HYPERVITAMINOSIS D IN FELIDS FOLLOWING FEED CONTAMINATION

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Abstract

Routine vitamin D evaluation of a serum sample collected in late March 2019 from a cheetah at Busch Gardens Tampa Bay revealed highly elevated levels of 25-OH vitamin D (838 nmol/L). Currently, serum 25-OH D3 levels > 400 nmol/L are considered indicative of hypervitaminosis D. Lab analysis error, over-supplementation, consumption of a D-containing rodenticide, or feed contamination were considered potential causes. We immediately alerted our feed manufacturer that there could be a potential issue, sent banked portions of the original sample to two labs for confirmation, sent samples of the diet in for vitamin D analysis, and began testing other felids to evaluate the extent of the issue.

The testing of the initial cheetah sample at a new lab and a repeat sample sent to the original lab revealed similarly high levels, indicating it was likely not a lab error. Because most of our cats are trained for voluntary blood draws, we were able to quickly get blood samples from 3 different felid species located in 3 different areas of our park. All blood samples tested had elevated levels (654 ± 149 nmol/L) of Vitamin D as measured by RIA. The only food in common among all three species was the commercial feline diet. The pattern of exposure of all animals was not consistent with rodenticide exposure.

These results indicated that feed contamination, rather than lab error, rodenticide exposure or vitamin over-supplementation, was the most likely scenario. We also sent out historical banked blood samples to determine how far back the issue extended and discovered elevated blood levels in banked samples as far back as January 2019. Other zoos feeding the same diet were contacted. Several institutions sent in samples of feed for testing as well and began testing their cats.

BGT received a shipment of feed in early January 2019 that had been manufactured in December, and another in March 2019 that had been manufactured in early March. It is apparent that both lots had elevated levels. Unfortunately, no remaining sample of the January shipment was available for testing. The March feed contained 14.4 ng/g of Vitamin D3 and 18.2 ng/g of 25-hydroxyvitamin D3 as fed. The expected value of 25-OH D3 in mammalian feeds is zero.

Because 25-OH D3 is rarely used as a mammalian supplement, only as a poultry supplement for laying hens, little is known about the impacts on 25-OH D3 on mammalian systems. Diluted by the other items in our felid diets (primarily meaty bones and whole prey), our cats consumed diets containing ranging between 9-14 ng/g of 25-OH on a dry matter basis. This level of 25-OH D3 intake is below levels that are known to cause problems in laying hens (82 ng/g; Vazquez *et al*., 2017) and laboratory rats (8,364 ng/g; Shepard & Deluca, 1980). No clinical signs of hypervitaminosis including changes in urine chemistry were seen, indicating that this level of dietary 25-OH D3 did not have an immediate noticeable clinical impact on the animals. However, it was enough to cause marked elevation in serum levels. Therefore, levels of 25-OH D3 greater than 400 nmol/L may not, by themselves, be indicative of hypervitaminosis D. Excessive supplementation with 25-OH D3 may also cause high serum 25-OH D3.

Literature Cited

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