

Individual	Age	$\delta^{13}\text{C}_{\text{breathCO}}$ (‰)	$\delta^{13}\text{C}_{\text{breathCO}}$ $\delta^{13}\text{C}_{\text{start}}$ (‰)	c (min^{-1})	t_{50} (min)
2	Juvenile	-25.1	-4.4	-0.00908	76.3
5	Juvenile	-26.9	-3.2	-0.03879	17.9
7	Juvenile	-22.8	-5.9	-0.02209	31.4
8	Juvenile	-20.7	-8.7	-0.02036	34.0
9	Juvenile	-21.1	-7.4	-0.02233	31.0
10	Juvenile	-23.7	-4.4	-0.01145	60.6
11	Juvenile	-20.4	-7.7	-0.00825	84.0
12	Juvenile	-24.3	-4.7	-0.02899	23.9
mean \pm s.d.		-23.1 ± 2.3	-5.80 ± 2.0	-0.02017 ± 0.01232	44.9 ± 25.2
13	Subadult	-18.2	-10.4	-0.01842	37.6
14	Subadult	-22.2	-5.8	-0.01802	38.5
15	Subadult	-15.6	-12.6	-0.00604	114.7
16	Subadult	-14.0	-13.4	-0.00405	171.3
17	Subadult	-20.3	-8.0	-0.01285	53.9
18	Subadult	-18.4	-7.9	-0.01694	40.9
20	Subadult	-17.7	-9.8	-0.02486	27.9
mean \pm s.d.		-18.0 ± 2.7	-9.7 ± 2.6	-0.01445 ± 0.00735	69.3 ± 53.5
21	Adult	-22.2	-7.3	-0.01382	50.2
22	Adult	-24.3	-5.3	-0.02445	28.4
23	Adult	-21.1	-7.9	-0.02733	25.4
24	Adult	-20.6	-10.1	-0.04667	14.9
25	Adult	-26.0	-3.9	-0.01588	43.7
26	Adult	-20.3	-8.9	-0.01685	41.2
27	Adult	-24.8	-4.6	-0.00858	80.8
28	Adult	-26.9	-1.6	-0.03307	21.0
mean \pm s.d.		-23.3 ± 2.6	-6.2 ± 2.9	-0.02333 ± 0.01232	38.2 ± 21.1

Table S1: Individual parameters for the one-pool exponential model for the incorporation rate

experiment. $\delta^{13}\text{C}_{\text{breathCO}}$, asymptotic stable carbon isotope ratio of exhaled CO_2 when animals were equilibrated to the stable carbon isotope signature of the C4 diet; $\delta^{13}\text{C}_{\text{start}}$, stable carbon isotope ratio of the exhaled CO_2 at time 0; c, rate constant of isotopic incorporation into the metabolism; t_{50} , time at which 50% of the carbon atoms in the metabolism have been exchanged. Mean values and standard deviation are presented for each age/size class.

Individual	Age	$\delta^{13}\text{C}_{\text{breath}\infty}$ (‰)	$\delta^{13}\text{C}_{\text{breath}\infty}$ $\delta^{13}\text{C}_{\text{start}}$ (‰)	c (h ⁻¹)	t ₅₀ (h)
1	Juvenile	-19.0	-11.5	-0.10511	6.6
2	Juvenile	-17.6	-12.4	-0.17574	3.9
6	Juvenile	-17.9	-12.3	-0.17545	4.0
7	Juvenile	-17.3	-11.0	-0.07754	8.9
8	Juvenile	-18.3	-9.4	-0.13608	5.1
9	Juvenile	-17.8	-9.8	-0.11695	5.9
10	Juvenile	-17.6	-10.4	-0.13448	5.2
11	Juvenile	-18.0	-9.3	-0.11347	6.1
12	Juvenile	-18.0	-11.3	-0.19921	3.5
mean ± s.d.		-17.8 ± 0.3	-10.8 ± 1.7	-0.31711 ± 0.03931	5.5 ± 1.7
13	Subadult	-18.2	-9.9	-0.83240	0.8
14	Subadult	-17.9	-9.6	-0.29140	2.4
15	Subadult	-17.8	-8.8	-0.18840	3.9
16	Subadult	-18.0	-9.2	-0.46469	1.5
17	Subadult	-17.7	-9.4	-0.27942	2.5
19	Subadult	-18.0	-9.1	-0.16791	4.1
20	Subadult	-17.4	-9.8	-0.94850	0.7
21	Subadult	-20.2	-6.9	-0.53890	1.3
mean ± s.d.		-18.1 ± 0.9	-9.1 ± 1.0	-0.46395 ± 0.29364	2.1 ± 1.3
21	Adult	-17.3	-9.7	-0.04716	14.7
22	Adult	-17.5	-11.1	-0.08920	7.8
23	Adult	-17.7	-10.6	-0.33492	2.1
24	Adult	-18.6	-11.5	-0.36810	1.9
26	Adult	-18.0	-10.1	-0.26446	2.6
27	Adult	-17.4	-12.2	-0.20171	3.4
28	Adult	-17.3	-12.0	-0.16263	4.3
29	Adult	-17.4	-11.2	-0.22911	3.0
mean ± s.d.		-17.6 ± 0.5	-11.1 ± 0.9	-0.21216 ± 0.11169	5.0 ± 4.4
mean ± s.d. excluding Indiv. 21		-17.7 ± 0.5	-11.2 ± 0.7	-0.23573 ± 0.09678	3.6 ± 2.1

