

Gulf of Alaska - Marine Mammals

Investigating Regional Differences in Nutritional Metabolites of Young Steller Sea Lions in Alaska

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The decline of the western stock of Steller sea lions (*Eumetopias jubatus*) since the 1970's prompted seasonal monitoring of health indices to assess nutritional stress using blood metabolites known to change predictably when animals are food deprived. Blood samples were collected from free-ranging sea lions captured at rookeries and haulouts in the Aleutian Islands (AL), Gulf of Alaska (GOA), Prince William Sound (PWS), and Southeast Alaska (SE) from July 1998 to April 2005 (n=674). Plasma ketone bodies (β -HBA) and blood urea nitrogen (BUN) were measured spectrophotometrically. Pups (2 to 11 mo) and juveniles (12 to 48 mo) were grouped into trimesters to elucidate changes in feeding and fasting behavior during maturation. Consistent differences in β -HBA ([β -HBA]) and BUN ([BUN]) concentrations were evident between pups and juveniles within region (ANOVA with Tukey-Kramer; $\alpha=0.05$). Pups from GOA (0.385 ± 0.219 , n=40), PWS (0.330 ± 0.182 , n=174) and SE (0.245 ± 0.174 , n=150) had higher [β -HBA] than juveniles (GOA: 0.191 ± 0.158 , n=16; PWS: 0.128 ± 0.120 , n=82; SE: 0.150 ± 0.126 , n=127) ($p < 0.002$). Over 48% of 8-10 month old pups from all regions had [β -HBA] above 0.3mM, a threshold indicative of fasting in pups; and consistent with longer maternal foraging bouts necessary to support larger late-lactation pups in the winter. However, low [BUN] indicated adaptive, short-term fasting rather than Phase III or "starvation". Juveniles from AL (14.41 ± 9.13 , n=7), PWS (8.69 ± 4.17 , n=80) and SE (8.70 ± 5.65 , n=128) had higher [BUN] than pups (AL: 6.23 ± 3.47 , n=74; PWS: 5.37 ± 2.44 , n=174; SE: 6.92 ± 3.28 , n=153) ($p < 0.001$) presumably due to a higher protein fish diet versus milk ingestion by younger animals. With few notable exceptions, there were no consistent differences in plasma β -HBA and BUN concentrations between regions, suggesting there was no evidence of consistent long-term fasting in animals from the declining western stock. The high degree of variability of β -HBA and BUN concentrations in the 11-13 mo and 23-25 mo samples is coincident with the June-July pupping season when mothers are likely to dedicate the majority of their lactation resources to new pups.



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