FMNH 34449, USNM 163209
Oryx leucoryx	Bovidae	2	USNM 581996, USNM 588339
Ourebia ourebi	Bovidae	7	FMNH 127970, FMNH 127972, FMNH 127975, FMNH 26962, FMNH 60546, USNM 164029, USNM 164496
Ovibos moschatus	Bovidae	6	FMNH 49230, FMNH 49341, USNM 251592, USNM 256969, USNM 288025, USNM 399997
Ovis canadensis	Bovidae	5	USNM 155622, USNM 240289, USNM 240959, USNM 274707, USNM 569106
Ovis dalli	Bovidae	5	FMNH 104780, FMNH 57630, FMNH 60513, USNM 112824, USNM 257512
Philantomba monticola	Bovidae	5	FMNH 101847, FMNH 154182, FMNH 177241, FMNH 177243, USNM 241578
Pseudois nayaur	Bovidae	2	FMNH 31134, USNM 84082
Raphicerus campestris	Bovidae	7	FMNH 127976, FMNH 127977, FMNH 127978, FMNH 17792, USNM 161981, USNM 161983, USNM 164494
Raphicerus sharpei	Bovidae	3	USNM 367433, USNM 367434, USNM 367445
Redunca arundinum	Bovidae	1	FMNH 134366
Saiga tatarica	Bovidae	1	USNM 304688
Sylvicapra grimmia	Bovidae	6	FMNH 127995, FMNH 127996, FMNH 127998, FMNH 127999, FMNH 17789, USNM 163255
Tetracerus quadricornis	Bovidae	1	FMNH 30340
Tragelaphus angasii	Bovidae	3	FMNH 51777, FMNH 65736, USNM 258851
Tragelaphus eurycerus	Bovidae	2	USNM 163226, USNM 542466
Tragelaphus imberbis	Bovidae	5	FMNH 105028, FMNH 128014, FMNH 1416, FMNH 1418, FMNH 1419
Tragelaphus scriptus	Bovidae	6	FMNH 128009, FMNH 128010, FMNH 128011, FMNH 26941, USNM 164560, USNM 164741
Tragelaphus spekii	Bovidae	5	FMNH 128017, FMNH 51469, FMNH 60489, FMNH 60552, USNM 196910
Alces alces	Cervidae	6	FMNH 20336, FMNH 20338, FMNH 20339, USNM 251053, USNM 275127, USNM A14646
Axis axis	Cervidae	2	USNM 395635, USNM A35262
Axis porcinus	Cervidae	4	FMNH 25700, FMNH 27447, FMNH 27448, USNM 254922
Blastocerus dichotomus	Cervidae	3	FMNH 28280, USNM 261017, USNM 261018
Capreolus capreolus	Cervidae	6	FMNH 65360, FMNH 65571, FMNH 65572, FMNH 74057, FMNH 74058, FMNH 84482
Cervus elaphus	Cervidae	5	FMNH 25177, FMNH 34420, FMNH 97893, USNM 13973, USNM A49424
Cervus nippon	Cervidae	4	USNM 301942, USNM 301944, USNM 395181, USNM 588564
Dama dama	Cervidae	2	FMNH 104592, FMNH 134489
Elaphodus cephalophus	Cervidae	7	FMNH 39491, FMNH 39493, USNM 240373, USNM 240374, USNM 256107, USNM 258680, USNM 258681
Elaphurus davidianus	Cervidae	5	FMNH 60624, FMNH 74176, FMNH 91189, USNM 307612, USNM 396592
Hydropotes inermis	Cervidae	1	USNM 290513
Mazama americana	Cervidae	1	USNM 269164
Mazama gouazoubira	Cervidae	3	FMNH 28305, FMNH 70559, USNM 251747
Mazama rufina	Cervidae	1	FMNH 70563
Muntiacus atherodes	Cervidae	4	FMNH 68761, FMNH 68763, FMNH 68764, FMNH 88783
Muntiacus muntjak	Cervidae	7	FMNH 121680, FMNH 88784, FMNH 88785, FMNH 88786, USNM 151862, USNM 154383, USNM 589134
Muntiacus reevesi	Cervidae	10	FMNH 104802, FMNH 122723, FMNH 39524, FMNH 39525, FMNH 60487, USNM 240004, USNM 254797, USNM 259031, USNM 259032, USNM 259081
Odocoileus hemionus	Cervidae	4	FMNH 25178, FMNH 29918, FMNH 57222, USNM 155445
Odocoileus virginianus	Cervidae	4	FMNH 214510, FMNH 60772, USNM 254652, USNM 566620
Ozotoceros bezoarticus	Cervidae	2	FMNH 28290, FMNH 29184
Pudu mephistophiles	Cervidae	3	FMNH 86846, USNM 282141, USNM 309045
Pudu puda	Cervidae	5	FMNH 24363, USNM 580352, USNM 582443, USNM 588218, USNM 588447
Rangifer tarandus	Cervidae	6	FMNH 10933, FMNH 138849, FMNH 15572, FMNH 57585, FMNH 60384, USNM 241581
Rucervus duvaucelii	Cervidae	1	USNM 151606
Rucervus eldii	Cervidae	2	USNM 260832, USNM 588225
Rusa marianna	Cervidae	6	FMNH 186613, FMNH 187487, FMNH 196085, FMNH 226758, FMNH 61007, USNM A35261
Rusa timorensis	Cervidae	1	USNM 538456
Rusa unicolor	Cervidae	4	FMNH 27455, USNM 111985, USNM 240478, USNM 240479

