CAPTIVE UNGULATE DIETS AND DIET INFLUENCE ON URINE PARAMETERS AND UROLITHIASIS IN CAPTIVE GIRAFFE

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Ungulate Diet Survey

- 55 Zoos responded to the diet survey
- 41 species were represented in the collections from the zoos that responded
- The most prevalent species were:
  - 64% held generic giraffe
  - 34% held eastern bongo
  - \( \leq 30\% \) held the remaining 39 species.
Concentrates/Pellets

- 16 different Mazuri products reported
- 25 other types of concentrates reported
- 8 institutions have their pellets milled locally to their specifications.
Hay

- 69% of respondents fed alfalfa
- 27% fed timothy
- There were 14 other types of hay or combinations reported
Hay/Pellet Ratio

- 50 respondents reported 21 different ratios
- 9 respondents reported less pellet than hay with an avg. ratio of 1.5:6
- 12 respondents reported equal or more pellets fed than hay
- 2 of the respondents that listed more pellets than hay, had a 19:1 ratio
45 different supplements were listed.

Mineral block and Salt block were most commonly listed supplements.
Produce

- 55 Respondents
- 87% reported produce in their diets
- 13% reported no produce
- Most commonly used for training/enrichment purposes
Health Concerns

- 56% - Thin BCS
- 32% - Rumen Acidosis
- 32% - Chronic Loose Stool
- 28% - Obesity
- 24% - Rumenitis
- 20% - Bloat
- 20% - Urolithiasis
Health Concerns cont.

- 16% - Hoof issues
- 16% - Poor reproductive success
- 4% - Colic
- 4% - Laminitis
Comments

- Variety of diets is high
- Number of health concerns is high
- Ratio of concentrates to hay is a concern
Urolithiasis

- Urolithiasis – a diseased condition marked by the formation of stones in the kidney, bladder, and/or urethra that occurs in many ruminants.
- Strong dietary component association with the formation of uroliths.
- Can be fatal, especially in males due to anatomy.
- Urine parameters can be used to aid in the detection and subsequent treatment plans and diet strategies.
- Surgery can be done, but is difficult in large ruminants.
- Data suggest manipulation of diet is effective in treating/preventing urolith formation.
- Once uroliths are present, diet changes will not eliminate those present, but may slow or stop further formation.
Urine Screening

- 7 respondents check giraffe urine
- 86% of them check for crystals
- 43% check Ca/P ratio
- 43% check for the presence of blood
Oakland Zoo Case, 13 yr.-old male, urine phosphorous 30.9 mg/dl & MAP crystals in urine, stranguria, pollkakiuria & hematuria.
Oakland Zoo Case

- Immediate diet change recommended to a higher fiber diet and remove all produce and concentrates. No grain at all for 11 days.

- 2 months post diet change, animal asymptomatic and urine phosphorous = 0.2 mg/dl.
Oakland Zoo Case, 21 yr.-old female giraffe with no physical symptoms. Urine phosphorous 11.8 mg/dl and magnesium ammonium phosphate crystals in urine.
Oakland Zoo Case

- Immediate diet change recommended to a higher fiber content diet and remove all produce and concentrates. No grain at all for 11 days.
- 3 months post diet change, animal asymptomatic and urine phosphorous = 1.4 mg/dl.
DIET

1. Original Diet Oakland Zoo –
Mazuri ADF-16 (5648) & Mazuri Wild Herbivore Diet Hi-Fiber (5ZF1) at 60:40, orchard grass hay & alfalfa at 85:15, browse, sweet feed, and a variety of vegetables.

2. New Diet Oakland Zoo –
For 11 days no grain at all and removed sweet feed and produce except for romaine lettuce and carrots for training. Transitioned over 51 days to 100% Mazuri Wild Herbivore Diet Plus (5ZK4), browse, and weeds.
Nineteen Giraffes - Avg. Urine Phosphorous Levels

Average Urine Phosphorous by Individual (no diet change)

Studbook Number (Oakland animals pre-diet change indicated with *)

Urine Phosphorous mg/dl
Change in Urine Phosphorous – Individuals At Oakland Zoo

Average Urine Phosphorous by Individual Before and After Diet Change (Oakland Zoo)

Studbook Number

Urine Phosphorous mg/dl

Pre Diet Change
Post Diet Change

1722 2297 2783 2553 2263 3149
Change in Urine Phosphorous – Group at Oakland Zoo

Urine Phosphorous Levels in Oakland Zoo Giraffes Before and After Diet Change

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The bar graph shows a significant decrease in urine phosphorous levels post-diet change.
Urethra Process – 14 yr.-old male giraffe
Urethra at Sigmoid Flexure – 14 yr.-old male giraffe
CONCLUSIONS

- Diet has been shown to affect urine parameters associated with urolith formation.
- Once uroliths are present, a diet change will not cure the problem.
- A diet change may affect urine parameters and relieve symptoms related to urolithiasis in a relatively short period of time.
- Diets consisting of high fiber content (especially browse and other natural plants) and low grain concentrates may be effective in preventing urolithiasis.
References


Questions/Comments
Thanks