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Supplementary material

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Supplementary material

Incubation and rearing details for ruffs. Eggs were incubated at 37.5°C and 52% humidity in automatically turning table top incubators (Marsh Farms Roll-x® (Lyon Electric) and R-Con 50®). At 19 – 20 days of incubation, when eggs had clear star pips, they were moved to individual sections of non-turning hatchers, maintained at 37.2°C and 85% humidity. Hatchers were checked frequently, with a maximum of eight hour intervals, and newly hatched chicks were individually marked, weighted, and assigned approximate hatching times based on the stage of feather development. Chicks remained in hatchers ca. 12-24 hours post hatch, until they became active and interested in pecking. Chicks were then weighed and moved to ca. $0.5^3 m^3$ brooder boxes maintained at 37.2°C, with *ad libitum* water and food conditions, and artificial turf floors. Heterosexual groups of up to eight chicks were held together as randomly formed 'broods' of chicks hatching at the same time. Newly active chicks were initially presented with scattered dots of hard-boiled egg white and egg yolk pressed through a garlic press, scattered 26% protein gamebird starter and in later years 1mm pellets of 40% protein trout chow, and garlic press-processed bits of a "brown mixture" consisting of: 630g of commercial canned dog food (82% moisture, 8% wet weight protein), 226ml of powdered dry whole egg, 1000ml of 26% protein gamebird starter, 1000ml of 47% protein ground trout chow, and 113ml of vegetable oil. When chicks reached ca. 15-16g, at 2-3 days of age, they were moved to a ca. $0.5^3 m^3$ brooder box held at 35°C, and fed principally on the "brown food mixture". In some years and/or for some poorly growing individuals, small mealworms, fly maggots, or small crickets were added to the diet at this stage. As chicks reached 25-30 g and began to thermoregulate, they were moved to a run at ca. 21°C, with access to a heat lamp, and their diet was transitioned to a 16% protein poultry feed, which continued through fledging. The reduced

protein diet helps prevent twisting of carpal bones during the peak of primary feather growth (Kear 1973, personal observations).

Reference

Kear, J. 1973. International Zoo Yearbook. - Wiley Online Library.

Table A1 SNP information for sex and morph identification in ruffs. Contig and Position indicate the location of the SNP nucleotide base according to the e!Ensembl for "Ruff (*Calidris pugnax*)" (ASM143184v1; https://www.ensembl.org/Calidris_pugnax/Info/Index).

ID	Primer_AlleleFAM	Primer_AlleleHEX	AlleleFAM	AlleleHEX	Contig	Position
Z43Bruffsex1	TTTATACAAAGATCCATGGCTTGTGT	TTATACAAAGATCCATGGCTTGTGC	A (female)	G (male)	KQ482207	3802865
RuffSexD7	TTGGAAAGTAATGTTGAASCCCTAT	TGGAAAGTAATGTTGAASCCCTAG	A (male)	C (female)	KQ482207	3802762
SNP_Faed2	CCCCCTGCGCCTGCTGC	CCCCCCTGCGCCTGCTGT	C (Indep./ Sat.)	T (Faeder)	KQ482164	10201572
SNP_Faed1	GAGCACAGCACCACCTCCC	GGAGCACAGCACCACCTCCT	G (Indep./ Sat.)	A (Faeder)	KQ482164	10202461
SNP_Inv0	GTTTGCAGAACACAAAAGCTCG	CCTGTTTGCAGAACACAAAAGCTCA	G (Ancestral)	A (Inversion)	KQ482164	10229835
SNP_Faed3	AGCCAAGGGCAGCTTAATCAGTA	GCCAAGGGCAGCTTAATCAGTG	A (Indep./ Sat.)	G (Faeder)	KQ482164	7506730
SNP_Inv1	CAAAAATCACCCAAGCAGCTTCG	GCAAAAATCACCCAAGCAGCTTCA	G	A	KQ482164	6919925

			(Ancestral)	(Inversion)		
SNP_Inv3	AGGAGGTGGTTATTTTGGCTTCC	GAGGAGGTGGTTATTTTGGCTTCT	G (Ancestral)	A (Inversion)	KQ482164	6238245

Table A2 Priors used to determine model parameters (A: asymptote, K: growth coefficient and T_I: age at inflection point) in Logistic, Gompertz and Bertalanffy growth models in black coucals (BC), white-browed coucals (WBC) and ruffs.