Table S2: Individual parameters for the one-pool exponential model for the fat

turnover experiment. $\delta^{13}\text{C}_{\text{breath}\infty}$, asymptotic stable carbon isotope ratio of exhaled CO₂ when animals were equilibrated to the stable carbon isotope signature of the C4 diet; $\delta^{13}\text{C}_{\text{start}}$, stable carbon isotope ratio of the exhaled CO₂ at time 0; c, rate constant of isotopic incorporation into the metabolism; t₅₀, time at which 50% of the carbon atoms in the metabolism have been exchanged. Mean values and standard deviation are presented for each age/size class.

Individual	Age	Capture mass (g)	Skull height (mm)	Tooth row (mm)	Capture mass (Standardised)	Skull height (Standardised)	$\delta^{13}\text{C}_{\text{start}}$ (‰)
1	Juvenile	7.86	6.134	6.873	1.144	0.892	-29.1
2	Juvenile	8.17	6.218	7.039	1.161	0.883	-29.7
3	Juvenile	8.16	5.860	7.163	1.139	0.818	-29.1
4	Juvenile	7.58	6.453	7.306	1.038	0.883	-30.1
5	Juvenile	7.43	6.841	7.912	0.939	0.865	-29.6
6	Juvenile	8.31	5.763	7.135	1.165	0.808	-28.9
7	Juvenile	8.33	6.432	7.069	1.178	0.910	-28.3
8	Juvenile	7.98	6.371	7.051	1.132	0.904	-28.9
9	Juvenile	7.31	6.338	7.105	1.029	0.892	-28.2
10	Juvenile	6.62	6.510	6.648	0.996	0.979	-28.2
11	Juvenile	7.11	7.094	7.399	0.961	0.959	-28.0
12	Juvenile	7.22	6.092	7.074	1.021	0.861	-28.8
mean \pm s.d.	mean	7.67 \pm 0.55	6.341 \pm 0.376	7.148 \pm 0.306	1.075 \pm 0.087	0.888 \pm 0.049	-28.9 \pm 0.7
13	Subadult	6.81	4.723	7.108	0.958	0.664	-28.1
14	Subadult	7.56	5.410	7.462	1.013	0.725	-27.3
15	Subadult	6.99	5.267	7.460	0.937	0.706	-27.5
16	Subadult	7.00	5.016	6.987	1.002	0.718	-27.2
17	Subadult	6.60	5.743	7.341	0.899	0.782	-27.2
18	Subadult	6.16	5.007	7.102	0.867	0.705	-26.3
19	Subadult	8.08	5.551	7.421	1.089	0.748	-27.0
20	Subadult	6.41	5.512	7.266	0.882	0.759	-27.2
21	Subadult	7.93	5.788	7.437	1.066	0.778	-27.0
mean \pm s.d.	mean	7.06 \pm 0.67	5.335 \pm 0.361	7.287 \pm 0.180	0.968 \pm 0.080	0.732 \pm 0.038	-27.2 \pm 0.5
21	Adult	13.28	5.470	7.373	1.801	0.742	-29.2
22	Adult	11.01	5.365	7.000	1.573	0.766	-29.1
23	Adult	11.19	5.870	7.069	1.583	0.830	-28.4
24	Adult	14.26	5.996	6.964	2.048	0.861	-30.1
25	Adult	15.91	5.574	6.924	2.298	0.805	-29.5
26	Adult	12.68	5.770	7.106	1.784	0.812	-28.5
27	Adult	10.37	5.607	6.926	1.497	0.810	-29.0
28	Adult	12.56	5.527	7.343	1.710	0.753	-28.2
29	Adult	12.11	5.187	7.005	1.729	0.740	-28.1
mean \pm s.d.	mean	12.60 \pm 1.73	5.596 \pm 0.252	7.079 \pm 0.169	1.780 \pm 0.252	0.791 \pm 0.043	-28.9 \pm 0.7

Table S3: Individual morphological measurements, standardised values of all caught

individuals and $\delta^{13}\text{C}_{\text{start}}$ values. Skull height and length of tooth row was determined by measurements in x-ray images. For standardisation capture mass and skull height was divided by tooth row, which does not change with the age. $\delta^{13}\text{C}_{\text{start}}$ is the stable carbon isotope signature at the 0 min-baseline sample. Mean values and standard deviation are presented for each age/size class. Comparisons of the three age/size classes are also presented in the Supplemental Fig. S1C and D.