Table S6: List of postcranial specimens used for each species (C). N is the total number of specimens measured for that species. FMNH is Field Museum of Natural History in Chicago, IL. USNM is the Smithsonian National Museum of Natural History in Washington, D.C.

Species	Family	N	Specimens
Giraffa camelopardalis	Giraffidae	5	FMNH 104906, FMNH 127882, FMNH 127886, FMNH 187445, FMNH 60602
Giraffa giraffa	Giraffidae	2	FMNH 34424, FMNH 34426
Giraffa reticulata	Giraffidae	1	FMNH 53765
Giraffa tippelskirchi	Giraffidae	3	FMNH 127878, FMNH 127880, FMNH 127881
Okapia johnstoni	Giraffidae	5	FMNH 104923, FMNH 108987, FMNH 152135, FMNH 226790, FMNH 58839, USNM 308877
Moschus berezovskii	Moschidae	5	USNM 258555, USNM 258683, USNM 259381, USNM 259384, USNM 259385
Tragulus javanicus	Tragulidae	4	FMNH 33530, USNM A49461, USNM A49462, USNM A49501
Tragulus kanchil	Tragulidae	4	FMNH 33522, FMNH 36725, FMNH 68767, FMNH 68778
Tragulus napu	Tragulidae	5	USNM 197682, USNM 317286, USNM 578462, USNM A49605, USNM A49871

Table S7: References used to obtain body mass data for each extant ruminant species. The species averages reported in these sources were used to generate the species averages used in this study. Organized by family then by subfamily when applicable.