species	sex	model	A (range)	K (range)	T_I (range)
body mass:					
BC	males	Logistic	90 (20–160)	0.20 (-0.05 – 0.33)	5 (1 – 20)
		Gompertz	90 (20–160)	0.14 (-0.03 – 0.02)	5 (1 – 20)
		Bertalanffy	90 (20–160)	0.11 (-0.03 – 0.02)	5 (1 – 20)
	females	Logistic	130 (40 – 220)	0.20 (-0.05 – 0.33)	5 (1 – 20)
		Gompertz	130 (40 – 220)	0.14 (-0.03 – 0.02)	5 (1 – 20)
		Bertalanffy	130 (40 – 220)	0.11 (-0.03 – 0.02)	5 (1 – 20)
WBC	males	Logistic	130 (40 – 220)	0.20 (-0.05 – 0.33)	5 (1 – 20)
		Gompertz	130 (40 – 220)	0.14 (-0.03 – 0.02)	5 (1 – 20)
		Bertalanffy	130 (40 – 220)	0.11 (-0.03 – 0.02)	5 (1 – 20)
	females	Logistic	130 (40 – 220)	0.20 (-0.05 – 0.33)	5 (1 – 20)
		Gompertz	130 (40 – 220)	0.14 (-0.03 – 0.02)	5 (1 – 20)
		Bertalanffy	130 (40 – 220)	0.11 (-0.03 – 0.02)	5 (1 – 20)
ruff	males	Logistic	125 (50–200)	0.20 (-0.05 – 0.33)	15 (1 – 30)
		Gompertz	125 (50–200)	0.14 (-0.03 – 0.02)	15 (1 – 30)
		Bertalanffy	125 (50–200)	0.11 (-0.03 – 0.02)	15 (1 – 30)
	females	Logistic	80 (40 – 120)	0.25 (-0.08 – 0.05)	7 (1 – 30)
		Gompertz	80 (40 – 120)	0.17 (-0.06 – 0.03)	7 (1 – 30)
		Bertalanffy	80 (40 – 120)	0.14 (-0.05 – 0.03)	7 (1 – 30)
tarsus:					
ruff	males	Logistic	50 (25 – 75)	0.50 (-0.13 – 0.08)	5 (1 – 20)
		Gompertz	50 (25 – 75)	0.34 (-0.08 – 0.06)	5 (1 – 20)
		Bertalanffy	50 (25 – 75)	0.28 (-0.07 – 0.05)	5 (1 – 20)
	females	Logistic	43 (23 – 63)	0.50 (-0.13 – 0.08)	5 (1 – 20)
		Gompertz	43 (23 – 63)	0.34 (-0.08 – 0.06)	5 (1 – 20)
		Bertalanffy	43 (23 – 63)	0.28 (-0.07 – 0.05)	5 (1 – 20)
bill:					
ruff	males	Logistic	35.3 (20.3 – 50.3)	0.50 (-0.13 – 0.08)	4 (1 – 20)
		Gompertz	35.3 (20.3 – 50.3)	0.34 (-0.08 – 0.06)	4 (1 – 20)
		Bertalanffy	35.3 (20.3 – 50.3)	0.28 (-0.07 – 0.05)	4 (1 – 20)
	females	Logistic	30.6 (15.6 – 45.6)	0.50 (-0.13 – 0.08)	3 (1 – 20)
		Gompertz	30.6 (15.6 – 45.6)	0.34 (-0.08 – 0.06)	3 (1 – 20)
		Bertalanffy	30.6 (15.6 – 45.6)	0.28 (-0.07 – 0.05)	3 (1 – 20)

Table A3 Summary of biometric measures obtained with GAMM growth models in males and females of black coucals, white-browed coucals, and ruffs. Means (95% CrI) are given. Adult values in ruffs include a larger data set with sample sizes indicated after the CrI. In black coucals and white-browed coucals, adult values were taken from Goymann et al. (2015).

