

Thyroid and Cortisol hormones as an indication of metabolic function and well-being in Steller sea lions (*Eumetopias jubatus*)

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The purpose of this study was to investigate serum thyroid and cortisol concentrations in Steller sea lions. Seasonal concentrations were examined in captive and free-ranging sea lions in an attempt to develop a suite of measurements that provide a reliable index by which an animal's metabolic status could be measured. Thyroid hormones, thyroxine (T4) and triiodothyronine (T3), function primarily to regulate metabolism and contribute to the maintenance of homeostasis in mammals. Seasonal variation in captive sea lions (non-pups) of both thyroid hormones indicated enhancement of the metabolic rate in summer. However, these animals are kept in a stable environment with a prescribed diet. Total T4 hormones from free-ranging sea lions (non-pups) were elevated (mean 15.98 ng/ml \pm 6.44ng/ml) above captives (mean 12.41 ng/ml \pm 6.98 ng/ml), indicating environmental impacts on metabolism beyond those experienced by captive animals. Cortisol can be elevated in association with changes in an animal's environment and is used here as a barometer of stress in sub-populations. Interestingly, cortisol concentrations were also elevated in summer months in captive sea lions (non-pups). Cortisol concentrations from free-ranging sea lions (non-pups) were elevated (mean 99.13 ng/ml \pm 47.24 ng/ml) above captives (mean 80.78 ng/ml \pm 33.66 ng/ml) suggesting environmental impacts on the well-being of free-ranging sea lions (non-pups). A pup comparison between two subsequent years (2000 and 2001) revealed significant inter-annual differences. Average cortisol concentration in Western stock pups was significantly lower (mean 82.02 ng/ml \pm 33.16) in 2000 than in the following year (mean 107.66 ng/ml \pm 20.24) . A similar trend occurred in Southeastern pups with cortisol in 2000 significantly lower than in 2001. In 2001, an additional sampling protocol provided samples from Russian pups that were higher than the Western pup concentrations.

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