Species	Mass (kg)	Tribe	Body Mass References
Antilocapridae			
Antilocapra americana	45.4		(11; 8; 51; 54)
Bovidae (Antilopinae)			
Aepyceros melampus	45.99	Aepycerotini	(6; 7; 11; 22; 27; 29; 31; 34; 35; 37; 54)
Connochaetes gnou	138.51	Alcelaphini	(7; 11; 22; 31; 35)
Connochaetes taurinus	185.92	Alcelaphini	(7; 22; 31; 35; 54)
Damaliscus lunatus	129.2	Alcelaphini	(6; 7; 31; 37)
Damaliscus pygargus	66.92	Alcelaphini	(7; 9; 11; 22; 31; 35; 48; 53; 54; 35)
Antidorcas marsupialis	31.82	Antilopini	(7; 9; 11; 22; 31; 35; 54)
Antilope cervicapra	29.57	Antilopini	(11; 17; 31; 35; 46)
Eudorcas rufifrons	28.5	Antilopini	(11; 31)
Eudorcas thomsonii	21.08	Antilopini	(7; 19; 31; 40; 54)
Gazella bennettii	16.96	Antilopini	(31; 35)
Gazella dorcas	17.46	Antilopini	(7; 9; 11; 24; 31; 35; 40; 54)
Gazella gazella	18.37	Antilopini	(11; 14; 31; 35)
Gazella spekei	16.28	Antilopini	(7; 14; 31; 35; 40)
Gazella subgutturosa	22.18	Antilopini	(11; 26; 31; 35; 39; 46; 40)
Litocranius walleri	38.88	Antilopini	(7; 11; 31; 34; 40; 54)
Madoqua guentheri	4.31	Antilopini	(7; 31)
Madoqua kirkii	4.71	Antilopini	(7; 11; 54; 24; 31; 35)
Madoqua saltiana	3.37	Antilopini	(7; 11; 31; 35)
Nanger dama	57.81	Antilopini	(7; 31; 35)
Nanger granti	56.37	Antilopini	(7; 19; 31; 34)
Nanger soemmerringii	36.77	Antilopini	(14; 35; 40; 7; 54; 31)
Ourebia ourebi	14.71	Antilopini	(6; 7; 11; 23; 31; 37; 38; 54)
Raphicerus campestris	11.29	Antilopini	(7; 11; 31; 53)
Raphicerus sharpei	9.2	Antilopini	(7; 31)
Saiga tatarica	35.33	Antilopini	(9; 11; 31; 54)
Ammotragus lervia	80.55	Caprini	(11; 31; 35; 54)
Budorcas taxicolor	334.76	Caprini	(25; 31)
Capra falconeri	62.65	Caprini	(31; 36)
Capra sibirica	95.34	Caprini	(11; 31; 36)
Capricornis crispus	43.03	Caprini	(31)
Capricornis sumatraensis	98.65	Caprini	(11; 31; 36)
Hemitragus jemlahicus	57.05	Caprini	(9; 31; 35; 36)
Naemorhedus goral	29.36	Caprini	(11; 31; 32; 36; 54)
Ovibos moschatus	262.83	Caprini	(11; 31; 35)
Ovis canadensis	70.82	Caprini	(31; 54)
Ovis dalli	84.6	Caprini	(9; 31)
Pseudois nayaur	51.83	Caprini	(11; 31; 36; 54)
Cephalophus silvicultor	64.1	Cephalophini	(7; 11; 15; 20; 31)
Philantomba monticola	4.7	Cephalophini	(11; 31; 35)
Sylvicapra grimmia	14.46	Cephalophini	(6; 7; 11; 22; 31; 35; 53)
Addax nasomaculatus	91.47	Hippotragini	(31; 35; 54; 7)
Hippotragus niger	218.6	Hippotragini	(7; 31; 54)
Oryx dammah	177.6	Hippotragini	(7; 31; 54)
Oryx gazella	175.88	Hippotragini	(7; 22; 31; 35)