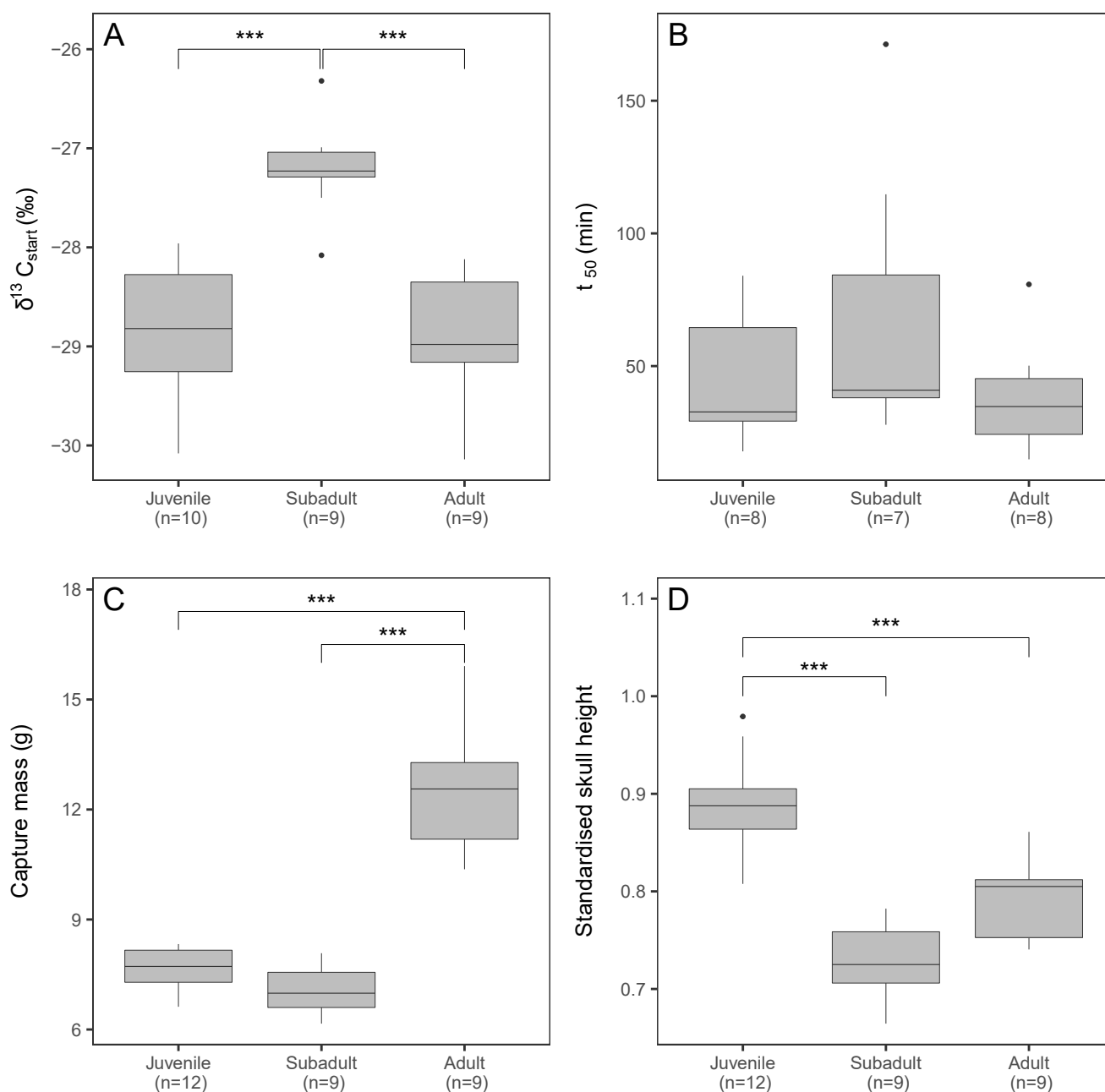


Fig. S1: Comparison of different parameters in the three seasons/age classes.