	black coucals		white-browed coucals		ruffs	
	Males	Females	Males	Females	Males	Females
body mass:	N=210	N=197	N=178	N=170	N=212	N=220
value at hatching (W_0)	9.55 (6.71 – 12.51)	11.21 (7.78 – 14.67)	8.63 (5.14 – 12.52)	10.53 (6.56 – 14.26)	11.07 (5.77 – 19.01)	11.43 (7.33 – 15.66)
value at fledging (W_F)	65.93 (62.2 – 69.74)	79.69 (75.73 – 84.39)	86.38 (81.84 – 90.4)	93.07 (89.18 – 97.05)	108.1 (105.73 – 110.13)	73.84 (71.68 – 76.13)
value at inflection (W_I)	28.65 (25.37 – 32.4)	38.36 (34.7 – 42.42)	31.93 (27.83 – 35.79)	35.12 (31.01 – 38.93)	51.18 (48.09 – 54.34)	31.28 (29.26 – 33.98)
adult value (W_{Ad})	98.07 (95.09 – 100.92)	165.53 (163.17 – 168.02)	136.17 (132.86 – 139.57)	153.71 (149.45 – 158.20)	155.62 (150.66 – 160.79); 416	91.12 (88.24 – 94.23); 432
growth rate at hatching ($\bar{K}_0$)	4.83 (3.87 – 5.68)	4.75 (3.58 – 5.96)	5.26 (4.08 – 6.53)	5.49 (4.22 – 6.67)	-0.29 (-1.65 – 1.30)	-0.64 (-1.33 – (-0.03))
max. growth rate ($\bar{K}_{max}$)	6.17 (5.22 – 7.06)	7.13 (6.05 – 8.14)	7.83 (6.72 – 8.97)	8.14 (7.12 – 9.22)	6.41 (5.40 – 7.00)	4.69 (4.05 – 5.22)
growth rate at fledging ($\bar{K}_F$)	2.47 (0.78 – 4.13)	3.40 (1.61 – 5.13)	1.55 (-0.64 – 3.66)	1.89 (0.10 – 3.82)	2.76 (1.69 – 3.70)	1.48 (0.86 – 2.08)
age at inflection point ($\bar{t}_I$)	4 (2 – 6)	5 (2 – 6)	4 (2 – 5)	4 (3 – 5)	10 (8 – 13)	7 (6 – 8)
relative value at hatching (W_0/W_{Ad})	0.10 (0.07 – 0.13)	0.07 (0.05 – 0.09)	0.06 (0.04 – 0.09)	0.07 (0.04 – 0.09)	0.06 (0.03 – 0.10)	0.11 (0.09 – 0.13)
relative value at fledging (W_F/W_{Ad})	0.67 (0.63 – 0.71)	0.48 (0.46 – 0.51)	0.63 (0.60 – 0.66)	0.61 (0.58 – 0.63)	0.69 (0.67 – 0.71)	0.77 (0.75 – 0.80)
relative value at inflection (W_I/W_{Ad})	0.29 (0.26 – 0.33)	0.23 (0.21 – 0.26)	0.23 (0.20 – 0.26)	0.23 (0.20 – 0.25)	0.32 (0.31 – 0.34)	0.32 (0.31 – 0.34)
tarsus length:	N=210	N=197	N=178	N=170	N=70	N=50
value at hatching (W_0)	8.27 (7.60 – 9.00)	8.13 (7.37 – 8.89)	8.75 (8.07 – 9.52)	8.86 (8.15 – 9.54)	28.86 (25.29 – 31.83)	25.63 (23.33 – 27.58)
value at fledging (W_F)	28.53 (27.63 – 29.35)	29.7 (28.85 – 30.69)	30.25 (29.5 – 31.08)	31.07 (30.39 – 31.76)	53.06 (51.07 – 54.70)	43.38 (42.31 – 44.52)
value at inflection (W_I)	14.78 (14.02 – 15.61)	14.72 (13.94 – 15.53)	12.79 (12.13 – 13.62)	14.99 (14.24 – 15.68)	33.93 (31.45 – 36.35)	27.24 (25.05 – 29.05)
adult value (W_{Ad})	38.86 (38.51 – 39.17)	42.32 (42.05 – 42.57)	41.00 (40.67 – 41.33)	41.89 (41.45– 42.30)	50.43 (50.00 – 50.8); 203	42.98 (42.57 – 43.39); 206
growth rate at hatching ($\bar{K}_0$)	1.56 (1.36 – 1.75)	1.64 (1.41 – 1.87)	1.27 (1.10 – 1.44)	1.42 (1.27 – 1.57)	1.53 (1.11 – 1.98)	1.68 (1.37 – 2.08)
max. growth rate ($\bar{K}_{max}$)	1.79 (1.59 – 1.98)	2.00 (1.77 – 2.23)	1.99 (1.90 – 2.10)	2.01 (1.91 – 2.11)	2.13 (1.92 – 2.33)	1.71 (1.44 – 2.07)
growth rate at fledging ($\bar{K}_F$)	1.01 (0.69 – 1.34)	1.32 (0.96 – 1.70)	0.94 (0.68 – 1.19)	0.96 (0.64 – 1.27)	0.20 (-0.02 – 0.39)	0.05 (-0.20 – 0.35)
age at inflection point ($\bar{t}_I$)	4 (2 – 5)	4 (3 – 6)	3 (2 – 5)	4 (3 – 5)	3 (0 – 6)	2 (0 – 4)
relative value at hatching (W_0/W_{Ad})	0.21 (0.20 – 0.23)	0.19 (0.17 – 0.21)	0.21 (0.20 – 0.23)	0.21 (0.19 – 0.23)	0.56 (0.48 – 0.65)	0.58 (0.52 – 0.65)
relative value at fledging (W_F/W_{Ad})	0.73 (0.71 – 0.75)	0.70 (0.68 – 0.72)	0.74 (0.72 – 0.76)	0.74 (0.72 – 0.76)	1.05 (0.97 – 1.11)	1.00 (0.96 – 1.03)
relative value at inflection (W_I/W_{Ad})						
bill length:					N=70	N=50
value at hatching (W_0)					10.9 (9.7 – 12.3)	10.1 (8.6 – 11.9)
value at fledging (W_F)					28.0 (27.2 – 28.8)	25.7 (24.7 – 26.7)
value at inflection (W_I)					15.0 (14.0 – 16.0)	13.3 (12.0 – 14.8)
adult value (W_A)					50.4 (50.0 – 50.8); 203	43.0 (42.6 – 43.4); 206
growth rate at hatching ($\bar{K}_0$)					0.89 (0.63 – 1.16)	0.94 (0.78 – 1.11)
max. growth rate ($\bar{K}_{max}$)					1.15 (1.01 – 1.28)	1.09 (0.99 – 1.17)
growth rate at fledging ($\bar{K}_F$)					0.63 (0.48 – 0.75)	0.48 (0.39 – 0.56)
age at inflection point (t_I)					3 (0 – 6)	2 (0 – 4)
relative value at hatching (W_0/W_{Ad})					0.32 (0.24 – 0.42)	0.32 (0.25 – 0.39)
relative value at fledging (W_F/W_{Ad})					0.8 (0.73 – 0.88)	0.83 (0.77 – 0.88)
relative value at inflection (W_I/W_{Ad})					0.44 (0.37 – 0.52)	0.43 (0.37 – 0.48)

