

Using stable isotope signatures of vibrissae and ingested milk from young Steller sea lions to monitor changes in the diet their lactating mothers

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The carbon (¹³C) and nitrogen (¹⁵N) isotopic signature of vibrissae and ingested milk collected from young Steller sea lions (*Eumetopias jubatus*) in Prince William Sound, Alaska (PWS; n=15 vibrissae & 19 milk) and in Southeast Alaska (SEA; n=25 vibrissae & 27 milk) were analyzed to examine changes in the trophic profile of the diet of young sea lions. PWS animals were sampled twice, first at 5 and then 9.5 months of age. The growth rate of vibrissae between captures was 0.80 ± 0.18 mm/month (range 0.44 to 1.04 mm/month). While young sea lions are maternally dependent, vibrissae ¹³C and ¹⁵N signatures directly reflect the milk diet that is ingested (with a 2.0‰ and 2.5‰ enrichment in C and N respectively), and thus can be used to infer the diet of the lactating female at the time of milk production. Strong seasonal changes in the ¹³C and ¹⁵N profiles of pup vibrissae in SEA suggest that adult females switch to a higher trophic level diet (with a resulting 1.8 to 4.3 ‰ enrichment of ¹⁵N, mean 2.6 ± 0.6 ‰ ¹⁵N) after they leave the breeding rookeries on the outer coast to continue raising pups at more inshore haulout locations. This pattern closely reflected changes in the C/N profile of ingested milk samples collected from pups 2 to 11 months of age. In PWS, seasonal fluctuation were distinguishable in the C/N ratios of vibrissae of pups, however the uneven seasonal distribution of milk samples collected in PWS makes it difficult to confirm that these changes were the result of seasonal shifts in the diet of lactating females. Fatty acid signature analysis performed on ingested milk samples collected in PWS (n=16) and SEA (n=49) also support that lactating females changed diet seasonally in both PWS and SEA.

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