



Lead Exposure in Namibia: A Comparative Analysis Among Captive Cheetahs (*Acinonyx jubatus*), Wild Cheetahs, and Wild Leopards (*Panthera pardus*)



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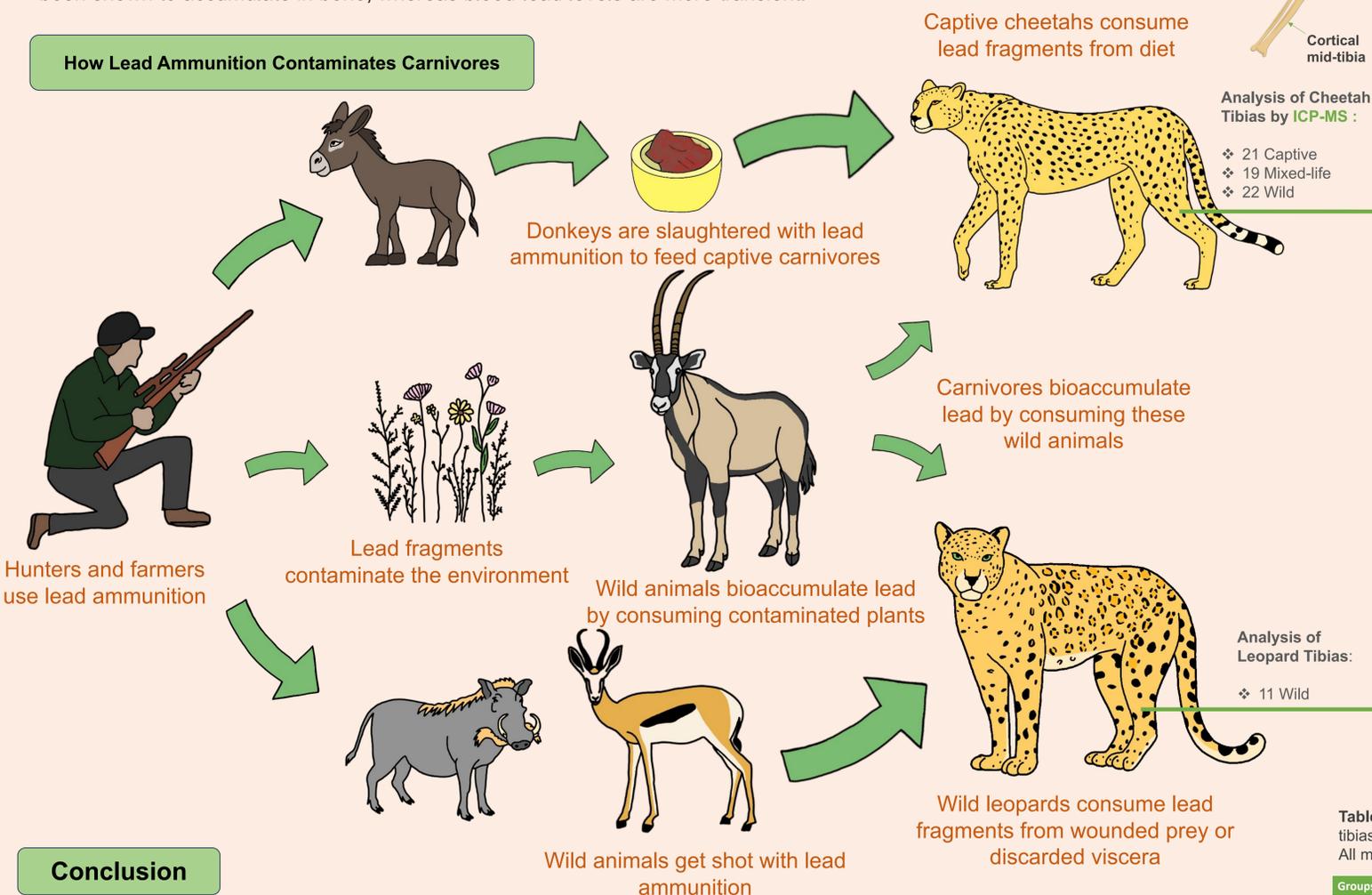
Introduction