Table A4 Summary of mass parameters obtained with GAMM growth models for inter- and intrasexual size variation in ruffs.

Means (95% CrI) are given for morphs according to sex. Adult values include a larger data set with sample sizes indicated after the CrIs.

	Males			Females		
	Independents N=127	Satellites N=45	Faeders N=40	Independents N=138	Satellites N=49	Faeders N=33
mass at hatching (W_0)	15.68 (13.63 – 18.16)	12.17 (9.45 – 15.89)	11.91 (9.29 – 15.71)	12.07 (10.59 – 13.84)	10.85 (8.09 – 16.28)	11.89 (5.03 – 19.07)
mass at fledging (W_F)	120.27 (117.69 – 122.86)	113.21 (110.70 – 115.71)	101.46 (99.03 – 103.67)	77.53 (76.07 – 79.13)	73.37 (70.98 – 78.62)	62.49 (55.61 – 69.67)
mass at inflection (W_I)	63.58 (61.37 – 65.84)	54.71 (52.67 – 56.82)	42.69 (40.53 – 44.99)	32.11 (30.73 – 33.82)	33.18 (31.21 – 34.96)	26.35 (24.17 – 27.68)
adult value (W_A)	170.84 (168.49 – 173.42); 289	162.97 (159.09 – 166.97); 83	132.39 (128.15 – 136.91); 44	100.65 (98.26 – 103.03); 320	94.53 (90.72 – 98.33); 79	76.75 (71.65 – 81.73); 33
growth rate at hatching (K_0)	-0.14 (-0.69 – 0.45)	0.02 (-0.72 – 0.73)	-0.39 (-1.03 – 0.26)	-0.47 (-0.81 – (-0.11))	-0.43 (-0.99 – 0.07)	-0.44 (-1.03 – 0.16)
max. growth rate (K_{max})	7.07 (6.68 – 7.51)	6.72 (6.22 – 7.19)	6.32 (5.92 – 6.75)	5.00 (4.79 – 5.25)	4.61 (4.25 – 4.93)	4.23 (3.91 – 4.55)
growth rate at fledging (K_F)	4.05 (3.56 – 4.56)	3.00 (2.37 – 3.62)	1.90 (1.35 – 2.49)	1.62 (1.30 – 1.93)	1.37 (0.91 – 1.87)	1.23 (0.81 – 1.68)
age at inflection point (t_I)	11 (7 – 16)	10 (5 – 16)	8 (5 – 13)	7 (5 – 9)	7 (4 – 11)	6 (4 – 10)
relative value at hatching (W_0/W_{Ad} (%))	8.31 (5.95 – 10.46)	7.07 (3.30 – 9.72)	10.37 (8.05 – 14.08)	13.76 (11.64 – 16.06)	14.03 (10.38 – 17.66)	16.42 (13.60 – 18.92)
relative value at fledging (W_F/W_{Ad} (%))	69.95 (67.69 – 71.61)	69.77 (67.32 – 71.82)	78.35 (75.79 – 81.57)	79.37 (77.19 – 81.22)	80.85 (77.27 – 84.01)	83.90 (81.51 – 86.17)
relative value at inflection (W_I/W_{Ad} (%))	36.53 (34.31 – 38.25)	33.53 (30.57 – 35.54)	33.81 (31.59 – 37.24)	33.88 (31.87 – 35.76)	35.81 (32.34 – 39.01)	35.57 (33.17 – 37.71)

