

Table S1. Protein, lipid and carbohydrate content, and dry matter proportion for the two main prey of flamingos in the Camargue (*Artemias* and chironomid larvae).

	Artemias	Chironomids
Protein	0.56	0.50
Lipid	0.12	0.14
Carbohydrates	0.12	0.15
Water	0.87	0.87

Table S2. Example of climate data used for modelling flamingo daily energy requirements. Here we show data for the two years during which cold spells occurred, and for two 'normal' years (for 2012, only data for four months were available).

Year	Month	Air Temperature (°C)		Relative Humidity (%)		Wind speed (m s ⁻¹)		Cloud cover (%)	
		Min	Max	Min	Max	Min	Max	Min	Max
1985	Jan.	-1.89	6.45	54.51	78.87	3.03	14.8	0	1
	Feb.	4.35	13.28	60	88.21	1.5	10.75	0	1
	March	4.34	12.43	58.87	82.58	3.16	15.12	0	1
	April	8.48	18.72	47.5	81.16	2.76	15.33	0	1
	May	11.04	19.78	58.54	87.58	1.29	10.54	0	1
	June	14.45	24.86	50	81.16	1.93	11.66	0	1
	July	17.9	29.44	53.38	82.58	1.16	10.83	0	1
	August	16.18	27.38	52.9	83.38	1.45	11.38	0	1
	Sept.	14.57	27.31	50	86.33	1.6	10.33	0	1
	Oct.	11.58	21.35	60.32	89.35	2.5	12.25	0	1
	Nov.	3.55	11.18	58	82.66	3	13.92	0	1
	Dec.	4.73	12.29	70.8	87.9	3.12	13.16	0	1
2012	Jan.	3.65	12.39	51.65	84.26	2.2	13.58	0	1
	Feb.	-0.32	8.1	34.24	66.48	5.5	21.36	0	1
	March	6.53	17.87	40.19	84.13	1.74	13.7	0	1
	April	9.24	17.47	47.7	84.9	2.15	16.67	0	1
1984	Jan.	2.15	10.57	65.32	87.9	1.48	12.58	0	1
	Feb.	1.74	10.33	58.27	84.13	2.62	13.86	0	1
	March	3.95	13.01	53.87	82.9	4.06	16.19	0	1
	April	5.93	17.92	42.66	81	2.43	14.5	0	1
	May	9.36	18.55	55.8	85.8	2.64	13.35	0	1
	June	14.09	25.41	48.33	83.83	1.86	12.76	0	1
	July	16.55	28.16	56.29	83.38	2.7	13.35	0	1
	August	16.17	27.38	50.64	85.48	2	11.64	0	1
	Sept.	13.41	23.3	51.33	85.83	1.8	12.36	0	1
	Oct.	9.96	20.06	59.67	91.29	2.32	12.22	0	1
	Nov.	8.19	16.96	63.5	87.66	1.86	11.73	0	1
	Dec.	3.14	11.59	65.96	87.58	2.22	12.35	0	1
2011	Jan.	2.84	9.95	62.81	86.26	2.91	13.68	0	1
	Feb.	4.55	12.62	56.39	86.68	1.84	13.46	0	1
	March	6.3	15.39	53.68	88.06	1.54	12.89	0	1
	April	10.16	21.5	38.37	87.9	1.22	12.9	0	1

May	13.15	25.03	34.55	87.03	1	13.1	0	1
June	15.81	25.27	44.17	86.03	1.26	12.64	0	1
July	17.08	27.24	39.26	82.71	1.64	13.25	0	1
August	16.88	28.68	42.61	90.52	0.74	10.78	0	1
Sept.	15.48	27.07	43.4	90.57	0.86	10.94	0	1
Oct.	11.4	21.99	45.06	86.61	1.88	13.08	0	1
Nov.	10.32	16.65	65.17	90.27	1.64	11.83	0	1
Dec.	5.04	13.16	56.26	87.68	1.3	13.45	0	1

Table S3. Sensitivity analysis for estimated flamingo energy requirements, expressed as the % increase (positive value), or decrease (negative value) of the average daily energy expenditure (kJ d^{-1}). +10% and -10% mean climatic parameters and mean adult input parameters are used to simulate variable input. Significant variations in energy requirements ($>1\%$) are in bold. For climatic parameters, the minimum and maximum considered do not include values from cold spells.

Parameter	Average for males and females		Males		Females	
	Min/-10%	Max/+10%	Min/-10%	Max/+10%	Min/-10%	Max/+10%
Morphology						
Feathers length	0.48	-0.41	0.53	-0.40	0.55	-0.42
Feathers diameter	0.081	0.14	0.053	0.18	0.10	0.11
Plumage depth	3.97	-3.54	3.99	-3.54	3.97	-3.55
Plumage density	0.37	-0.23	0.35	-0.22	0.38	-0.25
Plumage reflectivity	-0.058	0.069	-0.054	0.00	-0.064	0.073
Body dimensions	-10.29	10.99	-10.16	10.79	-10.64	11.18
Physiology						
Body temperature	-4.44	12.10	-4.33	11.80	-4.58	12.49
O ₂ extraction efficiency	0.94	-0.74	0.93	-0.73	0.96	-0.75
Digestive time	0.00	0.00	0.00	0.00	0.00	0.00
Flight parameters						
Fly altitude	0.011	-0.011	0.01	-0.01	0.012	-0.12
Flight velocity	0.00	0.51	-0.52	0.46	-0.64	0.57
Time spent flying	-0.32	0.32	-0.37	0.37	-0.26	0.26
Flight metabolism	-0.34	0.34	-0.39	0.39	0.00	-0.26

Climatic parameters

Air temperature	6.15	-9.15	5.99	-8.95	6.35	-9.41
Relative humidity	-0.16	0.22	-0.15	0.21	-0.16	0.23
Wind speed	-0.0084	-0.001	-0.012	0.00091	-0.0032	-0.0015

Table S4. Sensitivity analysis for estimated flamingo energy requirements for birds wintering in the Camargue in January 1985 and February 2012. Variability is expressed as the % increase (positive value), or decrease (negative value) of the average daily energy expenditure (kJ d^{-1}). +10% and -10% mean climatic parameters and mean adult input parameters are used to simulate variable input. Mean parameters values for males and females confounded are used. Significant variations in energy requirements (superior to 1%) are in bold.

Parameters	January 1985		February 2012	
	Min/-10%	Max/+10%	Min/-10%	Max/10%
Morphology				
Feathers length	0.47	-0.40	0.48	-0.40
Feathers diameter	0.019	0.210	0.024	0.200
Plumage depth	4.33	-3.85	4.30	-3.83
Plumage density	0.34	-0.20	0.34	-0.21
Plumage reflectivity	-0.023	0.017	-0.031	0.023
Body dimensions	-11.63	12.42	-11.50	12.28
Physiology				
Body temperature	-3.32	9.04	-3.41	9.30
O ₂ extraction efficiency	0.49	-0.40	0.52	-0.42
Digestive time	0.00	0.00	0.00	0.00
Flight parameters				
Fly altitude	0.013	-0.013	0.013	-0.013
Flight velocity	-0.81	0.73	-0.78	0.70
Time spent flying	-0.24	0.24	-0.25	0.25

Flight metabolism	-0.26	0.26	-0.26	0.26
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