A) $\delta^{13}C_{start}$ values. The isotopic signature of the natural diet changes between the seasons. Subadults were caught in January/February and show a significant different carbon isotope signature compared to individuals caught in June (juveniles) or April/May (adults). **B) t_{50} values for the incorporation rate experiment.** There are no significant differences between the three age/size classes, indicating that the incorporation rate is independent of the age and Dehnel stage of the shrew. **C) Capture mass.** Adult individuals differ significantly from juvenile individuals and subadult individuals. **D) Standardised skull height.** The study animals show Dehnel's phenomenon with a significant decrease in standardised skull height from juvenile to subadult individuals. Box margins indicate the 25 and 75 percentiles, solid lines within the boxes show the median. Sample sizes are given below each age/size class. Significant differences ($p < 0.05$) are indicated by stars above the boxes. Outliers are indicated as black dots.

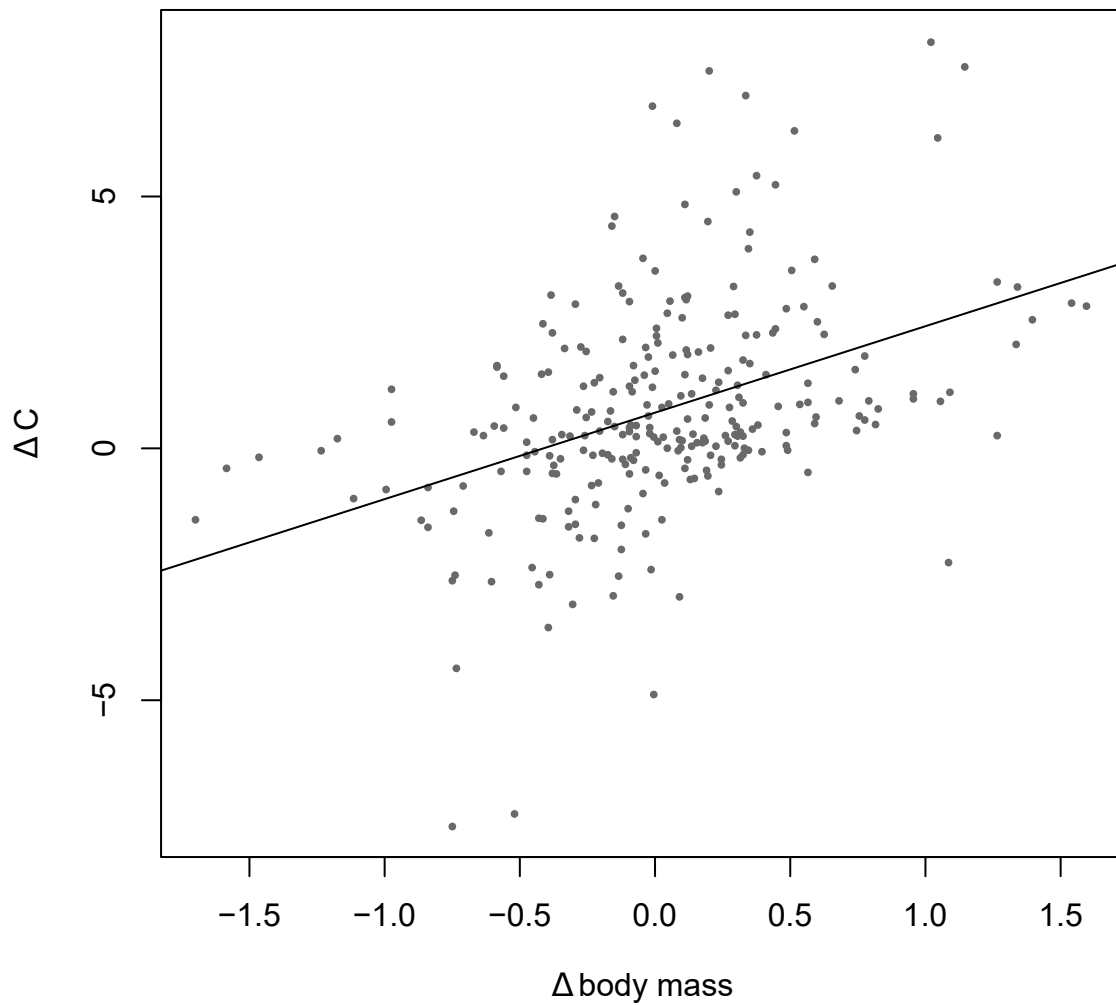


Fig. S2: Correlation between change in body mass and change in $\delta^{13}\text{C}_{\text{breath}}$. There is a positive correlation ($\rho=0.415$, $p<0.001$) between the body mass change (Δ body mass) and the change in $\delta^{13}\text{C}_{\text{breath}}$ (ΔC) in *S. araneus* from one sampling to the next. The stable carbon isotope signature in the breath drops when the animals lose body mass and increases when the animals gain weight. This could indicate that the shrews use different sources of substrate to fuel the metabolism depending on the body condition of the animal.