Table A5 Standard deviation of residuals and logarithm of the likelihood for each model. GAMMs had always the best fit compared to sigmoidal models as standard deviations and Loglikelihood values were closest to zero.

species	sex	model	Stand. Dev.	Loglikelihood
body mass:				
BC	males	GAMM	7.509414	-3389.818
		Logistic	7.992867	-3450.267
		Gompertz	8.002003	-3450.254
		Bertalanffy	8.011316	-3464.044
	females	GAMM	8.673274	-3307.727
		Logistic	9.326082	-3375.764
		Gompertz	9.163166	-3361.384
		Bertalanffy	8.837809	-3325.504
WBC	males	GAMM	9.959844	-3407.787
		Logistic	11.13674	-3519.088
		Gompertz	10.75013	-3483.401
		Bertalanffy	10.96879	-3523.576
	females	GAMM	11.11597	-3382.941
		Logistic	11.83183	-3438.04
		Gompertz	11.71689	-3431.643
		Bertalanffy	12.12048	-3471.618
ruff	males	GAMM	11.32201	-15385.81
		Logistic	11.6976	-15467.16
		Gompertz	12.25275	-15657.35
		Bertalanffy	12.69702	-15806.11
	females	GAMM	7.004496	-14612.87
		Logistic	7.21055	-14720.33
		Gompertz	7.272	-14770.88
		Bertalanffy	7.353855	-14832.06
tarsus:				
ruff	males	GAMM	3.926497	-1234.068
		Logistic	3.973078	-1283.087
		Gompertz	3.984456	-1273.498
		Bertalanffy	4.023005	-1292.516
	females	GAMM	2.038128	-841.262
		Logistic	2.233085	-906.9452
		Gompertz	2.409154	-955.9668
		Bertalanffy	2.417567	-952.9455
bill:				
ruff	males	GAMM	1.909997	-939.5998
		Logistic	2.178485	-1011.48
		Gompertz	2.187229	-1011.859
		Bertalanffy	2.305725	-1054.766
	females	GAMM	1.3689	-684.6862
		Logistic	1.459891	-722.2661
		Gompertz	1.471549	-724.4708
		Bertalanffy	1.541512	-771.3014

Table A6 Model parameters for logistic, Gompertz and Bertalanffy growth models in males and females of black coucals, white-browed coucals, and ruffs. Indicated are means with 95% CrI.

