

PHYSIOLOGICAL DEVELOPMENT IN JUVENILE HARBOR SEALS

Burns, J. M.¹, Costa, D. P.¹, Harvey, J. T.², Frost, K.³

(1) Institute of Marine Science, University of California, Santa Cruz, CA 95064
First Author Address: Institute of Marine Science, EMS 316A, University of California, Santa Cruz, CA, 95064, USA

(2) Moss Landing Marine Laboratories, Moss Landing, CA 95039

(3) Alaska Department of Fish and Game, Fairbanks, AK 99701

Harbor seal (*Phoca vitulina*) pups are one of the most precocial of all phocids. Pups can swim and dive at birth and do so regularly throughout the lactation period. Such behavioral maturity suggests that neonatal harbor seal pups may also be more physiologically mature than those of species with delayed diving activity. To test this hypothesis, we measured the blood and muscle oxygen stores of harbor seal pups, yearlings, and adults, and compared resulting estimates across age classes. Hematocrit and hemoglobin values were lower in neonates ($55 \pm 0.2\%$, 21.7 ± 0.4 g% respectively), but reached adult values ($57 \pm 0.2\%$, 23.8 ± 0.3 g%) by the time pups were weaned. In contrast, mass specific blood volume did not increase during the lactation interval and remained lower than adult values until after pups were weaned ($12.9 \pm 0.2\%$ vs. $15.9 \pm 0.3\%$). Muscle myoglobin load was low in neonates (1.4 ± 0.2 g%), increased during the lactation and post-weaning period, but did not reach adult values (4.1 ± 0.4 g%) within the first year. When combined with estimates of lung oxygen stores, these results indicate that the mass specific body oxygen stores of weaned pups and yearlings were lower than those of adults (by approximately 25% and 10% respectively). Comparisons with similar data from other phocids suggests both that the rate of physiological development is closely tied to the length of the

lactation period, and that the early aquatic activity of harbor seal pups is supported more through early modification of blood oxygen stores than those within the muscle. As a result of immature oxygen stores and high metabolic rates, harbor seal juveniles have lower mass specific aerobic dive capacities than do older age classes. This limitation has the potential to significantly impact their foraging ecology.

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ABSTRACTS

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