Species	Mass (kg)	Tribe	Body Mass References
Oryx leucoryx	97.7	Hippotragini	(26; 31; 39; 54)
Nesotragus moschatus	6.83	Neotragini	(7; 11; 31; 54)
Oreotragus oreotragus	14.62	Oreotragini	(7; 11; 16; 31)
Kobus ellipsiprymnus	170.74	Reduncini	(6; 7; 23; 27; 31; 35; 37; 54)
Kobus megaceros	84.9	Reduncini	(7; 31)
Kobus vardonii	71.23	Reduncini	(7; 31)
Redunca arundinum	44.32	Reduncini	(6; 7; 11; 20; 22; 31; 37; 53)
Bovidae (Bovinae)			
Tetracerus quadricornis	19.26	Boselaphini	(11; 31; 33)
Bison bison	627.29	Bovini	(31; 54)
Bison bonasus	625.44	Bovini	(31; 35)
Bos javanicus	645.32	Bovini	(31; 35; 54)
Bos sauveli	791.32	Bovini	(31)
Bubalus depressicornis	178.32	Bovini	(11; 31; 35)
Bubalus mindorensis	254.39	Bovini	(31)
Tragelaphus angasii	94.44	Tragelaphini	(7; 22; 31; 35; 53; 54)
Tragelaphus eurycerus	233.67	Tragelaphini	(7; 31; 54)
Tragelaphus imberbis	90.89	Tragelaphini	(7; 27; 29; 31; 34; 54)
Tragelaphus scriptus	48.34	Tragelaphini	(6; 7; 11; 16; 20; 22; 23; 31; 35; 54)
Tragelaphus spekii	88.51	Tragelaphini	(7; 20; 31; 35; 54)
Cervidae (Capreolinae)			
Alces alces	408.18	Alceini	(9; 11; 31; 35; 51)
Capreolus capreolus	19.78	Capreolini	(11; 16; 23; 31; 35; 51)
Hydropotes inermis	12.14	Capreolini	(11; 31; 35; 51)
Blastocerus dichotomus	102.5	Odocoileni	(47; 31; 42; 43)
Mazama americana	24.22	Odocoileni	(11; 30; 31; 35; 18; 4; 5)
Mazama gouazoubira	16.43	Odocoileni	(47; 11; 31; 4; 5; 51; 35)
Mazama rufina	19.87	Odocoileni	(47; 30; 31)
Odocoileus hemionus	70.78	Odocoileni	(31; 51)
Odocoileus virginianus	93.46	Odocoileni	(11; 31; 51)
Ozotoceros bezoarticus	31.94	Odocoileni	(47; 11; 28; 31; 35; 51)
Pudu mephistophiles	9.6	Odocoileni	(31)
Pudu puda	10.11	Odocoileni	(11; 31; 35; 51)
Rangifer tarandus	108.17	Odocoileni	(9; 11; 31; 35; 51)
Cervidae (Cervinae)			
Axis axis	58.35	Cervini	(11; 31; 35; 36; 41; 49; 51; 54; 12; 17; 13)
Axis porcinus	34.27	Cervini	(31; 35; 12; 17; 13; 49)
Cervus elaphus	172.17	Cervini	(9; 11; 31; 35; 36; 51; 3)
Cervus nippon	42.8	Cervini	(9; 11; 31; 35; 51)
Dama dama	60.56	Cervini	(9; 11; 31; 51)
Elaphurus davidianus	163.3	Cervini	(9; 11; 31; 35)
Rucervus duvaucelii	174.07	Cervini	(17; 31; 12)
Rucervus eldii	97.74	Cervini	(31; 49)
Rusa marianna	49.46	Cervini	(31)
Rusa timorensis	57.34	Cervini	(31; 11; 51; 9)
Rusa unicolor	206.33	Cervini	(31; 36; 41; 13; 49; 51)
Elaphodus cephalophus	30.03	Muntiacini	(11; 31; 51)
Muntiacus atherodes	17.47	Muntiacini	(31; 49)
Muntiacus muntjak	20.65	Muntiacini	(9; 11; 31; 36; 12; 17; 13; 49; 51)
Muntiacus reevesi	14.67	Muntiacini	(31; 35; 51)

Species	Mass (kg)	Tribe	Body Mass References
Giraffidae			
Giraffa camelopardalis	845.38		(31; 54; 52; 34; 27; 6; 11)
Giraffa giraffa	845.38		(31; 54; 52; 34; 27; 6; 11)
Giraffa reticulata	845.38		(31; 54; 52; 34; 27; 6; 11)
Giraffa tippelskirchi	845.38		(31; 54; 52; 34; 27; 6; 11)
Okapia johnstoni	253.11		(9; 11; 20; 21; 54; 31)
Moschidae			
Moschus berezovskii	10.24		(31; 50)
Tragulidae			
Tragulus javanicus	2.43		(9; 10; 11; 45; 31; 49; 54)
Tragulus kanchil	2.67		(11; 45; 44)
Tragulus napu	5.32		(11; 45; 31; 49)

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