	Black coucals		White-browed coucals		Ruffs	
	Males	Females	Males	Females	Males	Females
body mass:	N=174	N=167	N=151	N=148	N=212	N=220
logistic asymptote (A_{SLog})	81.46 (78.95 – 83.76)	104.47 (101.10 – 107.65)	112.83 (109.10 – 116.61)	115.01 (111.40 – 118.80)	138.39 (133.77 – 143.15)	85.22 (82.38 – 87.97)
Gompertz asymptote (A_{SGomp})	95.70 (92.77 – 98.67)	123.80 (120.19 – 127.44)	127.69 (124.07 – 131.51)	131.74 (127.49 – 135.70)	160.53 (152.23 – 169.10)	92.86 (89.25 – 96.66)
Bertalanffy asymptote (A_{SBert})	103.90 (100.70 – 107.06)	136.25 (132.20 – 140.05)	134.76 (130.63 – 138.89)	139.43 (135.16 – 143.69)	173.88 (164.29 – 183.52)	97.97 (93.97 – 102.29)
Logistic slope coefficient (K_{Log})	0.31 (0.28 – 0.35)	0.30 (0.28 – 0.32)	0.31 (0.29 – 0.32)	0.32 (0.30 – 0.33)	0.22 (0.21 – 0.23)	0.22 (0.20 – 0.23)
Gompertz slope coefficient (K_{Gomp})	0.17 (0.15 – 0.19)	0.16 (0.15 – 0.16)	0.17 (0.17 – 0.18)	0.18 (0.17 – 0.19)	0.12 (0.11 – 0.13)	0.13 (0.12 – 0.14)
Bertalanffy slope coefficient (K_{Bert})	0.13 (0.12 – 0.14)	0.11 (0.11 – 0.12)	0.14 (0.13 – 0.14)	0.15 (0.13 – 0.16)	0.09 (0.08 – 0.10)	0.10 (0.09 – 0.11)
age at K_{Log} (T_{I_Log})	6.3 (6.0 – 6.7)	7.5 (7.1 – 7.8)	6.8 (6.5 – 7.1)	6.8 (6.3 – 7.3)	12.1 (11.2 – 12.9)	9.5 (8.8 – 10.3)
age at K_{Gomp} (T_{I_Gomp})	5.3 (5.0 – 5.5)	6.5 (6.2 – 6.8)	5.5 (5.1 – 5.8)	5.5 (5.1 – 5.9)	10.5 (9.5 – 11.5)	7.3 (6.6 – 8.0)
age at K_{Bert} (T_{I_Bert})	4.3 (4.0 – 4.6)	5.6 (5.3 – 5.9)	4.4 (4.1 – 4.7)	4.5 (4.1 – 4.8)	9.2 (8.3 – 10.2)	5.9 (5.3 – 6.6)
tarsus length:					N=70	N=50
logistic asymptote (A_{SLog})					53.67 (50.22 – 57.41)	43.45 (42.97 – 43.95)
Gompertz asymptote (A_{SGomp})					53.79 (49.83 – 57.48)	43.51 (43.05 – 43.95)
Bertalanffy asymptote (A_{SBert})					53.76 (50.14 – 57.59)	43.52 (43.05 – 43.96)
Logistic slope coefficient (K_{Log})					0.24 (0.18 – 0.31)	0.29 (0.21 – 0.37)
Gompertz slope coefficient (K_{Gomp})					0.20 (0.16 – 0.25)	0.28 (0.19 – 0.39)
Bertalanffy slope coefficient (K_{Bert})					0.20 (0.16 – 0.24)	0.27 (0.17 – 0.38)
age at K_{Log} (T_{I_Log})					1.2 (0.2 – 2.2)	-0.51 (-1.1 – 0.1)
age at K_{Gomp} (T_{I_Gomp})					-0.4 (-1.5 – 0.7)	-1.6 (-2.4 – (-0.8))
age at K_{Bert} (T_{I_Bert})					-1.0 (-2.3 – 0.2)	-1.9 (-3.1 – (-0.8))
bill length:					N=70	N=50
logistic asymptote (A_{SLog})					33.91 (32.52 – 35.29)	30.98 (30.35 – 31.63)
Gompertz asymptote (A_{SGomp})					34.00 (32.75 – 35.25)	31.08 (30.49 – 31.65)
Bertalanffy asymptote (A_{SBert})					33.62 (32.32 – 34.88)	30.97 (30.38 – 31.56)
Logistic slope coefficient (K_{Log})					0.14 (0.10 – 0.17)	0.12 (0.11 – 0.13)
Gompertz slope coefficient (K_{Gomp})					0.11 (0.08 – 0.15)	0.10 (0.09 – 0.11)
Bertalanffy slope coefficient (K_{Bert})					0.11 (0.08 – 0.14)	0.10 (0.09 – 0.11)
age at K_{Log} (T_{I_Log})					6.7 (5.5 – 7.9)	4.8 (3.8 – 5.7)
age at K_{Gomp} (T_{I_Gomp})					3.1 (2.1 – 4.2)	1.2 (0.2 – 2.2)
age at K_{Bert} (T_{I_Bert})					1.5 (0.5 – 2.5)	-0.3 (-1.3 – 0.7)