- ❖ Cheetahs are currently classified as **'Endangered'** in Namibia and are the most widely kept large carnivore in captivity in southern Africa¹.
- ❖ In Namibia, hunting plays a substantial role in generating revenue, facilitating meat production, and contributing to conservation efforts². However, **lead ammunition** is still widely used worldwide, constituting a significant and largely unregulated source of environmental lead³. Lead contamination has serious **One Health implications**, as it detrimentally affects the local wildlife, environment, and people⁴.
- ❖ In captivity, cheetahs are predominately fed horse and donkey meat, slaughtered on local farms using lead ammunition. In the wild, **cheetahs** only consume fresh meat from the prey they hunt. In contrast, wild **leopards** are opportunistic scavengers (i.e., consume carcasses), in addition to fresh prey⁵. Carcasses often contain lead ammunition remnants, which then gets ingested by leopards and other scavengers.
- ❖ **Hypothesis 1:** Lead levels in **captive cheetahs > mixed (captive and wild) life > wild cheetahs**
- ❖ **Hypothesis 2:** Lead levels in **wild leopards > wild cheetahs**

Cheetahs and Leopards as Models

- 🐆 Cheetahs as a model for **captive carnivores**
- 🐆 Both cheetahs & leopards as models for **wild carnivores**
- Life-long exposure of lead was measured from the **mid-tibia cortex**, as lead has been shown to accumulate in bone, whereas blood-lead levels are more transient.

How Lead Ammunition Contaminates Carnivores



Results

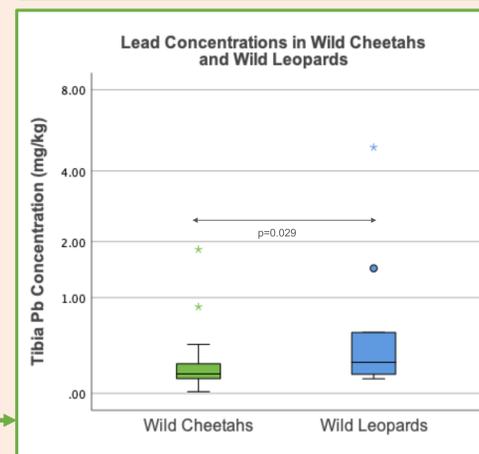
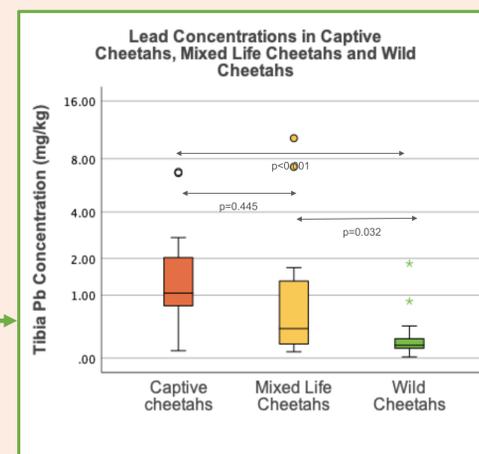


Table 1: Bone lead levels from cheetah and leopard samples from tibias collected by Cheetah Conservation Fund from 1992 to 2021. All measurements are in units of mg/kg.

| Groups | n | Mean | SD | Median | Highest value |
|---------------------|----|------|------|--------|---------------|
| Captive Cheetahs | 21 | 1.66 | 1.85 | 1.05 | 6.78 |
| Mixed Life Cheetahs | 19 | 1.47 | 2.67 | 0.38 | 10.28 |
| Wild Cheetahs | 22 | 0.27 | 0.39 | 0.15 | 1.83 |
| Wild Leopards | 11 | 1.02 | 1.56 | 0.28 | 4.93 |
| Total | 73 | 1.09 | 1.86 | 0.29 | 10.28 |

Conclusion

- Captive cheetahs had the highest bone lead concentrations, surpassing that of wild cheetahs and wild leopards.**
- ❖ The main source of lead in cheetahs and leopards therefore appears to originate from **lead ammunition (captive diet or scavenging)**.
 - ❖ Even minor levels of lead exposure have been shown to detrimentally affect **reproductive rates** and **cognitive abilities** in other species.
 - ❖ Therefore, this study emphasizes the importance of **transitioning to non-leaded ammunition** for slaughtering and hunting, to protect captive and wild carnivores and minimize lead pollution.

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References

1. Melzheimer et al. (2022), Red List
2. Brown (2021), Namibian Chamber of Environment
3. Arnemo et al (2016), Ecohealth
4. Arnemo et al (2022), Springer International
5. Butler et al. (2002), Animal Conservation Forum

Future Research

- ❖ Include **other carnivore species**, such as jackals and hyenas, that display different feeding behaviors.
- ❖ Study **environmental lead** by analyzing local plants, water, and soil & by analyzing lead concentrations in cheetahs living near lead mines.