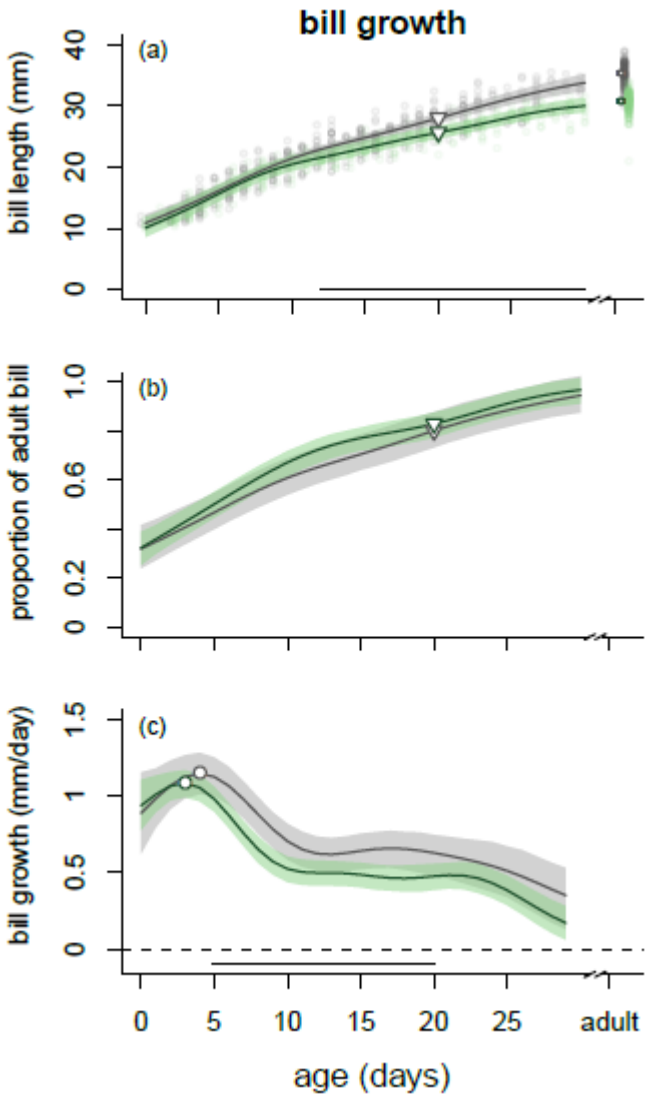

Fig. A1. Development of sexual size dimorphism in bill length in juvenile ruffs. Mean ± 95% CrI of males in grey and females in green. Open circles refer to points of maximal growth, whereas open triangles show absolute bill length at fledging, the developmental endpoint of the study, and relative to adult length. Black bars at the bottom of the plots indicate time-periods where means did not fall within the CrIs of the other sex.

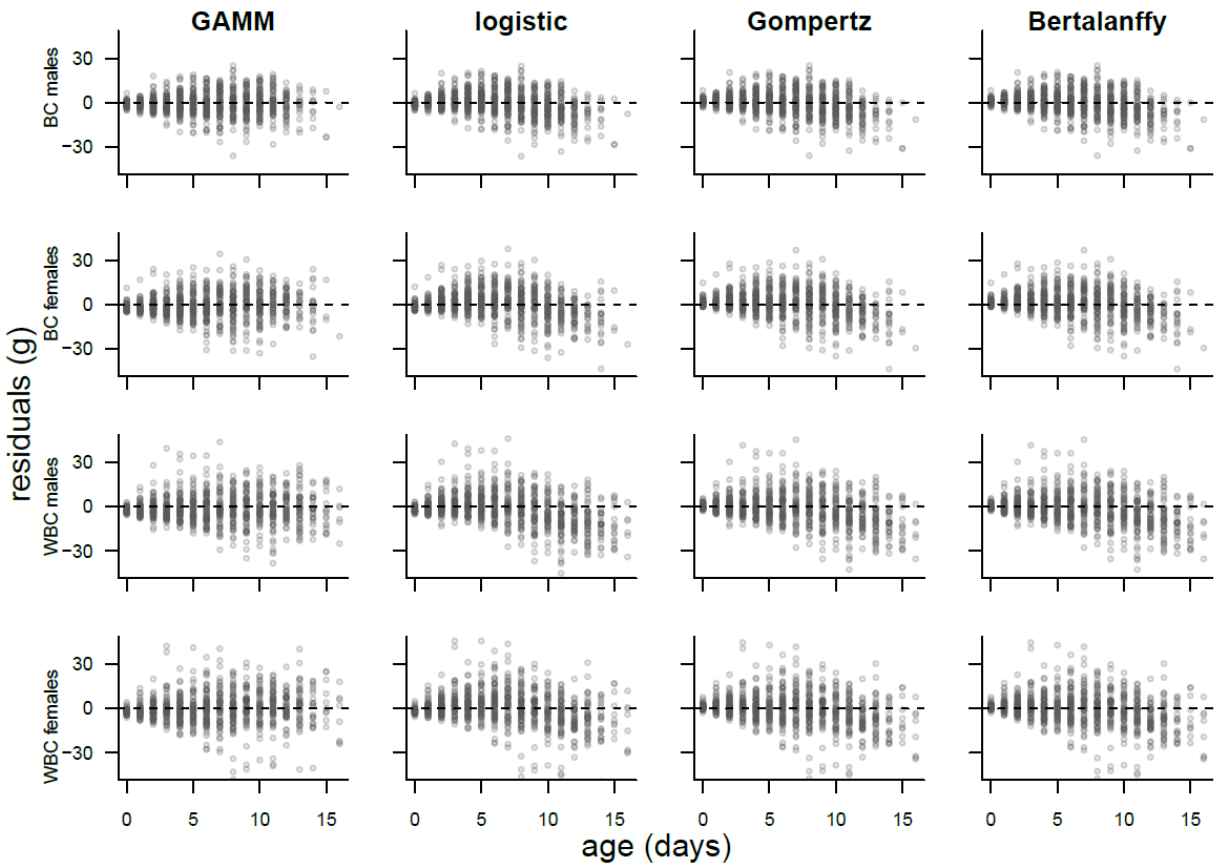

Fig. A2. **Comparison of fit for different growth models:** Residual distribution for body mass over the entire set of observations in black (BC) and white-browed coucals (WBC).

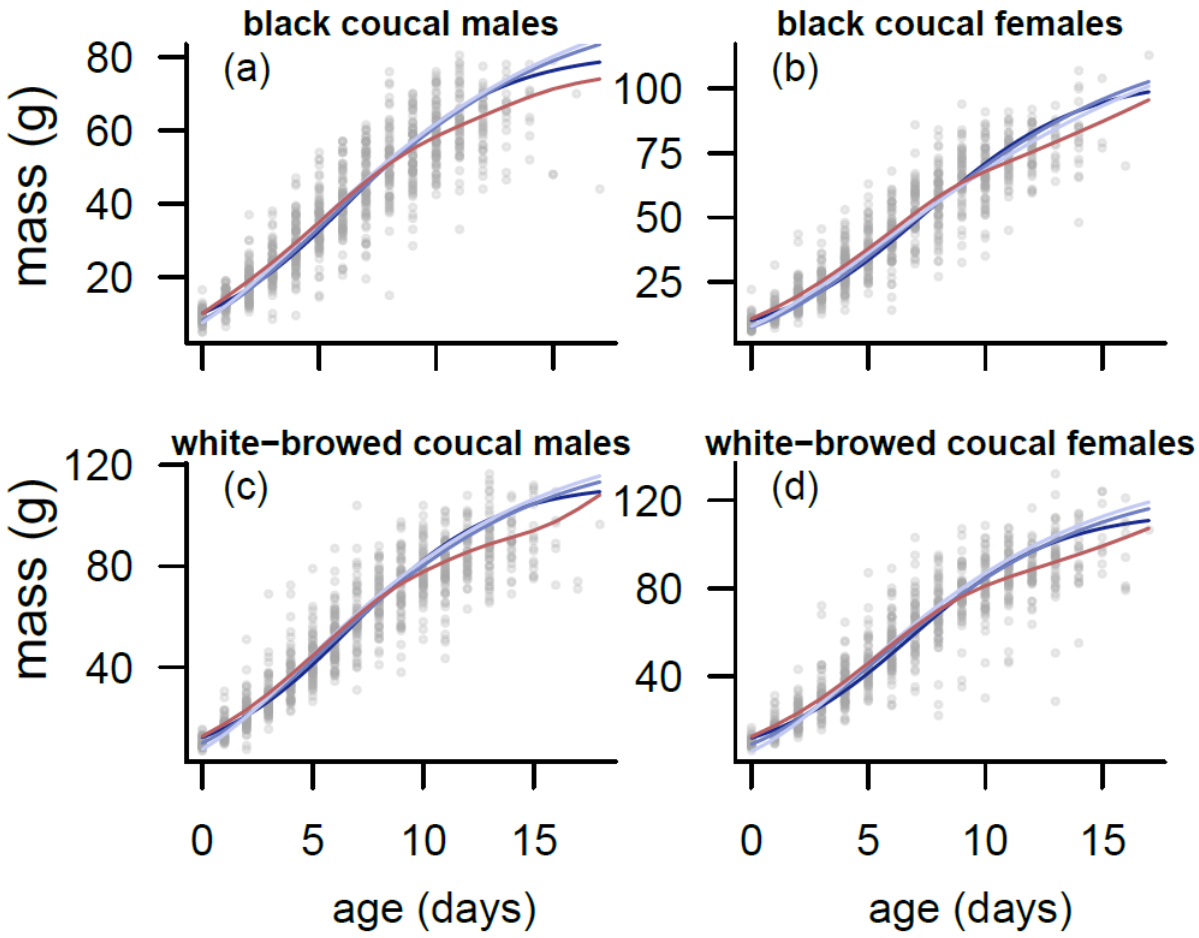

Fig. A3. **Comparison among different growth models:** Logistic (dark blue), Gompertz (blue), Bertalanffy (light blue) and GAMM (red). Mean values for each model for body mass of black and white-browed coucals.